RUSSIAN JOURNAL OF AGRICULTURAL AND SOCIO-ECONOMIC SCIENCES

ISSN 2226-1184

#10(70)

October 2017

"RJOAS is an interdisciplinary open access journal of agriculture and socio-economic studies. The journal aims at establishing a bridge between theory and practice in the fields of agriculture and socio-economic research..."

www.rjoas.com

OPEN ACCESS

TABLE OF CONTENT

Koesriwulandari, Wisnujati N.S., Judho D.P.

- CHALLENGES OF LIBERALIZATION: ASEAN ECONOMIC TRADE IN THE CASE OF FARMERS AND REGIONAL GOVERNMENT IN SIDOARJO (EAST JAVA, INDONESIA); pp. 6-12
- Crossref DOI: 10.18551/rjoas.2017-10.01

Suryana N.K., Pudjiwati E.H.

- SOCIAL EMPOWERMENT TO ACHIEVE FOOD SECURITY AT THE BORDERS: A CASE STUDY AT NORTH SEBATIK SUBDISTRICT OF NUNUKAN REGENCY (NORTH KALIMANTAN PROVINCE, INDONESIA); pp. 13-17
- Crossref DOI: 10.18551/rjoas.2017-10.02

Muchlis F., Lubis D.P., Kinseng R.A., Tasman A.

- COMMUNITY RADIO ROLES AS PUBLIC SPHERE STRUGGLING ORANG RIMBA RIGHTS FROM BUKIT DUABELAS NATIONAL PARK (JAMBI PROVINCE, INDONESIA); pp. 18-23
- Crossref DOI: 10.18551/rjoas.2017-10.03

Dzulkirom M.

- ANALYSIS ON BILLING SYSTEM IMPLEMENTATION QUALITY IN ENDEAVOR TO INCREASE CUSTOMER SATISFACTION IN IMPORT ACTIVITY: STUDY OF SURABAYA CONTAINER TERMINAL; pp. 24-32
- Crossref DOI: 10.18551/rjoas.2017-10.04

Hermawan A.F., Mulyadi L., Putranto E.H.D.

- MANAGEMENT OF SCHEDULING OPTIMIZATION OF SUPPORTING FACILITIES AND INFRASTRUCTURE DEVELOPMENT PROJECT IN THE AREA OF FOLDER AIR HITAM SAMARINDA; pp. 33-37
- Crossref DOI: 10.18551/rjoas.2017-10.05

Bafadhal A.S., Yulianto E., Siswidiyanto, Hendrawan M.R.

- CONCEPT AND MODEL OF SHARIA SALONS AND SPAS: MYTH OR REALITY? pp. 38-44
- Crossref DOI: 10.18551/rjoas.2017-10.06

Komissarova V.V.

- ANALYSIS OF LEASING ADVANTAGES AND DISADVANTAGES AS PUBLIC-PRIVATE PARTNERSHIP'S FORM IN ROAD INFRASTRUCTURE PROJECTS; pp. 45-51
- Crossref DOI: 10.18551/rjoas.2017-10.07

Lytvyn R.

- ECONOMETRIC FORECAST OF AGRIBUSINESS ACTIVITY IN CONTEXT OF FOREIGN DIRECT INVESTMENTS' ATTRACTION; pp. 52-55
- Crossref DOI: 10.18551/rjoas.2017-10.08

Krasova E.V.

- ECONOMIC AND LAW BASIS FOR FORMATION OF LOCAL BUDGET INCOMES: A STUDY ON THE EXAMPLE OF MUNICIPAL DISTRICTS AND RURAL SETTLEMENTS IN RUSSIA; pp. 56-60
- Crossref DOI: 10.18551/rjoas.2017-10.09

Astakhova E., Partida E.

- THE MAIN TRENDS OF AGRO-INDUSTRIAL COMPLEX'S DEVELOPMENT IN THE CONDITIONS OF MARKET ECONOMY; pp. 61-66
- Crossref DOI: 10.18551/rjoas.2017-10.10

Matveev V.V., Makarova Y.L., Bazarnova O.A.
- ALGORITHM OF EVALVATION AND PREVENTION OF ECONOMIC RISKS OF AGRIBUSINESS ORGANIZATIONS; pp. 67-74
- Crossref DOI: 10.18551/rjoas.2017-10.11

Al-Rawasdeh H.M., Kuzubov A.A.
- ANALYSIS OF ORGANIZATIONAL AND ECONOMIC MECHANISM IN THE MANAGEMENT SYSTEM OF AGRICULTURAL ENTERPRISES; pp. 75-80
- Crossref DOI: 10.18551/rjoas.2017-10.12

Kulikov S.P., Shchitov K.V.
- POLITICAL SUBJECTIVITY PHENOMENON OF STUDENT-AGE YOUTH; pp. 81-83
- Crossref DOI: 10.18551/rjoas.2017-10.13

Wijaya S.
- TAX ANALYSIS OF MARRIED WOMEN HAVING AN INCOME FROM ONE EMPLOYER; pp. 84-92
- Crossref DOI: 10.18551/rjoas.2017-10.14

Novikov S.V., Gavrilova I.S.
- INNOVATIVE SYSTEM MANAGEMENT MECHANISM IN THE EARLY STAGES OF INNOVATION; pp. 93-96
- Crossref DOI: 10.18551/rjoas.2017-10.15

Ayuningtyas A.K., Saleh C., Noor I.
- EMPLOYEE PROMOTION PLANNING IN ANALYTICAL HIERARCHY PROCESS PERSPECTIVE: STUDY ON NATIONAL PUBLIC PROCUREMENT AGENCY; pp. 97-106
- Crossref DOI: 10.18551/rjoas.2017-10.16

Bocharova I.Y., Rymanov A.Y.
- REMUNERATION OF TOP MANAGEMENT AND BOARD OF DIRECTORS IN RUSSIAN COMPANIES; pp. 107-115
- Crossref DOI: 10.18551/rjoas.2017-10.17

Syamsuddin
- THE INFLUENCE OF ISO 9000 AND STRATEGIC ROLE OF MSDM TOWARDS PERFORMANCE OF AN ORGANIZATION: SURVEYS AT ISO 9000 STANDARDIZED PUBLIC HEALTH CENTERS IN CENTRAL SULAWESI, INDONESIA; pp. 116-125
- Crossref DOI: 10.18551/rjoas.2017-10.18

Afrizal R., Rizkiyah N., Ismawati I.
- IMPACT OF MINANGKABAU'S OUT MIGRATION: MERANTAU TO HOUSEHOLD LABOR ALLOCATION IN WEST SUMATRA, INDONESIA; pp. 126-131
- Crossref DOI: 10.18551/rjoas.2017-10.19

Kambolong M., Sahrun
- SOCIO-ECONOMIC STUDY OF SUPLIT STONE BREAKER WOMEN IN SUPPORTING FAMILY LIFE: A CASE STUDY OF INFORMAL SECTOR STONE BREAKER WORKER IN THE NORTH MORAMO, INDONESIA; pp. 132-139
- Crossref DOI: 10.18551/rjoas.2017-10.20

Septana D., Umar H.
- INFLUENCE OF TRANSFER MOTIVATION AND TRAINING RETENTION TOWARDS TRAINING TRANSFER ON EMPLOYEE'S PERFORMANCE; pp. 140-149
- Crossref DOI: 10.18551/rjoas.2017-10.21

Fathorrahman
- THE IMPACT OF JOB PERFORMANCE AND REWARD SYSTEM AS A MEDIATOR AND MODERATOR VARIABLE BETWEEN ORGANIZATIONAL COMMITMENT AND JOB SATISFACTION OF LECTURERS AT PRIVATE COLLEGES IN EAST JAVA, INDONESIA; pp. 150-159
- Crossref DOI: 10.18551/rjoas.2017-10.22

Shashlo N.V.
- METHODICAL APPROACH TO THE FORMATION OF THE MARKETING COMMODITY STRATEGY OF AGRO-INDUSTRIAL COMPLEX AT THE REGIONAL LEVEL; pp. 160-167
- Crossref DOI: 10.18551/rjoas.2017-10.23

Arvianti E.Y., Gunawan C.I.
- PUSH FACTOR ANALYSIS OF YOUNG FARMER COMMUNITY BASED ON AGRIBUSINESS IN MALANG REGENCY OF INDONESIA: A CASE STUDY IN CURUNGREJO, WONOSARI AND PLAOSAN VILLAGES; pp. 168-176
- Crossref DOI: 10.18551/rjoas.2017-10.24

Otinova M.E.
- THE MAIN DIRECTIONS OF INTERACTION BETWEEN AGRARIAN BUSINESS AND THE STATE; pp. 177-184
- Crossref DOI: 10.18551/rjoas.2017-10.25

Shakhvatova S.A., Zaripova A.S.
- THEORETICAL ASPECTS OF COMMERCIAL BANK'S EFFICIENCY EVALUATION; pp. 185-190
- Crossref DOI: 10.18551/rjoas.2017-10.26

Kuzubov A.A.
- THE MECHANISM FOR ENSURING THE PRODUCTION OF ENVIRONMENTALLY FRIENDLY AGRICULTURAL PRODUCTS; pp. 191-198
- Crossref DOI: 10.18551/rjoas.2017-10.27

Kravchenko T.S., Sukhocheva N.A.
- FEATURES OF REALIZATION OF INNOVATIVE POTENTIAL OF FARMS IN RUSSIA; pp. 199-205
- Crossref DOI: 10.18551/rjoas.2017-10.28

Darmawan D.P., Arisena G.M.K., Utami N.W.F., Baskara I.G.K.
- MARKETING DYNAMICS MODEL OF HIGHLAND VEGETABLE COMMODITIES IN EFFORTS TO INCREASE FARMERS' INCOME; pp. 206-212
- Crossref DOI: 10.18551/rjoas.2017-10.29

Malik A., Fitri Y., Nainggolan S.
- THE STUDY OF FARMERS' ECONOMIC ABILITIES IN PALM PLANTATION IN RURAL REGENCY OF MUARO JAMBI; pp. 213-220
- Crossref DOI: 10.18551/rjoas.2017-10.30

Sudaryono T.
- ENHANCING PRODUCTION AND SALAK SUWARU FARMING INCOME; pp. 221-225
- Crossref DOI: 10.18551/rjoas.2017-10.31

Sapsuha Y., Salim M.A., Ryadin A.R.
- EFFECT OF NUTMEG (MYRISTICA FRANGRANS HOUTT) LEAVES AND CLOVE (SYZYGIUM AROMATICUM L.) LEAVES TREATMENT TO PHYSICAL AND CHEMICAL CHARACTERISTICS OF KACANG GOAT (CAPRA HIRCUS); pp. 226-231
- Crossref DOI: 10.18551/rjoas.2017-10.32

Dyatlova N.A.
- TESTING OF BIOLOGIC PREPARATIONS AND CHEMICAL FUNGICIDES ON SPRING WHEAT IN THE CONDITIONS OF THE TULA REGION; pp. 232-238
- Crossref DOI: 10.18551/rjoas.2017-10.33

Sugiyatno A., Palupi N.E.
- INTERSTOCK EFFECT ON THE GROWTH OF MANDARIN CV BATU 55, TANGERINE CV PONTIANAK AND LIME CV NIMAS PROPAGATED BY GRAFTING; pp. 239-246
- Crossref DOI: 10.18551/rjoas.2017-10.34

Mardjudo A., Yasin M.
- HOUSEHOLD ECONOMIC MODEL TO IMPROVE SMALL-SCALE FISHERMAN INCOME AT RURAL MINAPADI (RICE-FISH SYSTEM) DEVELOPMENT PROGRAM IN DONGGALA, CENTRAL SULAWESI; pp. 247-255
- Crossref DOI: 10.18551/rjoas.2017-10.35

Seregin S.V.
- EFFICIENCY OF GALEGA ORIENTALIS LAM. AS A PRECURSOR OF WINTER WHEAT; pp. 256-260
- Crossref DOI: 10.18551/rjoas.2017-10.36

Dwijatenaya I.B.M.A.
- SWEET CORN FARMING: THE EFFECT OF PRODUCTION FACTOR, EFFICIENCY AND RETURN TO SCALE; pp. 261-268
- Crossref DOI: 10.18551/rjoas.2017-10.37

Filipchuk O.D., Glinushkin A.P.
- IMPLEMINTATION OF ADAPTIVE PLANT PROTECTION FROM PESTS IN THE CONDITIONS OF SANATORIUM-RESORT ZONE; pp. 269-273
- Crossref DOI: 10.18551/rjoas.2017-10.38

Alekseev G.V., Romanchikov S.A., Leu A.G., Derkanosova A.A.
- THE EFFICIENCY OF USE OF INNOVATIVE TECHNOLOGIES FOR GRINDING THE GRAIN CROPS; pp. 274-279
- Crossref DOI: 10.18551/rjoas.2017-10.39

Onogwu G.O., Bentley B.S., Egbeadumah O.M.
- EFFECTS OF INPUT COSTS ON EGG PRODUCTION AMONG PULLET FARMS IN JOS (PLATEAU STATE, NIGERIA); pp. 280-295
- Crossref DOI: 10.18551/rjoas.2017-10.40

Korneyko O.V.
- FOREIGN EXPERIENCE OF STATE REGULATION OF ENTREPRENEURSHIP IN FISHERIES; pp. 296-300
- Crossref DOI: 10.18551/rjoas.2017-10.41

Sayuti M., Supriatna I., Hismayasari I.B., Budiadyani I.G.A., Yani A.
- NUTRITIONAL COMPOSITION AND SECONDARY METABOLITES OF «DAUN WOTON» (STERCHULIA SP.): ALTERNATIVE RAW MATERIAL FOR FISH FEED; pp. 301-305
- Crossref DOI: 10.18551/rjoas.2017-10.42

Fariedah F., Widodo S.M., Yuwanita R.
- MATURATION OBSERVATION OF GONAD IN MUDSKIPPER PSEUDAPOCRYPTES ELONGATUS FROM KALI LAMONG RIVER (GRESIK, INDONESIA); pp. 306-311
- Crossref DOI: 10.18551/rjoas.2017-10.43

Prokhorov I.P., Pikul A.N.

- CHARACTERISTICS OF GROWTH AND DEVELOPMENT OF THE SKELETON CARCASSES OF CALVES OF BLACK-MOTLEY BREED AND ITS HYBRIDS WITH ABERDEEN-ANGUS AND CHAROLAIS; pp. 312-318
- Crossref DOI: 10.18551/rjoas.2017-10.44

Kapustin A.V., Moiseeva N.V., Laishevtcev A.I., Luchko M.A., Yatsentyuk S.P., Gorbacheva N.S.

- HISTOPHILOSIS OF CATTLE; pp. 319-326
- Crossref DOI: 10.18551/rjoas.2017-10.45

Laishevtcev A.I., Kapustin A.V., Yakimova E.A., Luchko M.A., Pimenov N.V.

- ANTIBIOTIC RESISTANCE OF EPIZOOTIC ISOLATES OF MANNHEIMIA HAEMOLYTICA, ALLOCATED ON THE TERRITORY OF THE RUSSIAN FEDERATION; pp. 327-330
- Crossref DOI: 10.18551/rjoas.2017-10.46

Yatsenyuk S.P., Gorbacheva N.S., Yaralova E.A., Kozlova A.D.

- USING THE PCR METHOD TO IDENTIFY THE CAUSATIVE AGENTS OF INFECTIOUS DISEASES IN CATTLE SPERM; pp. 331-337
- Crossref DOI: 10.18551/rjoas.2017-10.47

Shabeykin A.A., Drozdova E.I., Stepanova T.V., Tenjanova V.A., Gulyukina I.A., Filimonova A.D.

- THE PREVALENCE OF TOXOPLASMOSIS IN CATS' POPULATION OF THE MOSCOW METROPOLIS; pp. 338-342
- Crossref DOI: 10.18551/rjoas.2017-10.48

Vatnikov Y.A., Sahno N.V., Medvedeva I.N., Byahova V.M., Popova I.A., Glogoleva T.I.

- PECULIARITIES OF PARVOVIRUS ENTERITIS IN DOGS; pp. 343-347
- Crossref DOI: 10.18551/rjoas.2017-10.49

DOI https://doi.org/10.18551/rjoas.2017-10.01

CHALLENGES OF LIBERALIZATION: ASEAN ECONOMIC TRADE IN THE CASE OF FARMERS AND REGIONAL GOVERNMENT IN SIDOARJO (EAST JAVA, INDONESIA)

Koesriwulandari*, **Wisnujati N.S.**, **Judho D.P.**
Wijaya Kusuma University, Surabaya, East Java, Indonesia
E-mail: wulandari_uwks@yahoo.co.id

ABSTRACT
Local governments and farmers throughout Indonesia must be prepared to meet the challenges that come with MEA. This is due to the ratification that the Indonesian government has made to become part of the MEA. The MEA aims to become the basis of primary regional market, as well as becoming the basis of primary regional production. In the end, becoming the MEA aims to develop regions that have the qualities that can compete in the global market, and a proportionate market competitiveness in a regional scale. However in reality, majorities of Indonesian farmers are low-scale and minor farmers with small lands, thus highly prone to fluctuation and changes in the price of agricultural commodity. The question is whether Sidoarjo as the one of the primary region of rice production in Indonesia, and its local government, are prepared to face the challenges that comes with MEA. This research aims to analyze how the local government of Sidoarjo prepares itself for the challenges that comes with MEA. The primary method that is used in this research is the Delphi method; the Delphi method works by collecting experts' opinions these opinions then is used to construct the policies that may be implemented to face the challenges of MEA. In the local government level of Sidoarjo and between the farmers Focus Group Discussion (FGD) was held. This research founds that Sidoarjo in facing the challenges of MEA sets innovative policies to increase food productivity, in particular food-based crop such as rice. This is done by implementing policies such as; Sustainable Farmland Policy (LP2B) written in The Act on Agriculture No. 41 Year 2009, by means of bridging a continuous coordination between the executive and legislative branch; as well as, maintaining the Regional Landscaping Plan (RTRW); assuring the government's special effort (UPSUS) in food self-sufficiency by making reparation in the irrigation system, and production facilities, land optimization, and lastly development of System of Rice by means of intensification. Also, the Movement on Implementation of Integrated Management of Crop (GP-TPP) as well as, the procurement of agricultural machinery and tools (ALSINTA).

KEY WORDS
ASEAN, economic community, government, policy, agriculture, rice.

Building a regional economic strength by creating the ASEAN Economic Community (MEA) trade bloc; enhancing regional trade competitiveness; creating a basis for free-flow goods production, services, investment, capital, skilled labor and to promote regional peace and stability, the block is formed aspiring to create EU-style single market (Asia News Monitor, 2015).

The MEA block of concessions brings consequences for Indonesia, because the MEA bloc expects the establishment of a production base; the realization of a production based can only be done if regional government provides support to food crop agriculture. An example of this can be seen in the State of India. Using technology from the green revolution program that was able to promote a sustainable growth of economic by 4 percent (Lengkap 2014). in Mumbai, India a health card is given to a land used by almost two thousand fertilizer company equipped with soil and seed testing (Lengkap 2017). In Vietnam, the government conducted a dam construction in order to rectify the production of rice in the city of Praja Yedse. Indonesia as the world's fourth most populous country; agriculture plays an important role this is because half of the total employment is agricultural work, and it

accounts for about a fifth of the Gross Domestic Product, agriculture remains challenging (Syuaib 2016). Policies that can encourage the establishment of agricultural production base in Sidoarjo revolves around the procurement of high yielding and disease-resistant seeds. The policy of agricultural technology implementation is not an arbitrary approach but it is the responsibility of the state in order to minimize losses of trade as well as responding to consumers' demands; increasing public investment in the field agricultural development, furthermore, universities are expected to support the development of agriculture by conducting research as part of the development projects to improve agricultural productivity on certain commodities.

From the descriptions above, the role of the government is significant in order to support agricultural development, next is the issue on how prepared is the local government of Sidoarjo in anticipating the challenges of MEA.

METHODS OF RESEARCH

Method of Determining Location. The location of this research is chosen purposively (purposive) in the regency of Sidoarjo due to it being one of the regions that produce rice as a commodity in East Java.

Method of Determining Sample. In determining sample for this study, purposive sampling method is used by the researcher; by gathering samples from experts on the field of agriculture such as the Department of Agriculture of East Java, and the Centre for Agricultural Technology Assessment, as well as, the University of Wijaya Kusuma.

Method of Data Retrieval. The Delphi technique is used due to its advantage and capability of a more in-depth data retrieval; where in this instance questionnaire is required to be conducted multiple times. The questionnaire is intended and given to the experts and farmers by means of interview using prepared questions, as well as, Focus Group Discussion (FGD) between the local government and the farmers.

Type of Data. There are two types of data collected, which are: primary and secondary data. In order to collect the primary data, the researcher conducted an interview directly with the respondents; the tool that is present in this activity is questionnaires. The secondary data is collected from the statistics provided by the local statistical institutions and other related institutions (e.g., The Agricultural Department and Service of Sidoarjo and The Office for Food Security).

Method of Data Analysis. By using the Delphi method, which is expected to create solutions for priority development, in readying the farmers' and local government's perception for the effects of MEA.

RESULTS AND DISCUSSION

There are a few findings that this research has successfully unveil: A. The challenges faced by the Regency of Sidoarjo on Development of Food Crop Agriculture, B. Perception of Farmer from the Regency of Sidoarjo towards the Economic Community of ASEAN, and C. Agricultural Development Funding Policy of the Sidoarjo Regency and how it faces ASEAN Economic Community (MEA), lastly, D. The result from the Delphi analysis from the experts.

The challenges faced by the Regency of Sidoarjo on the Development of Agricultural Food crops are as such: a. The narrowing of usable farmland; b. The sluggish growth of the Regional Domestic Product Income Growth (GRDP) from the agricultural sector; c. Supporting agricultural facilities and infrastructure, d. Food availability against the result of production within the regency of Sidoarjo; e. The result of production against the consumption rate of Sidoarjo regency; f. The recent function switch of Bulog. The results of this research will be further elaborated as followed.

The Narrowing of Usable Farmland. Due to the recent conversion of usable farmland to non-agricultural land (e.g., residential area). The Sustainable Agriculture Farm (LP2B) program is aimed at maintaining food security. The regency of Sidoarjo has provided an area equivalent of 12,206 ha however the government of East Java Province wants those land to

be used for the preparation of Juanda Airport city in Buduran and Sedati sub-districts. causing the Sidoarjo regency to have only 7,000 hectares of LP2B land. According to research conducted in Tanzania, that results of fragmentation also provides advantages of growing many environmental zones, minimizing production risks and optimizing cropping activities (Reuben et al. 2017)

To support food security in the regency of Sidoarjo a statute may be implemented which is Statute No. 49 of 2009. The only problem is that it cannot be applied in the regency of Sidoarjo, this is due to the lack of personalized data collection of the name and address of the farmer. Again, this is due to the owner of the farmland being outside of the regency of Sidoarjo in the time of data collection, or the farmland is being managed by someone that is not the original owner, furthermore this is exacerbated by the current user of the farmland not knowing the address of the original owner.

Implementation of Statute No.49 of 2009 is still unclear, especially regarding the value of compensation that are received by farmers, this causes farmers to feel at loss. In the District of Buduran more farmers are inclined to sell their land due to it often does generate a substantial amount of profit, in addition the salary that it requires to compensate the workers is quite substantial since many of the workers are brought outside of the regency (e.g., Jombang).

The Growth of GDP within the Regency of Sidoarjo. The picture shows the growth of PDRB Subsector of Agriculture and Husbandry of the regency of Sidoarjo from the year of 2010-2015 (%).

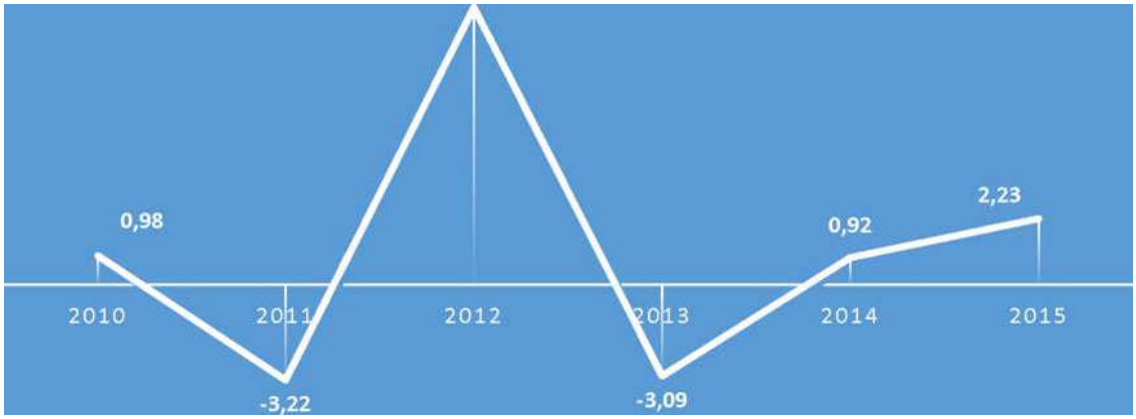


Figure 1 – GDP Growth Subsector Agriculture and Husbandry District Sidoarjo, 2010-2015 (%)
Source: BPS Sidoarjo Regency

GDP growth from the agricultural and livestock subsectors in 2012 to 2015 fluctuates, the largest growth can be seen in 2012 and in 2013 its growth seems to slow down.

In the theory of government expenditure written by Ferry Prasetya (Prasetya 2012) states that every member of the society wants material and spiritual prosperity, and the Government aims to achieve the wishes of society. In northern Romania the position of agricultural sector contribution occupies a secondary position, however the sector appears to support the industry sector. The development of the agricultural sector; increasing the skills of the farmers to better the industry in order to overcome rural poverty (Tefan and Coca 2015).

On the other hand, a research in Nambia shows that the government is responsible for improving the technical and the organizational capacities such as farmers associations, groups, and cooperatives; improving the ability to develop business plans and proper recordings (Zuwarimwe et al. 2014). It is necessary to prepare a roadmap for the development of agriculture through irrigation development, in land development that will become a reference in the implementation of agricultural development of dry land, that can support food self-sufficiency (Pangan, Kemampuan, and Pangan 2015).

Agricultural Facilities and Infrastructure. The regency of Sidoarjo designates several other development priorities besides agriculture (i.e., food crops, fish and shrimp ponds, as

well as industry) the problem lies in which development should be prioritize. The food crop sector needs enough water for irrigation but other priority is industry. Gedangan sub-district is not expecting any water from the river that flows in the region, so it makes the efforts to control the water nearby abundant source of water. This is as in the case by (Pangan, Kemampuan, and Pangan 2015) that in development of irrigation, it is necessary to formulate a scaffolding prior to the execution of plan.

In the year 2016 a flooding happened that flooded the industrial areas of the regency (District Gedangan, and Tambak area in District Sedati). Learning from this experience, the disaster was caused by an overflow from a river in the Mojokerto regency there was an effort to reduce the flow that leads to Sidoarjo (i.e., from Balongbendo diverted to small river area of Tawangsari with reason for drinking water supply (PDAM), its impact is Sukodono District, sub district of Buduran and lack of water.

Farmers in both areas of the village experienced no obstacles such as the availability of Fertilizers and Seedlings as well as infrastructure issues, not experiencing any water constraints. Farmers in the area also have a way of testing the seeds in which they see the first harvest, if the crops are good they will use the seeds from the first harvest, because they think the seedlings have the resilience and adaptation of the soil in the village area.

The main obstacle in these two villages is damage by attacking pests on the roots of rice commonly called "SUNDEP" damaging the roots and making the dead rice plants. It is also experienced by them when SUNDEP seeding has attacked the prospective rice seedlings.

The obstacles that almost all farmers perceive in these two areas are the value / cost of production and the result is less balanced or almost cuman break event point (behind the capital)

From the results of this study then farmers should be given socialization about the MEA, because the success of development in Sidoarjo regency apart from determined by the government apparatus but also support the public and private (BAPPEDA 2013) in the opinion (Moorthy and Benny 2012) that public opinion is essential to provide legitimacy of the ASEAN integration process.

Availability of Food to Production Results of Sidoarjo Regency. In terms of quantity of production continues to increase, decreased in 2013 increased again in 2014. Food production in Sidoarjo regency when compared with the availability is still low, so the number of food imports from outside the region tends to increase.

Results of Production Against Consuming Needs of Sidoarjo Regency. The following figure describes the results of food production on Consumption needs from Start of 2010 to 2015.

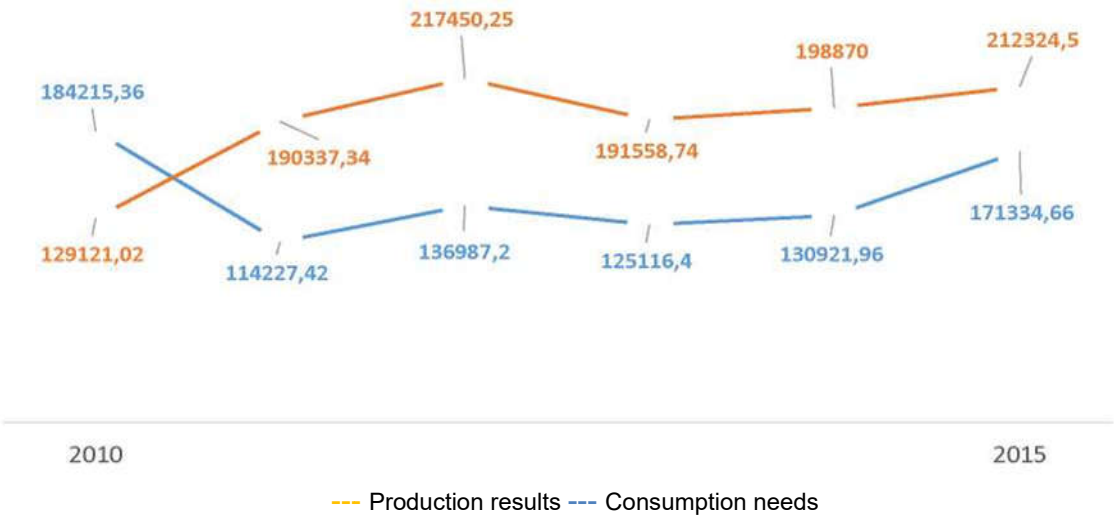


Figure 2 – Production Results on Consuming Needs of Sidoarjo Regency, 2010-2015
Source: Food Security Agency of Sidoarjo Regency

Based on the data above there is a distance between food production to food needs, In the picture shows that consumption is greater than the production it is necessary to meet the consumption of rice from outside Sidoarjo regency. To achieve self-sufficiency in food and the fulfillment of food needs hence the acceleration of food productivity area.

Bulog switch function. Bulog (Agency for Logistics Affairs) Indonesian government established agency usually able to accommodate rice farming during harvest season, but now BULOG switch function is no longer able and willing to buy paddy farmer, this of course make farmer feel confusion, farmer hard sell product, there is a certainty of price and uptake of their production. But the function of BULOG's role started on January 20, 2003 is due to pressure from the community to make BULOG more transparent, and accountable to food policy in particular and government policy in general (Rashid et al. 2008).

Perceptions of Farmers of Sidoarjo Regency in the ASEAN Economic Community. From the results of Focus Group Discussion (FGD) on Farmers In Buduran District Dukuh Tengah Village, Damarsi Village and Sukodono District Cangkringsari Village Gained the fact that farmers do not understand what is meant by the ASEAN Economic Community (MEA), the role of farmers on the liberalization of MEA, socialization of the MEA, assistance given to farmers in facing the MEA and in what year the MEA is signed and implemented.

If on the question of readiness of the farmers with the MEA, they assume MEA no impact for farmers. Annual production results do not experience significant fluctuations. Most of the crops are sold to middlemen and almost all villages in Sidoarjo do not have rice granaries. Types of varieties used are ir 64. Ciherang, commonly used by farmers in the village of middle dukuh and damarsi.

Agricultural Development Funding Policy of Sidoarjo Regency Facing the ASEAN Economic Community (MEA). In Macroeconomic Theory, Government expenditure / local government investment on development aims to improve the welfare of the community. Every member of society wants a material and spiritual prosperity, meaning fulfilled security, justice and prosperity (Prasetya 2012) Expenditure of regional government in agriculture sector will strengthen agricultural development, both in the field of facilities and infrastructure, human resources and credit in the peasant society, investments and government spending have a strategic role.From the results of research Sidoarjo Regency Government uses agricultural investment in equipment and machinery, Irrigation road and land as listed below.

Table 1 – Average Regional Balance Sheet of Sidoarjo Regency Budget 2016 (In Million Rupiah)

No	Uraian	Jumlah	Rata Rata Pertumbuhan (%)
1	Peralatan dan Mesin	744.700	13,70
2	Jalan Irigasi dan Jaringan	2.500.373	11.15
3	Tanah	2.072.670	5.41

In line with research from Olowoparoku et al about the Government of Nigeria's aid (John et al. 2017) to farmers, research shows that agricultural development undertaken is constrained due to staff shortages, low education, poor supervision, less publicity. Sidoarjo regency also uses government fund allocation for irrigation, this is in line with research from Udama in Negeria (Uduma, Samson, and Mure 2016), Sidoarjo District Government need to be noted that the research results indicate that the policy runs alone or ego sectoral, consistent, overlapping oversight, mandate duplication, improper rice markets and relatively high production costs at the farm level so it is necessary to improve the policy of coordination at the level of government agencies.

Kabupaten Sidoarjo Using funding in the land with an average growth of 5.41 percent, meaning that the PEMDA Sidoarjo is seriously allocating funds on agricultural land.

Productivity of Rice / Rice in Sidoarjo District 2010-2015 (kw / ha). The following figure describes the achievement of paddy productivity annually from 2010 to 2015. Based on the figure of achievement each year the productivity of rice tends to increase, in 2010 to 2014 ranged 65-66 kw / ha, and increased in 2015 that is 73.93 kw / ha.

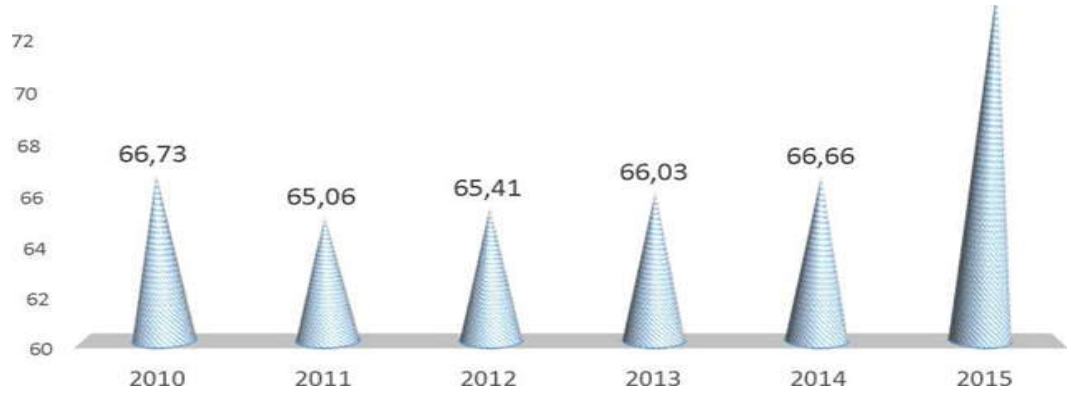


Figure 3 – Productivity of Rice / Rice in Sidoarjo District 2010-2015 (kw / ha)

Sidoarjo in Food Crop Development and Facing MEA. The policy applied in Sidoarjo regency cannot be separated from the policy of the Government above that is East Java Province, Sidoarjo Regency Agricultural Development policy is expected to implement several items, namely:

Irrigation is attempted to use irrigation water optimally;

The cropping index is attempted to increase from 1x to 2x;

Varieties of seedlings planted are usually relatively long (4 months or 110 days) then it is expected to use varieties aged only 80 days;

Pest prevention in rice crops, conducted spot stop ie pest management by eradicating pests of disease in the area of attack (Spot) and in the stop (this) reduces the cost and efficiency of pesticide use and reduce environmental damage;

Utilizing assistance from East Java Province which aims farmers can make organic fertilizer, the aid is a tool called APPO (organic fertilizer maker). Assistance in channel per Kecamatan each District get 3 tools and, price peralat is Rp. 25.000.000,-;

the question as to whether the aid is useful, because in the study of land size, type of ecosystem, type of soil tillage, education, age and incomes in chemical fertilizers in Nigeria

Improvement of agricultural technology to farmers, to cope with the decline of agricultural production but the problem arises that farmers are not skilled farmers because Sidoarjo regency in particular and generally farmers in East Java have aged. Older farmers will find it harder to operate agricultural technology than young farmers, whereas today's agriculture has been left behind by young farmers.

CONCLUSION

From the results of research then it can be concluded as follows: inputs on agricultural development such as irrigation, agricultural land needs to be optimized; increasing the application of technology Production needs to combine cropping index in striving to increase from 1x to 2x, varieties of seedlings planted relatively short, pest prevention, farmers are able to make organic fertilizer; improvement of agricultural technology to farmers.

ACKNOWLEDGEMENTS

Thank you to the Minister of Research and Technology (MENRISTEK) of Higher Education (DIKTI) of the State of Indonesia for funding assistance in this Applied Products research grant, which uses funds in fiscal year 2017, with contract number No.08/LPPM/UWKS/V/2017.

REFERENCES

1. Bappeda. 2013. “Kabupaten Sidoarjo.”: 1–6. http://bappeda.jatimprov.go.id/bappeda/wp-content/uploads/potensi-kab-kota-2013/kab-sidoarjo-2013.pdf

2. Ayodeji J. et al. 2017. “Challenges of Oyo State Agricultural Development Program For Rural Farmers in Oyo State , Southwestern Nigeria.” 5(1): 8–12.
3. Lengkap, Teks. 2014. “Bioagri Experts Welcome Budget Allocations for Technology , Capacity Building.”: 11–12.
4. 2017. “Budget 2016 Focus on Agriculture and Farmers â€™ Welfare.”: 2015–17.
5. Moorthy, Ravichandran, and Guido Benny. 2012. “Is an ‘ASEAN Community’ Achievable?” Asian Survey 52(6): 1043–66.
6. Pangan, Terhadap Kemandirian, Memperkuat Kemampuan, and Swasembada Pangan. 2015. “Dukungan Pembangunan Irigasi Dan Lahan Kering Terhadap Kemandirian Pangan Nono Sutrisno Dan Nani Heryani”: 30–48.
7. Prasetya, Ferry. 2012. “Modul Ekonomi Publik Bagian V: Teori Pengeluaran Pemerintah.” Universitas Brawijaya Malang: 1–36.
8. Rashid, Shahidur, Ashok Gulati, Ralph Waldo Cummings, and Ralph Cummings Jr. 2008. “From Parastatals to Private Trade: Lessons from Asian Agriculture.”: 253-NaN, 253. http://search.proquest.com/
9. Reuben, M. J. Kadigi et al. 2017. “Land Fragmentation, Agricultural Productivity and Implications for Agricultural Investments in the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) Region, Tanzania.” Journal of Development and Agricultural Economics 9(2): 26–36.
10. Syuaib, M. Faiz. 2016. “Sustainable Agriculture in Indonesia: Facts and Challenges to Keep Growing in Harmony with Environment.” Agricultural Engineering International: CIGR Journal 18(2): 170–84.
11. Uduma, Bernadette Ugalahi, Olajide Adeoye Samson, and Uhunamure Agbonlahor Mure. 2016. “Irrigation Potentials and Rice Self-Sufficiency in Nigeria: A Review.” African Journal of Agricultural Research 11(5): 298–309. http://academicjournals.org/journal/
12. Zuwarimwe, J, M.Y Teweldemedhin, E Nafele, and M Katjiua. 2014. “Comparative Analysis of Small Scale Irrigation Schemes Government Funded and Private Small Scale Community Project in Namibia.” Journal of Development and Agricultural Economics 6(3): 59–64.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.02

SOCIAL EMPOWERMENT TO ACHIEVE FOOD SECURITY AT THE BORDERS: A CASE STUDY AT NORTH SEBATIK SUBDISTRICT OF NUNUKAN REGENCY (NORTH KALIMANTAN PROVINCE, INDONESIA)

Suryana Nia Kurniasih*, **Pudjiwati Eko Hary**
University of Borneo Tarakan, Indonesia
*E-mail : zlynia@gmail.com

ABSTRACT
Food security plays strategic role in national development. Food security does not only mean adequate food availability, but also ability to access (including purchase) foods and does not refer to food-dependent upon anyone. Excessive food availability, which is not accompanied with sufficient access to foods and optimal absorption of foods, will create food scarcity. The area of North Sebatik Subdistrict is divided into two parts, however, a part belongs to Indonesia area and the other one belongs to Malaysia. This island is one of outer islands, which should become the main priority of development due to it borders on the neighboring country. Foods become very crucial problem due to they do not only affect on human resources quality, but also on national defense. Social empowerment could be encouraged by improving human resources capacity in order to create and raise income of the household through farming activity. Objectives of the research were to analyze the empowerment level and to analyze food security level at North Sebatik Subdistrict. The research used both qualitative and quantitative approaches in order to catch the essence of facts and social problems accurately. Results of the research showed that social empowerment (farmers) level at North Sebatik has scored 2 on average and considered as moderate criteria. Moreover, food security of the society (farmers) at North Sebatik also has scored 2 on average and considered as moderate criteria.

KEY WORDS
Social empowerment, food security, food, borderline.

Food security does not only mean adequate food availability, but also ability to access (including purchase) foods and does not refer to food-dependent upon anyone. Excessive food availability, which is not accompanied with sufficient access to foods and optimal absorption of foods, will create food scarcity (Mun'im, 2012). Husodo (2002) suggested comparison between food production volume and numbers of population, which does not mean that none may experience lack of foods, however, foods problem has nothing to do with production availability, but it relates to distribution and access to foods.

The area of North Sebatik Subdistrict is divided into two parts, however, a part belongs to Indonesia area and the other one belongs to Malaysia. This island is one of outer islands, which should become the main priority of development due to it borders on the neighboring country. Sebatik Island has much potency of diverse sectors, such as agriculture, plantation, fishery, and tourism.

Empirical facts showed that almost the whole main necessities of the people at Sebatik Island depend on supplies from Malaysia, and of course, it may threat food security and national defense. In accordance with the Government's Regulation Number 68 in 2002 about Food Security, efforts to realize the national food security should be based on local food resources that have high variability among regions and should avoid any dependence of imported-foodstuff. In order to bring the food security into reality, all sectors should play their roles actively and well coordinate with Central Government, Provincial Government, Municipal Government, Local Government at Village level, and society to improve and realize the national defense. Objectives of the research were to analyze social empowerment (farmers) in order to achieve food security at the North Sebatik Subdistrict and to analyze food security level of the society (farmer) at the North Sebatik Subdistrict.

LITERATURE REVIEW

Social Empowerment. Empowerment refers to ability to participate in taking opportunity and, or to access the required resources and services in order to improve quality of their lives. Society is the actor in relation to their ideas as basis for local, regional, and national development programs (Mardikanto, 2010). In development, social empowerment is very crucial due to it protects social interest (Galié, 2013).

Social empowerment means developing social ability to be self-supported and have skills to overcome their own problems by strengthening social ability to get involved in each process of development dynamically (Sugiyanto, 2010) and becomes a tough device for problem-solving (Kasmel, 2011).

Wrihatnolo and Dwidjowijoto (2007) suggested that the process of empowerment has three stages as follow:

Awareness refers to “enlightenment” given to the potential target by awakening them that they have right to have something;

Capacity building refers to the targets should have ability first before they are given authority or power;

Empowerment refers to the targets that have been given power, authority, or opportunity in accordance with quality of their skills.

Empowerment as a theoretical form could be traced from a humanitarian and educator, Freire, who stated that a plan to free the suppressed people in this world is through education (Hur, 2006). Empowerment may be applied by increasing access to resources, improving social ability, and strengthening the institution (Westendorp, 2013). Langerodi (2013) suggested that factors, which affect empowerment, are age, capital, training, and problem-solving. Meanwhile, Babu (2013) stated that the empowerment components include knowledge, decision-making, and self-confidence.

In general, indicators of social empowerment include welfare, access, and participation, bravery to take risk, awareness and decision-making. Indicators of empowerment level as direct and indirect consequences of social empowerment program, based on results of research by Firmansyah (2012) suggested four parameters of social empowerment levels, such as (1) awareness and willingness to change (power within); (2) ability to increase capacity to get access (power to); (3) ability to overcome obstacles (power over); ability to establish cooperation and solidarity (power with).

Food Security. Laws on Foods No 18 in 2012 define food security as condition of food fulfillment for the country and personal, which reflected from sufficient food availability, both quantity and quality, safe, variety, nutritious, evenly, and achievable, as well as not incompatible with religion, faith, and socio-culture to live healthy, actively, and productive continually.

Objectives of food security must be oriented to achieve right fulfillment for foods, increase quality of human resources, and national food security. The operation of such food security system highly depends on policy and performance of the economic, social, and political sectors. The government’s policies in economic, social, and political aspects affect on food security. Food security development must be viewed as a part of national defense concept. Therefore, the government should push the food security development through programs, which really could strengthen food security and increase social welfare (Kompasiana, 2013).

Basically, national food policies comprise of: (1) efficient growth in foods and agricultural sectors; (2) improving income distribution, particularly in creating efficient work opportunity; (3) nutrient status that conform to the whole populations by fulfilling their basic necessities; (4) sufficient food security to face any fluctuation of production, prices, income, and possibility of unavailable foods supply (Darmawan, 2011). Food security levels may be measured using some indicators. Indicator of food security in regional level is different from indicator of food security in household level. Mun’im (2012) suggested the differences as follow:

Table 1 – Different Indicators of Regional Foods Security and Food Security in the Household

Variable of Food Security	Indicator	
	Regional	Household
Food availability	Normative consumption ratio Average consumption of calorie per capita per day Average consumption of protein per capita per day	Produce the food by themselves Purchase the foods Food aid Food reserves
Food accessibility	Percentage of not poor people Percentage of average expenses of the households for non-foods consumption Percentage of villages, which are passed through by 4-wheels vehicles Percentage of villages for market access	Income of the head of family Income of the wife Income of the family's members Allocation of income for foods Allocation of income for non-foods
Food absorption	Percentage of households, which consume water Percentage in using toilet Percentage for head of family who graduates from Junior High School Percentage of households that have access to health service facilities	Adequacy of energy Adequacy of protein Adequacy of vitamin Foods diversity

Sources: Mun'im (2012).

METHODS OF RESEARCH

Based on objectives of the research, mixed methods were used by combining both quantitative and qualitative approaches. The research was conducted at North Sebatik Subdistrict of Nunukan Regency. Sebatik Subdistrict locates at the East end of Nunukan Regency and it lies at Sebatik Island, which is divided into two areas, a part belongs to Indonesia, and the other part belongs to Sabah, Malaysia. Data of the research comprises of primary and secondary data. Data of the research was collected through some methods, such as: observation in the field, interview, questionnaire distribution and deep interview. Populations of the research were members of the farmer groups, 195 farmers, at the North Sebatik Subdistrict. Samples were taken using Simple Random Sampling technique with 65 farmers as the sample. Data analysis used scoring.

Table 1 – Indicator and Parameter of the Research

No	Indicator	Parameter
1	Social empowerment	Awareness and willingness to change (power within) Ability to increase capacity to get access (power within) Ability to overcome obstacles (power over) Ability to establish cooperation and solidarity (power with)
2	Food security	Food availability Food accessibility Food absorption

RESULTS AND DISCUSSION

Social Empowerment Level. General objective of such empowerment programs was increasing social empowerment and self-support by improving productivity of farming operation in order to increase income and social welfare. Based on results of the research, social empowerment level of the farmers on food security at the North Sebatik Subdistrict is considered moderate. Moreover, average scores of the farmer's empowerment are presented in Table 2.

Based on Table 2 above, indicators of social empowerment in food security can be viewed from awareness and willingness to change behaviors in order to fulfill the needs for foods, ability to increase capacity to get access by increasing income, ability to face and overcome any obstacle in order to fulfill the needs for foods, as well as ability to cooperate.

Results of the research showed that average scores for awareness and willingness to change are 3, which are categorized high. Low farmers' empowerment in management farming aspect is determined by quality of program implementation, weak role of the assistant, low environmental support and access, as well as improper learning process of the farmers and characteristics of the farmers (Aminah et al. 2015). Meanwhile, Laily (2014) suggested that factors, which affect farmers' empowerment in increasing food security, include quality of human resources, lack of farming machineries and governmental assistances.

Table 2 – Average Scores of the Farmer's Empowerment on Food Security at North Sebatik Subdistrict

No	Description	Frequency (people)			Average Score	Criteria
		High	Moderate	Low		
1	Awareness and willingness to change	53	12	-	3	High
2	Ability to increase capacity to get access	35	30	-	2	Moderate
3	Ability to overcome obstacles	-	65	-	2	Moderate
4	Ability to cooperate	65	-	-	3	High
	Mean				2	Moderate

Source: Primary Data Processing, 2017.

Food Security Level. Food security level refers to ability of the household to fulfill the needs for foods whether from foods availability, food accessibility, and food absorption aspects. Based on results of the research, food security at the North Sebatik Subdistrict was categorized moderate on average. Scores and criteria for each aspect of food security are presented in Table 3 below.

Table 3 – Average Scores of Food Security at the North Sebatik Subdistrict

No	Description	Frequency (people)			Average Score	Criteria
		High	Moderate	Low		
1	Food Availability	-	65	-	2	Moderate
2	Food Accessibility	65	-	-	3	High
3	Food Absorption	31	22	12	2	Moderate
	Mean				2	High

Source: Primary Data Processing, 2017.

Table 3 presents that the highest score of those three food security aspects is food accessibility, score 3 and has high criteria; meanwhile, the other aspects, food availability and food absorption have scored 2 and have moderate criteria. Food accessibility is viewed from the access in fulfilling the needs for foods. Such access refers to social earnings, which are used to buy foods for about Rp 4,000,000 per month on average, accessible transportation to markets and foodstuff stores, good roads condition at the North, as well as some respondents have motorcycles and cars for their transportation. According to Rosyadi and Purnomo (2012), ability of the households to have access to foods is reflected on their expenses segment to buy foods. Correlation between expenses segment for foods and total expenses of the households are so-called working law. Such law states that the expense segment for foods has negative correlation with total expenses of the households. The higher expenses segment for foods, the lower food security of the household will be.

CONCLUSION AND RECOMMENDATIONS

Based on results of the research, it can be concluded that social empowerment and food security (farmer) at the North Sebatik Subdistrict have average score of 2 and moderate criteria. Social empowerment programs, which are intended to increase food security, should be implemented in accordance with the social needs and not only for building efforts, but also building both institutions and environments. Coordination between stakeholders/the interest

parties should be built in implementing the agricultural development in order to increase food security at the borders.

REFERENCES

1. Aminah, Siti, 2015. Strategy in Increasing Empowerment of the Small Farmers toward Food Security (Strategi Peningkatan Pemberdayaan Petani Kecil menuju Ketahanan Pangan). Journal of Sociohumaniora. Volume 18. No 3rd November 2015, 253-261.
2. Babu, G. P., Kadian, K. S., Kumar, N. S., & Sankhala, G. 2013. Empowerment of dairy farmers through ICT enabled I-kisan project in andhra pradesh. International Journal of Agriculture, Environment and Biotechnology, 6(4), 685-690.
3. Galié, A. 2013. Empowering Women Farmers: The case of Participatory Plant Breeding in Ten Syrian Households.Frontiers, 34(1), 58-92,136.
4. Hur, Man Hyung. 2006. Empowerment in Term of Theoretical Perspectives: Exploring a Typology of the Process and Components across Disciplines. Journal of Community Psychology. 34(5). 523-540.
5. Kasmel, A., & Andersen, P. T. 2011. Measurement of community empowerment in three community programs in rapla (estonia).International Journal of Environmental Research and Public Health, 8(3), 799-817.
6. Kompasiana. 2013. National Alert against Utilization of Wastelands Will Create Food Security (Kewaspadaan Nasional terhadap Pemanfaatan Lahan Terlantar Dapat Mewujudkan Ketahanan Pangan).
7. Mardikanto, T. 2010. Concepts of Empowerment. UNS Press, Solo.
8. Laily, Sean Fitria Rohmawati. 2014. "Farmers' Empowerment in Increasing Food Security (A Study at Betet Village of Ngronggot Subdistrict, Nganjuk Regency) (Pemberdayaan Petani dalam Meningkatkan Ketahanan Pangan (Studi di Desa Betet Kecamatan Ngronggot Kabupaten Nganjuk)." Journal of Public Administration 2.1 (2014): 147-153.
9. Langerodi, M. C. 2013. Farmers' Empowerment in Dicators Modeling in Mazandaran Province, Iran. International Journal of Agriculture and Crop Sciences, 5(7), 769-776.
10. Mardikanto, Totok. 2010. Communication of Development. Reference for Academician, Practitioner, and Devotee of Developmental Communication. UNS Press. Solo.
11. Mun'im Akhmad 2012. Analysis on the Effects of Foods Accessibility and Absorption on Food Security at Regency that Has Food Surplus: Partial Last Square Path Modeling Approach (Analisis Pengaruh Faktor Ketersediaan Akses dan Penyerapan Pangan terhadap Ketahanan Pangan di Kabupaten Surplus Pangan: Pendekatan Partial Last Square Path Modelling). Directorate of Production Balance (Direktorat Neraca Produksi. BPS. Jakarta. Journal of Agroeconomy. 30(1) Mei 2012 :41:58.
12. Presidential Regulation No 22 in 2009. Policy on Acceleration of Local Resources-Based Consumption Diversities (Kebijakan Percepatan Penganekaragaman Konsumsi Berbasis Sumberdaya Lokal).
13. Rosyadi, Imron. "Food security of the households at the isolated villages (Tingkat ketahanan pangan rumah tangga di desa tertinggal)." Journal of Developmental Economy: A Review on Economic Problems and Development 13.2 (2012): 303-315.
    Sugiyono. 2012. Methods of Quantitative, Qualitative Research and R&D (Metode Penelitian Kuantitatif Kualitatif dan R&D). CV Alfabeta. Bandung.
14. Laws No 18 in 2012. About Foods.
15. Widjajanti. Kesi. 2011. Social Empowerment Model (Model Pemberdayaan Masyarakat). Journal of Developmental Economy. 12 (2), 15-27.
16. Wrihatnolo RR, 2007. Empowerment Management: Introduction and Guidance for Social Empowerment (Manajemen Pemberdayaan: Sebuah Pengantar dan Panduan untuk Pemberdayaan Masyarakat). Jakarta: PT. Elex Media Komputindo. Gramedia Groups.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.03

COMMUNITY RADIO ROLES AS PUBLIC SPHERE STRUGGLING ORANG RIMBA RIGHTS FROM BUKIT DUABELAS NATIONAL PARK JAMBI PROVINCE, INDONESIA

Muchlis Fuad[1]*, **Lubis Djuara P.**[2], **Kinseng Rilus A.**[2], Lecturers
Aulia Tasman[3], Professor
[1]Faculty of Agriculture, University of Jambi, Indonesia
[2]Graduate School of Bogor Agricultural University, Indonesia
[3]Faculty of Economics and Business, University of Jambi, Indonesia
*E-mail: fuadm_orange@yahoo.co.id

ABSTRACT
The objective of the research is analyzing the roles of alternative media of community radio in struggling public rights of Orang Rimba in Bukit Duabelas National Park-Jambi. It is done by using case study method and analyzed by using qualitative method. It is located at south of Bukit Duabelas National Park or administratively located at Bukit Suban Village, Air Hitam, Sarolangun regency Jambi province. The results of the research explain that Benor FM as community radio for Orang Rimba which has roles as facilitating media and public sphere for them in struggling freedom for stating public opinion and creating public plan. Practically, Benor FM formulates and states widely some of Orang Rimba bussiness which is often ignored by representation institute, like struggling in conservation effort, emansipatoris, dan struglling to get public rights.

KEY WORDS
Benor FM, alternative media, Orang Rimba, community radio, public sphere.

Communication patterns which is top down and no democracy, still be a general issue happened in Indonesia, especially in village area. Teh result of the research of national communication and information institute in 2002, as quoted by Rachmiatie (2005) stated, “group of mass category in Indonesia shows passive characteristics or as an acceptor only, consume an information with bad quality and quantity”. Democration in communication aspect by using alternative media where every citizents has the same rights about information which expect can eliminate the domination between one to another and control the power which potentially make a forward and properous society as advices in opening of UUD 1945.

Community radio in Indonesia as part of alternative media should be seen as public sphere representation on certain grade. So, community radio can make a struggle to create freedom space to state and receive public opinion or to create public discourse. Community radio can create public discourse which is free frommodal bussiness and power or from ideology which may be distored social reality, it can be from external or internal.

Alternative media in communication has an important role in empowerment for some communities. Teh existance of community radio as democration form of communication in term of content and media owner which is hoped that can run the empowerment role. For *Orang Rimba* community in Bukit Duabelas National Park, this community radio was born to struggle public rights and some business which are often ignored. The existance is for struggling freedom space to state and receive public opinion which appears and be a community needs and create public discourse which is free from any business that is going to distored social reality in the middle of *Orang Rimba* community for creating independency and free them from marginal circle.

Based on the explanation above, so problem identification in this research can be identified and formulated in these research questions:

1. How is the history and the existance of *Orang Rimba* community radio in Bukit Duabelas National Park?
2. How is the role of community radio as public sphre in struggling *Orang Rimba* rights in Bukit Duabelas National Park?

METHODS OF RESEARCH

The research was conducted with qualitative approach in critical paradigm with case study research strategy (Yin, 1989). The research sites was in the southern part of Bukit Duabelas National Park or administratively located in *Air Hitam* Subdistrict of Sarolangun Regency of Jambi Province. This region became the location of the Community Radio station of *Orang Rimba Benor FM*. The data collection in the research was conducted with several techniques in accordance with qualitative research approaches (Creswell 2010) that is: recording news text, indepth interview with radio activist Benor FM (NGO activist), radio announcer from *Orang Rimba*, *Temenggung Orang Rimba*, from the villagers supporting the Bukit Duabelas National Park, the Commissioner of KPID of Jambi Province and the office of Balai Bukit Duabelas National Park in Sarolangun. Indepth interviews are conducted by referring to key questions developed during interviews and discussions. Data and information are also obtained from observation of direct observation, documentation and materials of Radio Benor FM broadcasting as well as Focus Group Discussion (FGD). FGD were conducted to explore ideas and confirm the results of previous data collection to make the data more comprehensive and relevant to the research objectives.

The data collected were analyzed descriptively. Qualitative descriptive analysis is by giving a review or interpretation of the data obtained so that becomes more clear and meaningful. The steps are data reduction, presentation of data with charts and text, then drawing conclusions to reveal facts, circumstances, phenomena, variables and circumstances that occurred during the study took place.

RESULTS AND DISCUSSION

Radio Benor FM: Orang Rimba alternative media. Benor FM is *Orang Rimba* community radio which is innitiated by KKI WARSI, an NGO in Jambi that concern to conservation issues and *Orang Rimba* in jambi province. Benor FM is located on the hills at the south side of Bukit Duabelas National Park, bukit suban village air hangat sarolangun regency jambi province. By using booster and exciter, Benor FM can reach 10 to 20 kilometers from location of the station. Moreover, because of the topography condition of Bukit Duabelas National Park, not all of group of *Orang Rimba* got the media. There are only two group who can be reached by Benor FM, they are group of *Tumenggung* nggrip in kedundung muda and *Tumenggung* Tarip in semapu river, pakuhaji. To make easier *Orang Rimba* understanding, so the announcing materials are provided into two languages, they are Indonesian and *Orang Rimba* language.

By Benor FM, *Orang Rimba* share any informations. Not only sing *Orang Rimba* favourite song, the announcer also tell various information and news starting from 08.00 till 17.00 WIB. The content of information is of course chosen based on their needs, like the information of rubber, rattan, and fruits price. Then, there are also information about environment, forest damage, and health if there is an unwell person. The existance of Benor FM is also used to discuss about *Orang Rimba*'s culture to introduce people about their tradition, like born or wedding ritual of *Orang Rimba*, and culture punnishment. This event is generally announced with *Orang Rimba*'s special music as an effort to ban streotype of orang terang on *Orang Rimba* like happen now.

«We hope that this radio can be a campaign media for Orang Rimba and media to connect the society and government to Orang Rimba. We campaign that Orang Rimba is not as like as people imagine, like dirty, smelly, and so on. There we tell people that Orang Rimba has culture and rules like us. We socialized it in radio.» (interview with the founder of Benor FM).

Alternative media Benor FM radio in this research based on communication experiences which exist as communities needs for completing and struggling the bussiness which are marginalized. Hopefully, the existance of Benor FM can be information media to *Orang Rimba* group which stay in the jungle. Understadning how is Benor FM exist, operate, hold and struggle, not only understand a radio in general, but can understand a culture and social dynamic, economic and politic which happen in this country, in the real form of traditional community in Indonesia.

Public sphere fights communication distorcy. Some studies about community media from critical perpective shows that local media in Indonesia may be a facilitator of power man in local level and be a politic communication facility (Awaludin, 2011), community radio can be a public democracy facilitation (Rachmiati, 2005), resistention of community radio as alternative media (Maryani 2007), government hegemony by community radio (eddiyono 2012) and the existance of community radio as an information agent in the village area (Yuliasari, et al, 2015). Related to local culture content on cummunity media, gotten local policy and local identity which are seen from psychology aspect (Ridwan 2007). Communication pattern which is up top down and no democracy still be a general issue happened in Indonesia, every citizents has the same rights about information which expect can eliminate the domination between one to another and control the power which potentially make a forward and properous society.

Benor FM as part of alternative media can be seen as public representation on certain level and make effort in creating freedom space to state and receive public opinion or to create public discourse. Community radio can create public discourse which is free frommodal bussiness and power or from ideology which may be distored social reality, it can be from external or internal from *Orang Rimba*.

All areas in our social life give us chance to create public opinion which is called as public sphere and all citizents principly may enter that kind of space (Hardiman, 2009). In that public sphere, citizents might have the same chances to participate and free from the domination and participate in taking decisions. If Habermas takes a chat prototype in *coffee house* (England) on 18 century*, salon* (Franch) and *tichgesllschaft*en (Germany) as public sphere, nowadays altenative media like community radio can be said as public sphere. This condition explains that era of public sphere topic in term of face to face has been moved to media.

In *Orang Rimba* case, Benor FM becomes one of media for *Orang Rimba* community to have a process critically to realize emansipatoris society, society which are concious and be able to say tehmselves as autonomic individual and can free themselves from any domination, it is as a point of view from Habermas (1989) which stated that only power decidded by critical public discussion is a power which cann be rationalized. Discussion like this may be done in a free sensor and domination society only. Actually, thery are the private one. But their talks create a public, because not about their privacy which are talked, but bussiness in general without any forces.

In *Orang Rimba* community, before empowerment program exists by using radio as the instrument, most of them are deaf in facing unfairness. They have to be supported to be brave in asking and requiring their rights. The obstacle “culture” to keep a good relation needs media, when a critic can be said by using media (without known by other people) so it can avoid that people in an opened conflict with others or in a community.

Not only about culture, Benor FM as media is a new technology in *Orang Rimba* community. As a technology which is developed then becomes a new institute, so there is no group which has power in this intitute. As a new instituute which is build by conciousness for taking out community from information domination of dominant group, so the young of *Orang Rimba* can support Benor FM becomes an intitution which relatively free from domination and processed to be a public sphere as told by Habernas. Meanwhile, it is not meant that Benor FM can be out or fall being a new system which might bind human with its system. It can happen if Benor FM follows the patterns of mainstream media operation by all teh administrative rules, schedule, text production system, announcing standart and so on. If it is happened, so the power in community media unites with its community be weak because of the system loses the community bussiness.

Benor FM roles in struggling Orang Rimba rights. The existance of Benor FM can transform a public sphere be more ideal like idealized by *Orang Rimba*. In this place, *Orang Rimba* can communicate and share confuseness about social, politics, economics, culture and so on. An ideal public sphere which is tranformed in journalism form, hopefully to be a free space to people to state their act, idea, sight and critics about the surrounding.

1. Struggle in keeping the conservation:

For *Orang Rimba*, jungle is a house as live space and living source. *Orang Rimba* live dynamics can not be out from jungle. Jungle be the hold in living process, as a place to hunt, create traditional medicines, and use the jungle or forest product to be economics source in

their live which becomes their identity in running several traditions and cultures, it is inherited by ancestors as guidance in their live. So every doing the discussion with *Orang Rimba*, they always give a message "*tolong jago rimbo kami*" or "please, keep our place." This message also be a concern in Benor FM.

In managing natural resources, *Orang Rimba* knows an area given, like *hompongan*, *tanoh peranokon, rimba, ladang, sesap, belukor* and *benuaron*. This areal given is a rotation of land using orderly and can be said as succeed system from their jungle. A place that is called rimba by them, processed as field to main course meals, then after it is left change becomes sesap. The concept of *hompongan* by *Orang Rimba* means border. *Hompongan* is in the form of field which connect one to another in Bukit Duabelas National Park line to avoid illegal logging action which is done by other people. Tanah penarokan or penarokan land is a land which has been chosen by wizard which is free from the devil who want to disturb and it is for pregnant woman. This land may not be used to open the field. Benuaron is a historical land from ancetors of *Orang Rimba* which full of fruity tree, like durian, kemang, rambutan and so on which exist in rimba. Each od *Orang Rimba* keeps it. This land is a common property, so that everyone can use it by taking the fruits based on the needs only. In the rimba also known sialang tree as a honeycomb nest. *Orang Rimba* will keep this tree and fights if there is illegal logging on the tree because it will threat the population of honeycomb and affect on the decrease of their economic source.

2. Emancipatory struggling:

Emancipatory ethics according to Habermas (1993) is really related to communication action that is an interaction form which is the succesfulness believe depend on two sides who interact for reaching agreement and understand each other, or relationship between subject and dialogist subject or not a relationship of mnologist. Dialogist communication has an active role, where all sides take other's role, so ideal role taking happened. On this communication, understand each other can be reached, so Habermas names it as communicative rationality (Suseno 2004).

In *Orang Rimba* context, where the existance is often seen negatively by other community make an emancipatory communication have to be struggled. Negative view from orang terang by saying *Orang Rimba* as "kubu" as an underestimate action for *Orang Rimba*. It is an example of how the position of *Orang Rimba* is not equal. They are assumed as a left behind, uncultured, uneducated, and anti social. On of the way to stop stupidity is by doing campaign about the importance of education for generation of *Orang Rimba*. Benor FM radio campaign bepelajorang intensively to *Orang Rimba*.

Dialogue which is developed by Benor FM radio explains *Orang Rimba* point of view on their generation's future which must be facilitated by education (school). *Orang Rimba* opinion implicitly give messages that *Orang Rimba* is starting to realize the importance of education. Stupidity because of can not read, write and count still be worst things for *Orang Rimba*. Critical thinking is also developed by a willing to cut the forest product which they sell. They are starting to realize, so they send message to their siblings or known as sanak to motivate them to be emancipatory, free from stupidity, not lef behind, and other negative view which underestimate *Orang Rimba*.

Misunderstanding which has been inherited from many years ago until now happened continuously and potentially react horizontal conflict and must be ended. For some group of people, *Orang Rimba* is often assumed as disturbance, moreever since the decrease of natural resources because of the forest condition which is more narrow. This condition causes fight for natural resources. It is usually ended by conflict and victims will be from orabg rimba's side. Giddens in modernity and self identity, it reminds how the emancipatory value is applied in economic value. According to him, emancipatory politic has a concern on invidual and group freedom from the things which can be obsracles for them to get better live chances. It involves two important elements, first the effort to remove disturbance and problem from the past, so possible to create transformative act to tge future, second it aims to solve the unallowed domination from individuals and certain group on other individuals and group. Benor FM radio is also assumed as strategic thing to make society accept the existance of *Orang Rimba* and be able to solve misunderstanding and negative view on *Orang Rimba*, build the equivalence to society to accept and live togeteher in an equal relationship without change any identity.

It is important to be announced by Benor FM radio by using content which has persuasive message to people (orang terang) in order amit and receive the existance of *Orang Rimba*. Campaign by using radio connects communication between *Orang Rimba* and society arround to support them to know general social culture, then society also know how's *Orang Rimba* culture. By this campaign, hopefully general community can remove several negative view about *Orang Rimba*, then change the attitude and action which can admit and appreciate the existance of *Orang Rimba*, and they can live together in a harmony situation. In another side, this radio program also provides information about village people's life and general norms in tbe villages. So this radio program can help to decrease conflict both two sides which is often happened by accepting and admitting the existance of *Orang Rimba* in general norm without remove their identity and have an equal view about *Orang Rimba*.

As the ideal of Habermas, communication is truely a systematic relation. Communication is always happened between balanced side. Communicayion is not about power, but it is happened if two sides can be equal, admit and believe each other. Knowledge which is transferred by using alternative media can be emancipatory knowledge which press the importance of knowledge and technology as a tool for humanization process. The values include culture, independent democracy, social fairness, natural environment integration and human related to human's bussiness to increase *Orang Rimba*'s position.

3. Stuggles to get public rights:

As stated by Habermas (1993), at the beginning public sphere identically with tradition of borjuis people, so this space is often been equal with coffee houses abd clubs. In the development, intelectual group appreciate this tradition by taking substantion process which is very egaliter in those coffe houses and clubs. Tbompson told that public sphere as idea meet space and place for individuals to do dialogue in local culture setting as equal participant in live dialogue. When it is moved to alternative media, this situation is not distorted, even it is more crowded. Alternative media has unlimited acess in public live, interact with several public business and use public spot like frequency spectrum. They may fill the frequency space, if it includes 3 components, they are public convenience, public interest and public neccesity.

Orang Rimba kid is being a Benor FM radio announcer when they go out from jungle, then they back with stories, about the decrease of rubber and rattan price, worst health condition, damage forest, burning forest and field and another problems which are faced by *Orang Rimba* in the forest. Problems of topography make *Orang Rimba* are difficult to access general facilitations which are needed to support their life. Important information relates to primary needs of *Orang Rimba* are announced in Benor FM radio.

Based on information told by prang rimva in Benor FM radio is usually responsed seriously. For example health officer directly visit and pick *Orang Rimba* up and bring them to puskesmas to get the medicines as soon as possible. They also do free helping to *Orang Rimba*. Because of theor coming, finally they are asked to give socialization about healthy. By havibg it will support *Orang Rimba* to use general healthy facilitation which are provided like nursewife. Radio program will also campaign about healthy life related to environment changes. Like antisipative way on diare, tbc, malaria which nowadays often happened to *Orang Rimba*. Besides, Benor FM also campaign the importance of society's role to help health services for *Orang Rimba*.

The less *Orang Rimba* to get general facilities and difficulty to get a fair proces of commodity, because market is controlled by tauke, it is also discussed in Benor FM, like part of commodity prices as materials. This program will also help to give information about alterbative market which give more benefits.

So Benor FM radio takes roles in struggling freefom space to state and receive public opinion and try to build public discourse which is free from modal bussiness and power or from ideology that will distore social reality which happened by struggling *Orang Rimba* right.

From the explanation above, it is relevant to be asked how is public sphere which is created by Benor FM radio? First, Benor FM radio as media is a public sphere in traditional community is different with habermas description. Benor FM radio exist in community scope with marginal condition in some aspects, like social, economics and politics. Meanwhile habermas describes who involved with in public sphere are intellectual group of society. Second, as media which has ideal to build public sphere in the community, in the process of Benor FM radio not only ace the dominant masters, but market competition from other media

like tv and radio which start be owned by *Orang Rimba* and being a competitor for Benor FM radio. Third, public sphere which is built in Benor FM radio as media, beside fight the dominant of state and market, sometimes also face communication culture and malay society in Bukit Duabelas National Park. As society which still run traditional realtionship or strong culture, so they give a directed and opened critics, it is assumed as an unwell thing for orang terang.

CONCLUSION

As alternative media, Benor FM radio can be seen as public sphere representation to state and receive public opinion and build public discourse which is free from ideology which will distore social reality, from external or internal community of *Orang Rimba*.

As public sphere, Benor FM radio guarantee that there will be a tree discussion and opened and possible critical argumentation about several issues on *Orang Rimba*; keeping the forest, emancipatory bussiness and rights as citizents.

REFERENCES

1. Awaludin I. 2011. Media lokal dalam konstelasi komunikasi politik di daerah. Jurnal Ilmu Sosial dan Ilmu Politik. 14 (3): 297-316
2. Creswell, J. 2007. Qualitative Inquiry & Research Design: Choosing Among Five Approaches, 2nd ed. California: Sage Publication
3. Eddyono AS. 2012. Radio Komunitas dan Kegagalannya sebagai Media Counter Hegemony (Studi Kasus Pada Radio Panaganti dan Angkringan di Yogyakarta. Journal Communication Spectrum. 2 (1): 13-29
4. Habermas 1993. The Structural Transformation of the Public Sphere. Massachussetts: MIT Press
5. Hardiman. 2009. Menuju Masyarakat Komunikatif, Ilmu, Masyarakat Politik& Post Modernisme Menurut Jurgen Habermas. Yogyakarta: Kanisius
6. Maryani E. 2007. Resistensi komunitas melalui radio alternatif. Tinjauan kritis terhadap radio komunitas “Angkringan” sebagai media alternatif di Desa Timbulharjo, Kecamatan Sewon, Kabupaten Bantul Propinsi DIY. [disertasi]. Depok: Universitas Indonesia
7. Muchlis F, et al. 2016. Communicative Action in Maintaining of the Communal Right (Case Study in Orang Rimba Bukit in the Eastern Region Bukit Duabelas National Park, Jambi Province, Indonesia). Internatinal Journal of Research in Social Science. ISSN 2307-227X) Vol X: 1-7
8. Rachmiatie A. 2005. Keberadaan radio komunitas sebagai eskalasi demokratisasi komunikasi pada komunitas pedesaan di Jawa Barat. Jurnal Mediator. 6 (2): 215-226
9. Ridwan NA. 2007. Landasan Keilmuan Kearifan Lokal. Jurnal Studi Islam dan Budaya. 5 (1): 27-38
10. Suseno FM. 2004. Dalam kata pengantar Buku Kritik Ideologi. Hardiman FB Fransisco. Yogyakarta: Buku Baik
11. Yin RK. 1989. Case Study Research Design dan Method, COSMOS Corporation
12. Yuliasari I et al. 2016. Community Radio Based On Local Wisdom As Information Media In Special Region Of Yogyakarta. I Internatinal Journal of Research in Social Science. Vol.VII: 35-43

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.04

ANALYSIS ON BILLING SYSTEM IMPLEMENTATION QUALITY IN ENDEAVOR TO INCREASE CUSTOMER SATISFACTION IN IMPORT ACTIVITY: STUDY OF SURABAYA CONTAINER TERMINAL

Dzulkirom Mochammad
Business Administration Department, Faculty of Administrative Science,
University of Brawijaya, Indonesia
E-mail: humas@ub.ac.id

ABSTRACT
This study aims to determine and explain the simultaneous and partial effects of service quality components consisting of reliability, responsiveness, assurance to customer satisfaction in PT. Terminal Petikemas Surabaya, and to know and explain which between the three service quality variables that have a dominant effect on customer satisfaction. The type of research used is explanatory research with population or census method with quantitative approach. Samples taken were 35 Billing Service users registered in PT. Terminal Petikemas Surabaya. Data collection method used is questionnaire. The result of multiple linear regression analysis shows that the three independent variables reliability, responsiveness, assurance have significant influence on the dependent variable that is customer satisfaction.

KEY WORDS
Service quality, customer, satisfaction, billing, service.

Commerce is a crucial aspect of a country's economic activity. International commerce is a transaction between nations as an economic subject with another, whether it is goods or services. International Commerce is usually conducted in the form of export-import. The export-import transaction is one of an important aspect of economic activity in Indonesia. Export-import is one of government method in obtaining foreign exchange in order to fulfill the country's need.

Indonesia possesses wider maritime territory compared to its land, therefore sea transport node is the mainstay in export-import. Aforementioned sea transport should be supported by adequate ports.

In supporting trading activities, a port not only acts as a harbor but also to switch transportation mode. Such as from sea to land transport, vice versa. Ship cargo would be unloaded and transported using trucks or trains to its destination. This activity is usually conducted in container terminal (*terminal petikemas*).

The container terminal is one of port-related business which focuses on services as main capital in order to face similar rival businesses. Service business capable of satisfying consumers is a compulsory aspect of running Service Company, maintaining long-term good relationship with consumers, as well as competing with similar businesses. Kotler (2009:170) stated that a service quality should start from consumer needs and end at consumer perception. Service quality is divided into five dimension which involves reliability, responsiveness, assurance, empathy, and tangibles. A company's method for increasing service quality user could be conducted by developing technology-based service. Fast technology development requires service companies to follow up in order to improve their services.

Fast technology development, especially electronics, is an inevitable aspect. Simplicity, speed, and effectivity offered by technology development require changes in various aspects of service businesses. Marketers ought to recognize the everchanging business landscape which is vastly different compared to several years ago. Technology is a primary factor which changes community thought process and lifestyle. The community found practicality and ease in advanced technology services.

Electronic-based service development influenced harbor service in Indonesia. One of such case occurs in PT. Terminal Petikemas Surabaya (PT. TPS) which is a company focusing on loading-unloading service. PT. PTS partners with more than 30 shipping companies. These companies transport containers to more than 25 countries worldwide. In the last five years, PT. TPS dominates container loading-unloading management in Tanjung Perak. PT.TPS dominates more than 50% of the market and it will continue to improve in the future.

One of the methods developed by PT. TPS, in order to improve their service, is by developing an electronic based payment application called Billing System. Billing System application development is one of PT.TPS support on the government program in an endeavor to decrease dwelling time, which in the end would smoothen imported goods unloading, therefore reducing ship accumulation and entry queue in the harbor.

Dwelling time is a set of time which is counted from whence a container is unloaded from a ship until it leaves terminal through the main gate (World Bank, 2011). Each country set their respective dwelling time. Indonesia is one of the countries with high dwelling time. Speed uping goods release is not only influenced by unloading process itself in the field but also documentation and payment procedure. Billing System was developed in order to speed up documentation process and record of release order (SPPB or *surat perintah pengeluaran barang*) and DO (delivery order) as well as speed up payment process. Billing System is part of payment service option provided by PT. TPS in endeavor to increase service quality.

LITERATURE REVIEW

International Commerce. According to Waluya (200:3), international commerce could be defined as commercial activity from a country of origin to country of destination. It is conducted by Multinational Corporation by performing goods and service transport, capital transport, labor transport, technology (factory) transport, and commercial brand transport.

Port. Auwjong (2005:16) stated that "A port is a region of calm sea water. This region enables a ship to load or unload cargo at a dock (kade)". Triatmojo (2009:3) stated that "A port is a gateway to enter a region or country. It acts as a connecting bridge between regions, islands, and even nations, continent, and nationality".

Maritime activity is divided into two: commercial and non-commercial. Commercial Maritime is shipping business between islands or countries. Non-commercial maritime is the patrol, naval survey, etc. Port functions as ship terminal after a voyage. Ship performs a various activity in a dock, the activities are described as follows: passenger embark-disembark, load-unloading goods (container), ship repair, supply procurement, etc.

According to Triajmojo (2009:1) ports were originally shores where ships docks in order to perform load-unload cargo, passenger embark-disembark, and other activities. Those activities could be conducted in ports with calm water. Therefore in the past, ports were usually by river shores, bay, or natural beaches protected from waves.

Due to country or region's social and economic development, its community need increase as well. Therefore adequate facilities are required in order to fulfill those need. Ships were originally simple and small. Nevertheless, with technology advancement, the ships were build bigger. Ports didn't need to remain in naturally protected regions such as river shores, but it could be built by sea shore to provide space for big ships.

Container Management. Container management occurred in container yard is conducted in the following procedure:

- A forklift truck, reach stacker, and side loader are utilized to stack containers up to six levels;
- Straddle carrier is utilized to stack containers up to two or three levels;
- Rubber tyre gantry (RGT) or transtainer is container crane in the form of a rubber wheeled portal, capable of stacking containers up to four or six levels.

Container Terminal Facility. Big ports in Indonesia are generally equipped with specialized terminal focuses in container transport. A number of facilities in container terminal is described as follows:

- Dock. Container docks generally built in the form of wharfs (docks parallel to the shoreline). This was built as docks receive heavy loads, whether it is containers or loading equipment.
- Apron. Container terminal apron is wider compared to another terminal which is normally 20m to 50 m in size. This particular apron is bigger as it is container loading equipment.
- Container Yard. Container yard is a set of land used to collect, store, and stack containers. Modern or big container terminal divides container yard into several divisions: export container, import container, refrigerated container, and empty container.
- Container Freight Station (CFS). Container Freight Station is a warehouse provided for Less Container Load/LCL. CFS in the loading dock, goods from several senders is loaded into one container.
- Observation Tower. The observation tower is utilized to perform observation in every nook and cranny, manage, and directing every activity in a terminal. This activity includes equipment operation and managing container storing and placement.
- Maintenance Workshop. Loading activity in container terminal is supported by a variety of equipment, therefore regular maintenance and reparation on loading equipment and empty containers are required. This activity is conducted in maintenance workshop.
- Other Facility. Container terminal requires several generic facilities such as entry gate, fuel supply, fresh water supply, electricity for the refrigerated container, etc.

Information System. System' is a term generally used in the education system, accounting system, banking system, etc. The system could be defined as a group or a set of elements, components, or variables. These elements are organized, interact and dependent on each other, and integrated (Sutabri 2005:3).

According to Darmawan (2013:1), data is a set of fact or manners that could be used as an input in generating information. Data could be in the form of discussion material, decision making, calculation, and measurement. Longkutoy (1978:3) stated that "Data is the plural form of datum. It means fact, which is used and correlated to facts, symbols, images, words, numbers, letters, or symbols representing an idea, objects, condition, situation, etc."

According to Darmawan (2013:3), information is a result of data processing. Nevertheless, not every obtained data could be processed into information. Processed data incapable of giving meaningful benefit could not be defined as information.

Billing System. The billing system is a part of payment service option provided by PT.TPS for service user in an endeavor to improve service. PT.TPS is the first and sole container company which uses electronic based payment system. The billing system is one of payment option aside from conventional payment at cashiers. Billing system was developed to enable online based import transaction. Billing System was developed in order to speed up documentation process and record of release order (SPPP or surat perintah pengeluaran barang) and DO (delivery order) as well as payment procedure.

Dwelling Time. Dwelling time, in general, is a vehicle waiting time such as public bus or train. These vehicles spend time in bus stop/train station. Normally this time is used for passenger embark/disembark, waiting for sterile traffic, parallel line merging, or schedule management. Dwelling time is a set of time counted from whence a container is unloaded from a ship until it leaves terminal through the main gate (World Bank, 2011).

Service Quality. According to Zeithmal, Parasuraman, dan Berry (1990:19), service quality is “the gap between consumer desire and perception”. Kotler (2009:170) stated that service quality must start at consumer need and end at consumer perception. Consumer perception of service quality is a thorough assessment of a service quality.

According to Photis M. Panayides and Dong- Wook Song (2006) defined port service performance as price (cost advantage), quality, reliability, customization, and responsiveness. Tongzon (2004) defined a variety of port service variable which is: port or terminal efficiency level, cargo maintaining fee, reliability, port selection preference, and

maritime route depth. In other Tongzon's study (2002), there is a few other variable defining port competition level which are efficiency, ship docking frequency, infrastructure availability, location, docking fee, responsiveness, and reputation on damaged goods.

Dwelling time quality service could be observed from clearance and post clearance stages solution as described by PT Pelabuhan Indonesia II (Persero):

- Pre-Notification on clearance. Early notification which allows PIB document submission in Custom before the ship docks, where existing PIB submitted after Data Heap from terminal (seat container unloaded).
- Trucking and freight forwarder in post clearance. Trucking and freight forwarder support on e-service and TBRCS usage. Importer or freight forwarder must collect container or IPC to be delivered to an importer.

Customer Satisfaction. According to Kotler (2009), customer satisfaction is a person's satisfaction level after comparing performance and expectation. Customer satisfaction is determined by their respective perception and expectation.

A system's success could be determined by service provided. Especially service type which is integrated with information system. User satisfaction towards information system is how a user perceives information system in reality, but not against system quality in technical aspect (Guimares et al, 2003). User satisfaction exhibits how a user is satisfied and place belief in the provided information system in an endeavor to fulfill their needs (Ives, et al., 1983).

METHODS OF RESEARCH

Research method utilized is explanatory research with population method or census and quantitative approach. The research was conducted in PT. Jakarta International Container Terminal (PT.PT.TPS) Jl. The researcher conducted this research in PT.PT.TPS after considering easiness in collecting data as the company is the biggest and busiest container port. PT.PT.TPS dominates 60% of DKI Jakarta and Indonesian market. Population taken in this research is service user utilizing loading-unloading service, conducting import activity, and registered as billing system user in PT.TPS. In order to accurately draw research variable, researchers took every population as the sample. Sample obtaining technique is called saturated sampling. Based on aforementioned criteria, samples taken (n) from PT.PT.TPS service and billing system user are 35 people.

The data source used in this research is primary and secondary data. Data collection technique utilized was a questionnaire. The research instrument used was questionnaire aid. In order to examine data validity, the researcher conducted validity test and reliability test. Data analysis conducted involved descriptive analysis, multiple linear regression analysis, and partial regression analysis.

RESULTS AND DISCUSSION

Reliability Variable Frequency Distribution (X1). Based on obtained data, reliability variable obtained grand mean of 4.40. The respondents, in general, agreed with proposed statements in the questionnaire. First item stating Custom Officer providing clear image in offline/online SPPB document arrangement obtained 4.20 in average. Second Item stating Custom finished offline/online SPPB on time obtained 4.34 in average. Third item stating fee accuracy on container release on e-billing application obtained 4.54 in average. Fourth item stating container number information accuracy on e-billing application obtained average 4.51.

Responsiveness Variable Distribution (X2). Based on obtained data, responsiveness variable obtained grand mean at 4.16. The respondents, in general, agreed with statements provided in research questionnaire. First item stating Custom Officer providing information on required document clearly and easy to understand gained average value 4.20. Second item stating Custom Officer providing aid in overcoming problems in arranging offline/online SPPB obtained average value at 4.09. Third item stating tutorial providing easiness in e-billing application usage obtained average value at 4.17. Fourth item stating existing service in case

of error system occurring obtained average value at 4.17.

Assurance Variable Frequency Distribution (X3). Based on obtained data, responsiveness variable obtained grand mean at 4.36. The respondents, in general, agreed with statements provided in research questionnaire. First item stating Custom officer providing detailed list of fees and its functions obtained average value at 4.29. Second item stating Custom officers provides clear answer on customer inquiry obtained average value at 4.29. Third item stating e-billing is equipped with advanced security obtained average value at 4.51. Fourth item stating existing payment slip in each transaction using e-billing obtained average value 4.26.

Customer Satisfaction Variable Frequency Distribution (Y). Based on obtained data, responsiveness variable obtained grand mean at 4.37. The respondents, in general, agreed with statements provided in research questionnaire.First item stating offline/online SPPB registry procedure in e-billing application is easy and in accordance with expectation obtained average value 4.46. Second Item stating good offline/online SPPB and e-billing service and in accordance with expectation obtained average value 4.29. Third item stating offline/online SPPB payment procedure and e-billing application is easy to use and in accordance with expectation obtained average value 4.37.

Table 1 – Normality Test Result

-	Unstandardized Residual
N	35
Normal Parametersa, b Mean	.0000000
Std. Deviation	1.01792938
Most Extreme DifferencesAbsolute	.084
Positive	.084
Negative	-.074
Kolmogorov-Smirnov Z	.500
Asymp. Sig (2-tailed)	.964

Source: Processed primary data (2017).

Based on calculation result, sig. the value obtained was 0.964 (as exhibited in Table 1) or larger than 0.05; therefore, H_0 conditions were accepted as normality assumption is fulfilled.

Table 2 – Multicollinearity Test Result

Dependent Variable	Collinearity Statistics	
	Tolerance	VIF
X_1	0.712	1.405
X_2	0.750	1.333
X_3	0.635	1.574

Source: Processed primary data (2017).

Based on examination result, total tolerance value > 0.1, therefore, it could be concluded that there is no multicollinearity between independent variables.

Table 3 – Regression Formula

Dependent Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.585	1.925		0.304	0.763
X_1	0.261	0.109	0.327	2.393	0.023
X_2	0.221	0.104	0.283	2.128	0.041
X_3	0.244	0.102	0.347	2.401	0.023

Source: Processed primary data (2017).

Regression formula obtained based on Table 3 is as follows:

$$Y = 0,585 + 0,261\ X_1 + 0,221\ X_2 + 0,244\ X_3$$

The formula above could be interpteted as follows:

1. Customer Satisfaction would increase each addition of X_1 (Reliability). Therefore should reliability improves, it would increase customer satisfaction by 0,261 with assumption other variables are constant.
2. Customer Satisfaction would increase each addition of X_2 (Responsiveness), Therefore should Responsiveness improves, it would increase customer satisfaction by 0,221 with assumption other variables are constant.
3. Customer Satisfaction would increase each addition of X_3 (Assurance), Jadi apabila Therefore should Assurance improves, it would increase customer satisfaction by 0,244 with assumption other variables are constant.

Based on interpretation above, Reliability, Responsiveness, and Assurance affect positively to Customer Satisfaction. In other words, should Reliability, Responsiveness, and Assurance improves, it would increase Customer Satisfaction.

Table 4 – Coefficient of Correlation and Determination

R	R Square	Adjusted R Square
0.767	0.588	0.548

Source: Processed primary data (2017).

The coefficient of Determination is utilized to determine influence or contribution of independent variables towards dependent variables. Table 4.11 analysis obtained *adjusted* R^2 (Coefficient of Determination) at 0.48. It indicates 54.8% Customer Satisfaction variable is influenced by dependent variables which are Reliability (X_1), Responsiveness (X_2), and Assurance (X_3)). On the other hand, 45.2% Customer Satisfaction variable is influenced by other variables not studied in this research.

The coefficient of Correlation exhibits a relationship between independent variables (Reliability, Responsiveness, and Assurance) towards Customer Satisfaction variable. R-value (coefficient of correlation) is 0.767. This correlation value exhibits that relationship between independent variable (Reliability (X_1), Responsiveness (X_2), and Assurance (X_3)) with Customer Satisfaction is included in Strong category as it is between 0.6-0.8.

Hypothesis Examination:

Table 5 – F-Test/Simultaneous

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	50.313	3	16.771	14.757	0.000
Residual	35.230	31	1.136		
Total	85.543	34			

Source: Processed primary data (2017).

Based on Table 5. F count value is 14,757. On the other hand F table (α = 0.05 ; db regression = 3 : db residual = 31) is 2,911. As F count > F table which is 14,757 > 2,911 or Sig. F value (0,000) < α = 0.05 therefore regression analysis model is significant. This indicates H_0 is rejected and H_1 accepted. It could be concluded that dependent variable (customer satisfaction) could be significantly influenced by independent variables (Reliability (X_1), Responsiveness (X_2), and Assurance (X_3).

Based on Table 3, the following result was obtained:

1. T-test between X_1 (Reliability) with Y (Customer satisfaction) exhibits t count = 2.393. On the other hand, t table (α = 0.05 ; db residual = 31) is 2,040. As t count > t table at 2,393 > 2,040 or sig. t (0,023) < α = 0.05 therefore X_1 (Reliability) towards Customer Satisfaction is significant. This indicates H_0 was rejected. Therefore it could be concluded that Customer Satisfaction could be influenced significantly by Reliability. By improving Reliability, customer satisfaction will significantly increase.

2. T-test between X_2 (Responsiveness) dengan Y (Customer Satisfaction) exhibits t count = 2,128. On the other hand t table (α = 0.05 ; db residual =31) is at 2,040. As t count > t tabel yaitu 2,128 > 2,040 or sig. t (0,041) < α = 0.05 therefore X_2 (Responsiveness) influence towards costumer satisfaction is significant at alpha 5%. This indicates H_0 was rejected. It could be concluded that Customer Satisfaction could be significantly influenced by Responsiveness. By increasing responsiveness, customer satisfaction will significantly increase.
3. T-test between X_3 (Assurance) and Y (Customer Satisfaction) exhibits t count = 2,401. On the other hand t table (α = 0.05 ; db residual = 31) is at 2,040. As t count > t tabel at2,401 > 2,040 or sig. t (0,023) < α = 0.05 therefore X_3 (Assurance) influence towards customer satisfaction is significant at alpha 5. This indicates H_0 was rejected. It could be concluded that Customer Satisfaction could be significantly influenced by Assurance. By improving Assurance, Customer Satisfaction would significantly increase.

Table 6 – Dominance Test Result

Ranking	Variable	*Beta* Coefficient	Influence
2	X_1	0.327	Significant
3	X_2	0.283	Significant
1	X_3	0.347	Significant

Source: Processed primary data (2017).

Based on Table 6, Assurance variable possesses the highest coefficient of regression. It indicates that Y variable is more influenced by Assurance variable. Coefficient possessed by Assurance variable is positive. This indicates parallel relation. Therefore it could be concluded that better Assurance variable would increase Customer Satisfaction (Y).

DISCUSSION OF RESULTS

Three variables of Reliability (X1), Responsiveness (X2), and Assurance (X3) possess significant influence towards Customer Satisfaction (Y) which is determined from service provided. Service user satisfaction towards dwelling time and billing system implementation determined from PT.TPS services were 54.8%. It is influenced simultaneously by the three variables. On the other hand, 45.2% service user satisfaction was influenced by other factors. Despite reliability, responsiveness, and assurance simultaneously provide positive influence to service user, each variable possess different influence value. The difference in value is described below based on hypothesis test conducted:

Reliability. Reliability involves capability in providing services immediately, accurately, and satisfactory. Hypothesis test exhibits coefficient of reliability for 0.261 with t count 2.393 and significant in influencing satisfaction. It indicates PT.TPS possess good reliability during dwelling time and in billing system utilization in endeavor to aid service user. PT.TPS service reliability influences the high satisfaction level of a service user. Service user's need were satisfied with existing punctual, accurate, and satisfying service. Punctuality in documentation procedure conducted by customs officers, fee and information accuracy in billing system enables service user to release goods. This research result is in line with Andy's research (2013) which stated reliability independent variable possess significant influence to patient satisfaction in RSUD Nganjuk (Nganjuk Public Hospital).

Responsiveness. Responsiveness is related to willingness in providing aid to customers and punctual services. Hypothesis test exhibits a coefficient of responsiveness at 0.221 with t count at 2.182 and significantly influence service user satisfaction. It indicates PT.TPS possess good responsiveness during dwelling time and in billing system utilization in endeavor to aid service user. The customer feels satisfied due to aid provided by customs officers in documentation procedure and existing tutorials in billing system. These factors influence high customer satisfaction.

Assurance. Assurance is related to knowledge, skills, manners, and trust. Coefficient of

regression exhibits assurance coefficient value at 0.244 with t count value at 2.401 and significantly influence customer satisfaction. It indicates PT.TPS possess good assurance during dwelling time and in billing system utilization in endeavor to aid service user. Assurance is a set of emotion when service user considers service provided is in accordanece with procedure and reality. In the end, it creates service user confidence. Detailed explanation on fees, transaction slip, advanced security system in billing system applied by PT.TPS causes assurance variable to be the most dominant factor in creating customer satisfaction. This research result is in line with Tamara's research (2011) stating that assurance is the most dominant factor influencing service user satisfaction in Pelindo IV Port in Makassar.

CONCLUSION AND SUGGESTIONS

Based on discussion above, there are several conclusion which is described as follows:

Simultaneous influence of each independent variables towards customer satisfaction needs through F-test examination. Based on multiple linear regression analysis, independent variable caused significant influence simultaneously towards customer satisfaction. It could be concluded that hypothesis examination stating existing simultaneous influence from independent variable towards costumer satisfaction variable is accepted.

In order to determine influence individually (partial) of independent variables Reliability (X_1), Responsiveness (X_2), and Assurance (X_3) to customer satisfaction was conducted utilizing t-test examination. Based on this examination, there are three variables possessing significant influence towards customer satisfaction which are Reliability, Responsiveness, and Assurance.

Based on t-test result, Assurance variable posses the highest t-count variable. Therefore Assurance variable possesses the strongest influence compared to other variables. Assurance variable possesses dominant influence to customer satisfaction.

Based on conclusion above, the researcher proposed the following suggestion:

It is expected from the company to improve responsiveness as among the three variables, responsiveness possess the lowest value. The company could improve service quality conventionally or through billing system, and additional information required by service user in SPPB arrangement and billing system utilization. The company should maintain service assurance as Assurance variable possess dominant influence to customer satisfaction.

With existing documentation and electronic based payment system (billing system) could become a benchmark to other similar ports to adopt and develop this system in endeavor to speed up and simplify dwelling time.

Independent variable is a crucial factor which influences customer satisfaction, therefore it is expected that this research result could be utilized as reference for future researcher in developing this research. Future researchers could consider other variables outside variables used in this research.

Considering the rarity of billing system utilization in port-related businesses, future researcher could conduct analysis on application benefit or conduct research on this application in other ports as benchmark.

REFERENCES

1. Auwjong, Peng Koen & Sugiantoro, R. B. 2005. Perang Eropa, vol 3. Jakarta: Buku Kompas.
2. Deni Darmawan dan Kunkun Nur Fauzi. 2013. Sistem Informasi Manajemen. Bandung: PT. Remaja Rosdakarya.
3. Guimaraes, Tor. 2003. Empirically Testing Some Main-User Related Factors for System Development Quality. Journal. ABI: INFORM Global.
4. Ives and Olson. 1983. User Involvement and MIS Succsess: A Review Research. Journal. ABI: INFORM Global.

5. Longkutoy, John. 1978. Pengenalan Komputer. Jakarta: Cendana Mas.
6. Kotler, Philip & Kevin Lane Keller. 2009. Manajemen Pemasaran. Alih Bahasa: Adi Maulana, Bob Sabrani, Devri Bernadi. Jilid 1. Edisi 13. Jakarta: Erlangga. Sutabri, Tata. 2005. Sistem Informasi Manajemen. Jakarta.
7. Tongzon, J. 2004. Determination of Competitiveness in Logistics: Implications for Regions. InternationalConference on Competitiveness: Challenges and Opportunitie for Asian Countries (pp. 1-16). Artikel. Bangkok, Thailand's National Competitiveness Committee. Triatmojo, Bambang. 2009. Hidrologi Terapan. Yogyakarta: Beta Offset.
8. Waluyo, dkk. 2008. Ilmu Pengetahuan Sosial. Jakarta: Pusat Perbukuan Departemen Pendidikan Nasional.
9. World Bank. Economic Premise, diakses pada 5 Desember 2016. www.worldbank.org/economicpremise.
10. Zeithmal, V.A., A. Parasuraman, dan Leonard L. Berry. 1990. Delivering Quality Services. New York: Free Press.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.05

MANAGEMENT OF SCHEDULING OPTIMIZATION OF SUPPORTING FACILITIES AND INFRASTRUCTURE DEVELOPMENT PROJECT IN THE AREA OF FOLDER AIR HITAM SAMARINDA

Hermawan Achmad Febrian*, **Mulyadi Lalu**, **Putranto Edi Hargono Dwi**
Civil Engineering Department, Construction Management Concentration, National Institute of Technology, Malang, Indonesia
*E-mail: achmad.febrian199@gmail.com

ABSTRACT
Supporting Facilities and Infrastructures Development Project of *Folder Air Hitam* Samarinda is realized by PT. Trinanda Karya Utama. This project has a possibility of retardation, so it results to the retardation of other activities. One of the ways to anticipate it by conducting acceleration which is by *Time Cost Trade Off* (TCTO) method through alternative of adding working hours in the trial ranging from 1 hour to 4 hours at maximum limit. It aims to analyze the time and cost needed by the implementation of TCTO in completing the development of Supporting Facilities and Infrastructure of *Folder Air Hitam* Samarinda. In realizing the design of the acceleration, it is started from the network creation of *Critical Path Method* (CPM) to know the existence of critical path, then TCTO method is applied to find the *cost slope* value of each of these critical activities. In order to realize the acceleration, then compression is done further on critical work items starting from the value of the lowest *cost slope*. The results of this study show that for overtime work of several activities ranging from overtime 1 hour to 4 hours, time and cost obtained over 2 hours overtime on mini pile work, poor plat sand backfill, sills + windows J3, ceiling paint, PVC toilet wall with 86 days, the cost needed is 4.532.921.979,82 and the additional cost is IDR 371.312.000,00.

KEY WORDS
Crashing, financing, scheduling, time cost trade off.

Along with the development of the industrial world as well as the development of transportation facilities, especially roads that are growing rapidly, the difficulty level to manage and run a road project is also higher. The higher the difficulty level, the longer the duration of time needed to complete the project.

Project generally has a certain time limit in the matter of supporting facilities and infrastructure in the area of *Folder Air Hitam* Samarinda. Project is subjected to re-scheduling because of there is a retardation of materials, and it does not meet initial project planning. There are many factors causing retardation in project implementation, internally the retardation in project implementation is caused by: the use of labor that does not match the target productivity, the lack number of personnel, improper implementation method, etc.; while externally the retardation is caused by equipment or materials, weather, etc.

METHODS OF RESEARCH

The obtained data are then analyzed by using *Critical Path Method* (CPM) and *Time Cost Trade Off* (TCTO), (Yamin and Harmelink, 2001). The steps in data processing are as follows: for scheduling purposes, some relatively similar activities are grouped; determining the order of work of the planned activities; making a network diagram; estimate the time taken for each activity; determining critical path; determine the value of additional cost (cost slope); method compression of *Time Cost Trade Off;* Illustrate the graph of time and cost relationship; determine optimal time and cost.

Grouping of Project Sections. In the Supporting Facilities and Infrastructure Development Project in the area of *Folder Air Hitam* Samarinda, it consists of four main works. Each section is composed of more specific work items. In the project, scheduling

used is time schedule (S curve). This project is scheduled for completion in 100 calendar days, starting from September 10, 2014 to December 18, 2014.

Where the additional cost of acceleration is expected later will be more effective than the cost of retardation that must be spent. To conduct an acceleration analysis of time, then the existing job description will be rescheduled by using network planning Critical Path Method (CPM).

Total Cost Normal. In the Supporting Facilities and Infrastructure Development Project in the area of *Folder Air Hitam* Samarinda, the contract value is IDR 4.152.506.000,00.

Indirect Costs. Indirect costs are costs that are not directly related to construction, but it must exist and it cannot be separated from the project. The indirect costs include overhead costs, profit, unexpected costs, and value added tax (VAT) which are explained as follows.

Overhead. Overhead costs are the wages of project staff and the cost of field facilities. The overhead costs identified in the Supporting Facilities and Infrastructure Development Project in the area of *Folder Air Hitam* Samarinda are IDR 890.000,00. With salary for each staff is project manager IDR 170.000,00; site manager IDR 100.000; surveyor IDR 100.000; drafter IDR 85.000; quality control IDR 100.000; site engineer IDR 100.000; administration staff IDR 85.000; and daily cost IDR 150.000. The staff directly involved in overtime work at the project site are field managers and quality supervisors. Field managers and quality supervisors are then reported to the site manager to be able to carry out activities that will have overtime work. Details of overtime costs incurred for staff in the field are as follows.

Total staff salary per day = Salary field manager + quality controller = IDR 200.000,00

$$\text{Total staff salary per hourly} = \frac{Total\ of\ Daily\ Wage}{Normal\ Working\ Hour} = \frac{Rp\ 200.000{,}00}{7\ Hours} = \text{IDR } 28.571{,}43$$

Profit. Contractors' profit is the profit earned on a project that has a difference between the Budget Plan (RAB) and the Implementation Budget Plan (RAP). Profit here is divided into two kinds, namely gross profit and net profit. The gross profit is the profit earned by 10% of the real cost, which includes the overhead cost incurred by the contractor. Real cost for this project is IDR 3.775.006.345,29 with real cost for each sub task are first floor breakdown IDR 1.647.987.848,32; second floor breakdown IDR 1.263.701.785,97; landscape and structure IDR 863.316.711,00.

Unexpected costs. Under the contractual agreement, the unexpected cost is 2% of the real cost.

Value Added Tax (VAT). Based on the letter of contract agreement, the cost of Value Added Tax (VAT) is 10% of the real cost incurred by the contractor.

The full details of indirect costs of Supporting Facilities and Infrastructure Development Project in the area of *Folder Air Hitam* Samarinda detail of indirect cost for 100 days project as mentioned above consists of overhead cost IDR 364.900.000,00; daily cost IDR 890.000,00; profit IDR 288.500.634,53; unexpected cost IDR 75.500.126,00; with daily cost consumption IDR 755.001,27 and valued added tax IDR 377.500.634,53.

Implementation of Time Cost Trade Off Method. Implementation of TCTO method it can be made when acceleration work duration in critical path. Project is executed at normal working time with 1 hour to 4 hour maximum experiment time. Step for implementing TCTO method is as follows.

Normal Duration (ND). Normal duration is the time needed to complete the job until it is done normally. Normal duration can be known in the S curve scheduling.

Normal Cost (NC). Normal Cost is the cost needed to complete the work with the normal time period. The stages are as follows:

Determining the unit price of workers' wages. Workers' wages earned from data PT Trinanda Karya Utama with value of foreman IDR 125.000,00; head laborer IDR 100.000,00; high skilled laborer IDR 90.000,00; laborer IDR 70.000.

Determination of Critical Path. In the CPM method, there are two estimation of time and cost for each activity in the network. Both estimations are the estimated time of completion

and the normal cost (normal estimate) and the estimated time of completion and the cost of which is crash estimate. In determining the approximate time of completion, the term of critical path will be known which is the path that has a series of activities with the longest total amount of time and the fastest project completion time. In the calculation time, three basic assumptions are also used: First, the project has only one *initial event* (start) and one *terminal event* (finish). Secondly, the fastest *event* of the *initial event* is the zero day. Third, the slowest occurrence of *the event terminal* is LS = ES.

If both calculations have been completed, then *Slack* or *Float value* which is a number of leeway time and elasticity in a network work can be obtained. Meanwhile, there are two kinds of *Slack* namely *Total Slack* and *Free Slack.*

Optimization Analysis. After going through several stages in the implementation of TCTO methods to analyze time and cost, identifying critical paths on CPM *network planning* is firstly started. Then, project financing is identified. Afterwards, TCTO method to find the *cost slope* value of each critical job is implemented, and the compression for each critical job is done, all of which are aimed at getting the targeted time and cost.

The following table shows some activities that can have overtime work for each overtime hours on Supporting Facilities and Infrastructure Development Project in the area of *Folder Air Hitam* Samarinda.

Table 1 – Activity that Has Overtime Work

No	Kegiatan Yang Dilemburkan	*Normal Duration*	*Crash Duration*				*Total Crash*			
			I	II	III	IV	I	II	III	IV
1	Papan Nama Proyek	2,89	2,56	2,35	2,22	2,15	0,33	0,54	0,67	0,74
2	Pancang Mini Pile	21,00	18,61	17,09	16,15	15,64	2,39	3,91	4,85	5,36
3	Urugan Pasir Bawah Poor Plat	10,92	9,68	8,89	8,40	8,13	1,24	2,03	2,52	2,79
4	Kusen + Pintu Type P1	12,11	10,73	9,86	9,32	9,02	1,38	2,25	2,80	3,09
5	Cat Plafond	13,30	11,78	10,82	10,23	9,90	1,52	2,47	3,07	3,40
6	Railing Pagar Hollow Steinless	14,00	12,41	11,40	10,77	10,43	1,59	2,60	3,23	3,57
Jumlah *Total Crash*							8,46	13,81	17,13	18,95
Total Waktu Normal							100	100	100	100
Total Waktu Proyek Setelah Dilemburkan							91,54	86,19	82,87	81,05

Based on the above tables, it can be obtained recapitulation of time and cost of the activities having overtime work in each overtime hours. The fastest time recapitulation with new project costs and additional costs can be shown in the following table.

Table 2 – The Fastest Time Output with Total Cost of TCTO

Overtime	Duration	Direct Cost	Indirect Cost	Total Cost
Normal	100	IDR 3.396.750.709,50	IDR 830.501.395,96	IDR 4.152.507.000,00
1 Hour	91,54	IDR 3.398.159.770,69	IDR 819.409.714,36	IDR 4.217.569.000,00
2 Hours	86,19	IDR 3.400.849.548,35	IDR 813.826.343,80	IDR 4.214.676.000,00
3 Hours	82,87	IDR 3.403.682.464,74	IDR 811.296.327,14	IDR 4.214.979.000,00
4 Hours	81,05	IDR 3.406.816.503,02	IDR 811.170.936,62	IDR 4.217.987.000,00

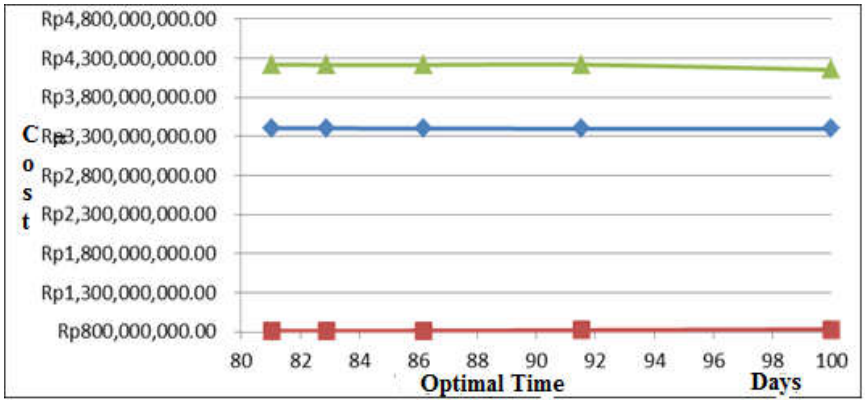


Figure 1 – Relationship between Time and Cost toward Project Total Cost

From the table have some variation of the fastest time output with the addition of cost. From the series of new project completion time, an effective project completion time is chosen with the minimum project cost increment. The relation between time and cost on 2 hours overtime work can be seen in the Figure 1.

According to figure 1, can obtained the most benefit alternative for finishing the project is 2 hours overtime work and also the most optimal phase. With this alternative, time for finishing the project experiencing 14 days acceleration as well as increasing cost of IDR 62.169,00. This phenomenon indicating a TCTO method can causing many time can use as an overtime work however, also can increase the cost of project execution.

DISCUSSION OF RESULTS

The following table shows the results of the recapitulation of the two alternatives that have reached the optimal stage in terms of time and cost.

Table 3 – Recapitulation of Cost Additions

No.	Overtime	Time	Acceleration	*Total Cost*	Added Cost
1	Normal	100	0	IDR 4.152.507.000,00	0
2	1 Hour	91,54	8,46	IDR 4.217.569.000,00	IDR 65.062.000,00
3	2 Hours	86,19	13,81	IDR 4.214.676.000,00	IDR 62.169.000,00
4	3 Hours	82,87	17,13	IDR 4.214.979.000,00	IDR 62.472.000,00
5	4 Hours	81,05	18,95	IDR 4.217.987.000,00	IDR 65.480.000,00

From table, the most profitable acceleration stage is by applying overtime work for six activities during 2 hours. The critical activities that get overtime work on 2-hour overtime are project nameboard, mini pile work, poor plate sand backfill, sills + door type P1, ceiling paint, and railing hollow stainless fence. Meanwhile, the acceleration cost is IDR 4.214.676.000,00 from the total normal cost of IDR 4.152.507.000,00.

In contrast, the total cost in table for normal hours is IDR 4.152.507.000,00, thus with the value, the selected value is the normal execution time. It is because the *total cost* at the normal time is the optimal time and the optimal cost which are obtained.

CONCLUSION AND SUGGESTIONS

The conclusions of this research are: 1) the optimal duration for completion of development project using TCTO method is 100 days with no additional hours, 2) the optimal cost needed is IDR 4.152.507.000,00, 3) there are no additional cost from the initial contract value.

For construction employers, if the project can be ensured, there will be no retardation from the schedule specified on certain contractual agreements, but if an acceleration step wants to be done, then the implementation of TCTO can apply overtime work in one of the critical activities only. It is because in addition to completing the project faster but in terms of the cost of acceleration, it will require additional cost as well. In the event of a retardation by pursuing a predetermined schedule of contractual agreements, it is advisable to implement TCTO method for some critical activities. It is because in addition to completing the project on time or faster, the cost required for the acceleration can be clearly identified through TCTO method approach.

For further research, it is suggested that the research can be developed with other acceleration method. For further research, it is suggested that the research can be done with the recent SNI.

REFERENCES

1. Soeharto, I. (2001). Manajemen Proyek – Dari Konseptual Sampai Operasional, Jakarta.

2. Popov, V., Juocevicius, V., Migilinskas, D., Ustinovichius, L., & Mikalauskas, S. (2010). The use of a virtual building design and construction model for developing an effective project concept in 5D environment. Automation in construction, 19(3), 357-367.
3. Ghasemzadeh, F., & Archer, N. P. (2000). Project portfolio selection through decision support. Decision support systems, 29(1), 73-88.
4. Breitman, R. L., & Lucas, J. M. (1987). Planets: A modeling system for business planning. Interfaces, 17(1), 94-106.
5. Tompkins, J. A. (2010). Facilities planning. John Wiley & Sons.
6. Pechmann, A., & Schöler, I. (2011). Optimizing energy costs by intelligent production scheduling. Glocalized Solutions for Sustainability in Manufacturing, 293-298.
7. Austin, T., Larson, E., & Ernst, D. (2002). SimpleScalar: An infrastructure for computer system modeling. Computer, 35(2), 59-67.
8. Elbeltagi, E. et al (2001). Schedule-dependent evolution of site layout planning. Construction Management & Economics, 19(7), 689-697.
9. Pang, C., Dutta, P., & Kezunovic, M. (2012). BEVs/PHEVs as dispersed energy storage for V2B uses in the smart grid. IEEE Transactions on Smart Grid, 3(1), 473-482.
10. Ko, C. H. (2009). RFID-based building maintenance system. Automation in Construction, 18(3), 275-284.
11. Zhang, H. (2006). Particle swarm optimization for resource-constrained project scheduling. International Journal of Project Management, 24(1), 83-92.
12. Yamin, R. A., & Harmelink, D. J. (2001). Comparison of linear scheduling model (LSM) and critical path method (CPM). Journal of Construction Engineering and Management, 127(5), 374-381.
13. Rogalska, M. (2008). Time/cost optimization using hybrid evolutionary algorithm in construction project scheduling. Automation in Construction, 18(1), 24-31.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.06

CONCEPT AND MODEL OF SHARIA SALONS AND SPAS: MYTH OR REALITY?

Bafadhal Aniesa Samira*, **Yulianto Edy**, **Siswidiyanto**,
Hendrawan Muhammad Rosyihan
Business Administration Department, Faculty of Administrative Science,
University of Brawijaya, Indonesia
*E-mail: aniesa.bafadhal@ub.ac.id

ABSTRACT
Currently, health issues have grown rapidly into Health Tourism segment to strengthen Indonesia's tourism. Ironically, the proliferation of salon and spa business as well as other forms of health tourism business is considered to cause negative effects in the form of destructive cultural penetration of foreign tourists. This study aimed to analyze the prospects of sharia salons and spas in safeguarding the health tourism in Indonesia. Furthermore, we examine the mix variables of sharia marketing as a marketing stimulus to encourage Muslim tourists in making the decision to visit and re-visit as well as their interest in the sharia salons and spas. This explanatory study uses the paradigm of quantitative research involved 13 informants of Muslim owner/staff sharia salons and spas in East Java, Indonesia. The results of this study indicate that stimulus of sharia marketing is needed to develop tourist visits, especially Muslim travelers in health tourism destination of sharia salons and spas.

KEY WORDS
Health tourism, sharia, salons, spas , Indonesia.

Thousands of years ago, people had to travel to distant places in order to heal themselves, so essentially a medical tourism is a phenomenon that has long existed. In its development, global competition has emerged in the health care industry. Countries that have advanced the tourism, such as Switzerland, Germany, France, UK, USA, Canada, Austria, Australia, Japan, China, Singapore, and even Malaysia have long organized forms of such health tourism for both domestic tourists and foreign tourists. This then led to the term of borderless patient for health tourists in developed countries and in developing countries. Wealthy patients from developing countries have long traveled to the developed countries for high-quality medical care. However, now many middle economic class patients from developed countries travel to developing countries to seek high quality medical care at affordable prices (Herrick, 2007).

Currently, health issues have grown rapidly into Health Tourism segment to strengthen tourism, not least for Indonesia, which has a lot of local knowledge in the field of health from the science of alternative medicine heritage. Health tourism activity generally refers to patients who travel for beauty, rehabilitation, care of themselves in their recreation. Health tourism emerged as a new form for the tourism industry which is diffusion between the needs of an individual to obtain health care and their wish to travel in the same time (Rollyson, 2010; Munro, 2012; Snyder *et al*., 2013; Henema, 2014). The form of implementation of health tourism includes yoga, gym or fitness, dentistry, spiritual festivals, ayurveda, mud baths, cosmetic surgery, acupuncture and acupressure, and what has been popular in Indonesia is a salon and spa services business.

Tilaar (2011) state that the development of salon and spa in Indonesia and the world is growing rapidly. Factors causing the inner pressure or stress are increasingly high that many people, especially among metropolitan, require salon and spa as a means of treatment for relaxing theraphy. Ironically, the development of health tourism in Indonesia also poses the threat of penetration of "wild west" (Macready, 2007; Cortez, 2008; Johnston *et al*, 2010) brought by foreign tourists as foreign culture can lead to transformation of culture or even cultural amnesia, that will ultimately bring multiple effects on various sectors of public life and business industry.

Young (1973) suggests that tourism may give rise to an undesirable activity, such as prostitution, sex trafficking, and HIV and penetration of foreign culture that can have negative impacts for local communities. In public perception, spa and salon business is identical to the negative stigma (Narendran, 2011). This is evidenced by the emergence of 'plus-plus' salon and spa, erotic massage parlors, homosexual salon as well as prostitution under the guise of health and fitness business in Indonesia. Although it promotes itself as a spa and sauna with exclusive prices and services, in practice it is similar to prostitution and other hedonism.

The mindset of tourism businesses people tend to be oriented to economic advantages alone without strong commitment and awareness in maintaining cultural, social, and religious values; and this can be a threat to the nation and especially for the development of the tourism industry itself. On the other hand, Indonesia is a potential market of abundance domestic Muslim tourists. However, the limited variety of facilities and infrastructure of the health tourism and ethical fulfillment of sharia and affluence of 'plus-plus' spa and salon in Indonesia shows that the country is still weak in capturing the opportunities and potential of Muslim tourists even for domestic market needs.

On a variety of spa and salon areas in Indonesia, it is difficult to obtain standard service according to the value of sharia for Muslim women who keep the "*aurat*" according to the religious beliefs, for example in terms of a therapist of the same sex, no-pork raw materials, no eyebrow shaving or like-man hair, and so forth.

Recognizing the potential and opportunities of Muslim tourists, and keeping the noble values of the nation's culture as well as maintaining and increasing attraction for them, both domestic and foreign tourists, on health tourism in Indonesia, the Ministry of Tourism and Creative Economy has started to promote standardization of sharia spa and salon (Ministry of Tourism, 2015).

Sharia salons and spas is a model of spas and salons that offer beauty therapist and rooms based on gender, halal cosmetic materials as well as service, interior, equipment and other facilities that comply with Islamic law (Yemen *et al*., 2012). Sharia salons and spas is expected to minimize the practice of adultery and other hedonism. Sharia salons and spas business continues to grow and is proven profitable and some has been using a franchise system. Until now, there are about less than a hundred sharia salons and spas in Indonesia. So far, the Majelis Ulama Indonesia (MUI) has not issued a special fatwa and sharia certification for the operation of sharia salons and spas, but many spas and salons are getting halal certification for its products.

Malang is a city in the province of East Java, Indonesia, which has a high potential to develop health tourism, especially with the support of domestic Muslim tourists. The high number of students, especially Muslim ones, poses potential for tourism in Malang City, Surabaya City and Sidoarjo City, East Java, Indonesia. They need to be accommodated and facilitated for health and fitness that meet the values and ethics of sharia, one of which is through sharia spas and salons. Furthermore, in the operation of sharia spa and salon, evaluation and assessment of the effectiveness of marketing and management variables is important to increase the number of users and encourage repeat visits, to increase the income of business, and to help develop the health tourism in Indonesia.

This study attempts to improve the health tourism segments through prospective sharia spas and salons in Malang, in encouraging domestic Muslim tourists. This study aimed to analyze the effect of implementation of sharia services marketing mix that has been applied to decision buying as well as revisit intention in sharia salons and spas.

Originality that this research offers is that it fills the gap of research on prospective sharia salons and spas in extending health tourism using a sharia marketing perspective that is still missing in Indonesia. Abroad, there are only a few researchers like Yemen *et al*. (2012) in Malaysia, conduct the same study. In Indonesia, previous research on sharia spas and salons is still in early stages of analyzing phenomena and behavior, in a study by Budiyanto (2015). While other researchers analyze the sharia salon spa business from various perspectives such as from the perspective of Islamic architecture in a study by Kusjuniardi (2014), Trison (2015), and Indry (2014) as well as from the perspective of human resource management, for example in research by Sari (2013).

LITERATURE REVIEW

Health Tourism. According to Pendit (1994), there are several types of tourism already known, such as Health Tourism, i.e. one's journey with the aim to exchange the circumstances and the environment in one's everyday live for the sake physical and spiritual health.

Health tourism is a blend of Medical Tourism and Wellness Tourism. Wellness or Healthy Lifestyle Tourism provides improved and preventive health services, and puts more emphasis on relaxation and good look, like beauty, weight loss, and fitness services. Medical tourism provides conventional and traditional medical services such as cosmetic surgery, organ transplantation, chemotherapy, physiotherapy, massage, and acupuncture.

Sharia Marketing. Alom and Haque (2011) state that sharia marketing can be defined as a process and strategy (*hikmah*) to meet the need through the halal products and services (*tayyibat*) by mutual consent and welfare (*Falah*) of both parties of buyer and seller to achieve material and the spiritual wealth in the world and the hereafter.

Sharia Salon and Spa. Sharia salons and spas are currently experiencing exponential and massive growth. This is similar and becomes the more popular development of modern Islamic hammam, which has long been growing, especially in the Umayyads. Nevertheless, at present, research on sharia salons and spasshows such poor trendas few researchers pay attention to the potential of innovation of sharia salons and spas compared conventional salons and spas especially in Muslim countries. Some researchers have initiated research on salons and spas in various countries, among others such as Malaysia (Bahaudin and Abdullah, 2010; Husain and Jamal, 2015), Indonesia (Bafadhal, 2017), Thailand (Chookaew et al., 2015), and Finland (Islam and Kärkkäinen, 2013). Even so, those researchers have put an important springboard for the development of the concept of sharia salons and spas.

Spa was originally defined as a medical treatment to ensure total relaxation for those who receive treatment using water vapor as its main element. Clark (in Bahanudin and Abdullah, 2010) shows that spas can be divided into four types, namely retreat spas, resort spas, day spas and salons or mini spas. Callen (2007) claims that in their development, spas are no longer just associated with mineral springs and therapeutic use of water. Spas now present in the form of chic services and products in a beauty salon, are available in a variety of department stores, and may also involve place to eat delicious and healthy food or even become the ultimate destination for a vacation.

It is similar to the development of services in the Islamic hammam as a forerunner of sharia salons and spas, as it also provided services such as guard baths (ḥammamīān), barber (salmānīān), masseur (āsījānān), therapists or cuppers (ḥajjāmān), and others (Mez, 1992). Islamic Practices Spa provides spa services, beauty therapists based on sex, the use of differentrooms and different services for male and female clients, and services in accordance with Islamic law (Yemen et al., 2012). By applying Islamic values in the beauty business, it will realize Muslim needs to feel comfortable and relaxed, knowing that servicesfor men and women are separated so privacy is maintained.

METHODS OF RESEARCH

This explanatory research uses qualitative research paradigm. The sample in this study was 13 owner/staff of sharia salons and spas in Malang City, Surabaya City and Sidoarjo City East Java, Indonesia. The data was collected for approximately 2 month from July 2017 until August 2017.

This research was conducted by distributing questionnaires to domestic Muslim tourists as visitors the sharia salons and spas in Malang City, Surabaya City and Sidoarjo City East Java, Indonesia. Respondents were identified based on informant name, informant position, age of company, business types, especially for woman, non-Muslims as seen as Table 1 below. Qualitative analysis technique such as interview and literature study was used in this study.

Table 1 – Description of Informants

No	Area	Company Name	Age of Company	Business Types	Esp. for Woman	Esp. for Non-Muslim
1	SBY	Alesya	9 years	Private	Yes	Yes
2	SBY	Alfafa	4 years	Private	Yes	Yes
3	SBY	Noura	6 years	Private	Yes	No
4	SBY	Nayyara	7 years	Private	Yes	No
5	SBY	Kayla	8 years	Private	Yes	Yes
6	SBY	Deva	10 years	Private	Yes	Yes
7	MLG	Fatimah	13 years	Private	Yes	No
8	MLG	Almira	2 years	Private	Yes	No
9	MLG	D'Mutia	4 years	Franchise	Yes	Yes
10	MLG	Yasna	5 years	Private	Yes	No
11	SDA	Sholika Yahya	3 years	Private	Yes	Yes
12	SDA	Jasmine	2 years	Private	Yes	Yes
13	SDA	Dhila Jasmine	6 years	Private	Yes	Yes

RESULTS AND DISCUSSION

Based on literature study and interview, the author states that sharia salons and spas are a form of business that provides promotive and preventive wellness services and products combining aesthetic, cosmetics, and spiritual treatments of the body, face, hair, and soul for both men and women, especially Muslims in conformity with Islamic law as the main determinant.

Muslim consumers, managers of Muslim-friendly salons and spas as well as the government must coordinate as to play the important role in setting up education and training, regulation, accreditation, quality standards, and marketing of sharia salons and spas. Through a review of various sources, the author has developed a standard concept for sharia salons and spas, i.e. the Salient Traits of Sharia Salon and Spa in table 2 and figure 1.

Tabel 2 – Salient Traits of Sharia Salons and Spas

No.	Category	Salient traits
1	2	3
1	Services	Forbidden to shave the eyebrows, beard, facial hair
		Forbidden to do hair coloring with black color, preferred red and yellow color
		Forbidden to show *aurat* especially the body secara vulgar
		Products must free form haram ingredients
		Forbidden to treat wig and *konde*
		Therapist must be of the same sex with the clients
		Tersedia layanan mencabut bulu ketiak, dada dan betis
		Suggested (*sunnah*) to shave the pubic hair and trim the mustache for man but not for woman
		Forbidden to have hair extension
		Suggested to trim the nails (pedicure andmanicure)
		Suggested to have a face mask and gulp down the body with blossom mask or halal materials
		Forbidden to mencukur atau menggundul rambut wanita hanya boleh memotong
		Forbidden to do*qoza'* (cut some hair and leave some other)
		Women are forbidden to cut all their hair resembling men
		Forbidden to have tattoos
		Forbidden to pull out grey hair
		Allowed to wear nail polish for women during their period
		Forbidden to wear nail polish as it causes *wudhu* or ablution not perfect form inai
		Allowed massage using oils; the treatment must not evoke lust and not torture the body
		Allowed to use aromatherapy with natural ingredients and non-intoxicating
		Allowed to have mud bath
		Allowed to have spice bath / herb
		Allowed to make the eyes up using kohl; the makeup must be simple
		Hair and nails of the female clients must be collected when they are having their period during treatment; the hair and nails must be included during *junub* bath
		Allowed to make up the hands and feet with *henna*
		Allowed to do dental spa and with *siwak*
		Allowed to style and to comb the hair
		Allowed to use perfume during treatment
		Allowed to treat acne and boils in particular with *dzarirah* perfume.
		Braid is allowed, yet *konde* is prohibited
		Not allowed to bath in warm water pool
		Allowed to use steam shower or sauna dengan ruangan terpisah antar klien
		Allowed to use ice water for treatment
		Allowed to provide traditional services or modern ones as long as the services are not prohibited by Quran, Hadith, *Ijma*, and *Qiyas*

1	2	3
2	Facilities	Providing the waiting room for the husband or *mahram* who accompanies the female customers
		Separating the service rooms between male and female
		Reciting of the Al-Quran verses
		The equipment used do not violate Islamic law and is free from any haram materials
		Availability of prayer room, prayer mat, and the Qibla direction
		No music expressing seductive and controversial messages
		Non-figurative decoration pattern (no pictures and *statues*, figurines of human and animal form)
		Bed, toilets, and therapy room facing Mecca
		Water friendly restroom or toilet
		Build-in *wudhu* facilities located outside the prayer room
3	Management	Therapists and staffs diutamakan beragama Islam
		Prohibited from providing services that lead to negligence of the prayer time
		Not hiring transgender as the staff
		Therapists and staff wearing descent clothes covering the *aurat*
		Providing special time for prayers for Muslim workers
		Special arrangement for Muslim workers duringRamadhan
		Ethical marketing and promotion
		Conducting corporate social responsibility
		Paying tax
		Conducting philanthropic donation based on *zakat* principles, giving *infaq* and *sodaqoh*
		All transaction using the network of Islamic financial institution such as sharia banks
		Management and ownership preferably by Muslim individual
		If possible, sharia supervisory boards are available within the organizational structure of the company

There are also controversies and conflicts related to halal haram for a woman to open their *aurat* in front of non-Muslim women. Some scholars declare that this is haram except for emergency and life-threatening conditions such as a medical operation or accident and treatment of diseases. However, when it comes to health care that is not urgent, most scholars agree that Muslim women should not open their *aurat* in the presence of non-Muslim women. Therefore, it is better that Muslim women go to a salon and spa managed and owned by Muslims. Meanwhile, for non-Muslims interested in opening up a salon and spa targeting Muslim users, they are suggested to provide Muslim therapists and staff. The development of beauty and spa treatments in various countries is because people are looking for new and unique experience. The main problem in dealing with beauty treatments and spa operations from the perspective of Islam is the issue of mahram, *aurat*, and separation of different sexes.

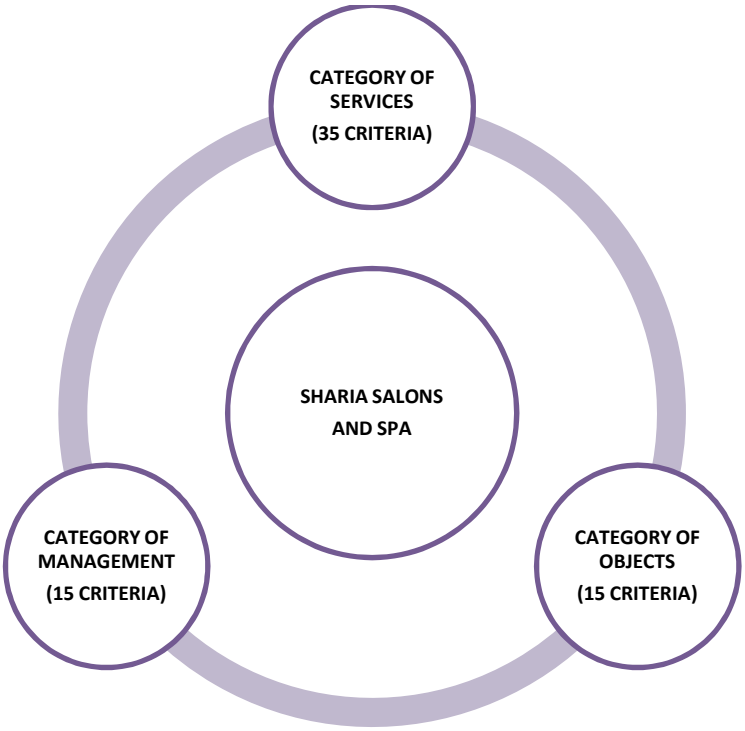


Figure 1 – Standard Model of Sharia Salon and Spa

The Quran commands, "...and not expose their adornment except to their husbands, their fathers, their husbands' fathers, their sons, their husbands' sons, their brothers, their brothers' sons, their sisters' sons, their women, that which their right hands possess, or those male attendants having no physical desire, or children who are not yet aware of the private aspects of women...." (An-Nur: 31).This shows the prohibition for a Muslim woman to appear without *hijab* in front of a non-Muslimfemale, fearing that the non-Muslim woman will be able to explain to her husband or other strangers (non-*mahram* of the Muslim woman) regarding the physical condition of the Muslim woman so as if the man sees the Muslim woman directly. Actually, Muslim women are allowed to get salon and spa treatments, as long as the treatments are not too much and not to show off. Muslim women should keep their beauty only for their husband (or future husband). It is necessary for married Muslim women to ask for husband's permission before going to the salon; the husband must also allow the treatments. It is also important not to miss any prayers during the treatments. The treatments must nottorture the body, such as shaving and embroidering eyebrow, hair extension, and tattoos.

CONCLUSION

Although Islamic marketing concept is relatively new in comparison with Western marketing, it does not mean that Islam has not been familiar with the marketing concept. Muslims have been trading for over a thousand years,have made contact with the various local cultures, and have adjusted their approach in the context of Islam in order to market their goods and services (Wilson and Grant, 2013). As part of the competitive tourism industry,sharia salons and spas not only provide facilities and products but are also required to execute a sharia marketing strategy to allocate their resources well to increase the number of customers. Although sharia salon and spa business is currently very promising, without sharia marketing management strategy, the value will certainly lose in the competition. In addition, there are differing opinions of managersin the implementation of standard operating procedure of sharia salons and spa. Evaluation and assessment on the effectiveness of sharia marketing management run by managers of sharia spas and salons is necessary in order to increase the number of service users,to increase revenues, and to help develop the health tourism in Indonesia.

The exponential growth of sharia salons and spas marks a positive trend; they have even grown into a franchise business. However, the development of sharia salons and spas in some countries has not been formalized by a *fatwa* of the authorities. Malaysia has issued a special *fatwa* on Islamic Spa Practice by Majelis Fatwa Kebangsaan. Indonesia, on the other hand, has not done so. A *fatwa* is a religious order issued by a leader of a Muslim scholar. As there has been no such *fatwa*, differences in the implementation of sharia salons and spas exist, both in Indonesia and in various countries around the world. Many salons and spas claim to work on sharia, but they have not uniformly applied Islamic values in both service and management.

Muslim scholars are expected to consider the importance of the *fatwa* specifically for sharia salons and spas, so the *fatwa* can be become a technical reference in the implementation of the business in the near future. With the *fatwa*, sharia salons and spas have standards in meeting the health care needs of domestic and foreign Muslims. In addition, the *fatwa* must also be reinforced with the regulations of the government legally and obligatory binding all sharia salons and spas.

REFERENCES

1. Alaika, Ilma Arsala (2014) factor-faktor bauran pemasaran yang berhubungan dengan minat kunjungan ulang pasien RS Hermina Bekasi Tahun 2014, Skripsi, Program Studi Kesehatan Masyarakat, Fakultas Kedokteran dan Ilmu Kesehatan, UIN Syarif Hidayatullah Jakarta, Jakarta.

2. Alom, M. (2011). Marketing: an Islamic perspective. World Journal of Soc. Sc., 1(3), 71-81.
3. Assael, Henry. 2002. Consumer Behavior and Marketing Action. Fifth Edition. Cincinnati Ohio: South-Western College Publishing.
4. Azzadina, Irna and Huda, Aulia Nurul, (2012), Corinthias Pamatang Morgana Sianipar Understanding Relationship between Personality Types, Marketing-mix Factors, and Purchasing Decisions, Procedia - Social and Behavioral Sciences 65, 352 – 357.
5. Budiyoanto, Ary (2015), Consuming Islamic Images. The politics of contemporary Indonesian Islamic Culture Industry, Universitas Gadja Mada, Yogyakarta, Indonesia.
6. Cortez, N (2008), Patient without Borders: The Emerging Global Market for Patients and the Evolution of Modern Health Care. Indiana Law Journal, 83:7.
7. Henama, Unathi Sonwabile (2014), “Health tourism in South Africa: opportunities and possibilities” African Journal of Hospitality, Tourism and Leisure Vol. 3 (1), pp. 1-8.
8. Herrick, Devon (2007), “Medical Tourism: Global Competition in Health Care”, NCPA Policy Report No. 304, National Center for Policy Analysis: Dallas, Texas.
9. Kotler, Philip (2009). Manajemen Pemasaran. Alih Bahasa: Jaka Wasana. Jakarta: Penerbit Airlangga.
10. Kotler, Philip dan Keller, K.L. (2006). Manajemen Pemasaran. Alih Bahasa Benyamin Molan, Ed. 12,Jilid 2. Jakarta: Penerbit PT Indeks.
11. Kotler, P. (2001). Prinsip-Prinsip Pemasaran, Alih Bahasa Imam Nurmawan, Jakarta.
12. Kusjuniardi, Mutiara Yudinda (2014), Salon Khusus Wanita Muslimah dengan Interior yang Bernuansakan Timur Tengah, Studi Kasus: Salon Moz5 Surabaya, Skripsi, Jurusan Desain Produk Industri, FTSP, Institut Teknologi Surabaya, Surabaya.
13. Lovelock, C., Wirtz, J (2011). 2nd Edition. Essentials of Services Marketing. Singapore: Prentice Hall. Marketing, Vol. 3, pp. 212-216.
14. MacReady, N (2007), Developing countries court medical tourists. Lancet, 369:1849-1850.
15. Munro, Julie W (2012) “Best Practices in Medical Tourism #3: What is Medical Tourism?”, Medical Travel Quality Assurance (MTQUA), Bangkok, Thailand.
16. Narendran, R. (2011). Are the female entrepreneurs of beauty salons in India, victims of bad publicity?. Int. J. of Diver. in Organizations, Communities and Nations, 11 (1), 47-56.
17. Payne, Adrian. 2001. The Essence of Service Marketing. Diterjemahkan oleh: Fandy Ciptono. Penerbit Andi. Yogyakarta.
18. Pendit, I Nyoman, S. 1994. Ilmu Pariwisata Sebuah Pengantar Perdana. Jakarta: Pradnya Paramita. Sari, Dian Permata (2013) Standar Kinerja Karyawan Azzahra Salon dan Spa Muslimah Yogyakarta, Skripsi, Fakultas Dakwah, Universitas Islam Negeri Sunan Kalijaga Yogyakarta.
19. Schiffman. G, Leon, Leslie, Lazar, Kanuk (2008). Perilaku Konsumen. Alih Bahasa Zoelkifli Kasip. Jakarta: Gramedia.
20. Tilaar, Martha (2011), Pioneers in Science, Jakarta: Dian Rakyat.
21. Trison, Sonia Yulia (2015), Bogor Az-Zikra Sharia Beauty Care and Fitness Center, Publikasi Ilmiah, Program Studi Arsitektur Fakultas Teknik, Universitas Muhammadiyah Surakarta.
22. Vahdati , Hojjat, Najmeddin Mousavi, Javad Taheri Moghadam (2014), A Study on the Effect of Marketing Mix on the Repurchase Intention with the Consideration of the Mediating Role of Brand Equity (Case Study: Ghaem Shahr Refah Bank), Advances in Environmental Biology, 8(21) October, Pages: 467-474.
23. Yaman, Rostam; Zarina Alias and Norishahaini Mohamed Ishak (2012) “Beauty Treatment and Spa Design from Islamic Perspective”, Procedia - Social and Behavioral Sciences 50 (2012) 492 – 501.
24. Young, G. (1973). Tourism - Blessing or Blight?. London: Penguin.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.07

ANALYSIS OF LEASING ADVANTAGES AND DISADVANTAGES AS PUBLIC-PRIVATE PARTNERSHIP'S FORM IN ROAD INFRASTRUCTURE PROJECTS

Komissarova V.V., Lecturer
Vladivostok State University of Economics and Service, Vladivostok, Russia
E-mail: valeriya.komissarova@vvsu.ru

ABSTRACT
The article deals with the problem of road infrastructure. The road network development gives the economy new production capacity by reducing transportation costs and transportation time expenditure, therefore, improving the quality of roads significantly affects the price level in the country, that means the common weal, the value of service and the increase of GDP, and as a consequence, on the amount of charged taxes. In order to ensure a sustainable growth of the common weal, the mutually connected development of the economy and the road transport complex is necessary, but now the state of the industry is characterized by a number of problems.

KEY WORDS
Road infrastructure, financing, leasing, innovation, public-private partnership (PPP), roads, transport infrastructure, concessions, credit.

Today the issues about the road network development are priority in Russia that is confirmed by the regulatory documents of the Ministry of Transport of the Russian Federation and defined in the Transport Strategy of the Russian Federation for the period until 2030 [1]. The most actual questions are about development of transport and, therefore, road industry at the regional levels. In many aspects roads determine the opportunities for the development of regions taking into account their geopolitical situation, mass transportation of goods and passengers is carried out, and life becomes impossible without the transport arteries, even small settlements, not to mention of large cities.

The road network development gives the economy new production capacity by reducing transportation costs and transportation time expenditure, therefore, improving the quality of roads significantly affects the price level in the country, that means the common weal, the value of service and the increase of GDP, and as a consequence, on the amount of charged taxes. Mentioned directions presuppose the development of measures to improve the activities of road enterprises, including the improvement of the management structure and monitoring system for the transport and operational status and development of the road network, the formation of a financing system based on program-target and project approaches, the training of highly qualified specialists and many other tasks to develop the road economy.

In the furtherance of these goals, the state's primary targets are to increase the reliability and operation life of road facilities, increase the technical level and transport-operational condition of highways, reduce the cost of road works, reduce accident rates and improve environmental safety on roads, etc. At the same time, the quantity and quality of transport communications serves are as an indicator of successful economic development and scientific and technical progress of the country. The state of the road economy is of strategic importance for the development of macroeconomic relationships not only between the regions of Russia but other countries.

In the project «Fundamentals of the Road Reform Concept of the Russian Federation», the road economy of the Russian Federation is defined as an element of the transport infrastructure that provides constitutional guarantees of citizens for freedom of movement and makes possible the free movement of goods and services, while the territorial integrity and unity of the economic space of the Russian Federation is determined by availability and condition of the road network for common use [2].

In order to ensure a sustainable growth of the common weal, the mutually connected development of the economy and the road transport complex is necessary, but now the state of the industry is characterized by a number of problems.

Firstly, this is a lack of financing of road maintenance operations, which leads to a shortening of the road operation life, an increase in the need for maintenance and repair costs. This is due to the fact that the modernization and development of the road network require significant capital investment, but the high capital intensity of road facilities and long payback periods hamper private investment.

Secondly, the simultaneous increase of the load on the road network exacerbates the inconsistency of highways to regulatory requirements for vehicle operation indicators.

Thirdly, 34 automobile routes of the European and Asian network of international highways pass through the territory of the Russian Federation. Over the past 20 years, the percent of transit traffic has increased from 12% to 30% of the total traffic flow. In the conditions of the globalization of the world economy and the development of foreign economic relations, the territory of the Russian Federation may find itself in economic isolation because of the lag in the development of the road network, its inadequacy to international requirements, the lack of development of a network of expressways allowing the crossing of the whole country without delays [3].

The unsettledness of the above-mentioned problems leads to the fact that the roads are one of the limitations which restrain the country's economic growth and reduce the competitiveness of the Russian economy. The growing lag in the development of roads leads to significant economic losses in agriculture, losses from road accidents and the negative impact of the road and road complex on the environment. The annual amount of losses associated with the inadequate development of the road network to the needs of the national economy and the low technical operation of the road sector is estimated at about 1.8 trillion rubles, which exceeds 3% of Russia's GDP and affects the receipt of taxes to the state budget [2].

Insufficient growth rates and low transport-operational indicators of the state of highways are due to factors such as insufficient funding for road maintenance; using of obsolete equipment and technologies; low quality of basic road building materials (crushed stone, bitumen, etc.) and structures; insufficient performance and technological discipline, etc. These reasons are aggravated by the inconsistency of the existing management systems in the road sector to the requirements of the development of the modern economy. At the same time, the improvement of management mechanisms can be viewed not only from the point of view of the necessary condition for the effective functioning of the road economy of the country, but also as a catalyst for the development of related sectors of the economy, a powerful factor in the formation of multiplicative effects, the forms whose manifestations are the growing competitiveness of potential stakeholders and increasing tax revenues to the budget state.

Today the fleet of vehicles is characterized by heavy wear and a relatively small number of modern machinery and equipment capable to provide qualitative indicators of construction, repair and maintenance of roads, which depend on the technical level of the machinery itself and the degree of automation. Wear of the equipment and machinery fleet in the road economy reached a threshold level and exceeded 50% at a sevenfold decrease in the renewal ratio of fixed assets since 1994. So the specific weight of machines with expired operation life to of the end of 2009 was: for crawler cranes - about 70%, for tower cranes - 58%, for tractors - 56%. The unsatisfactory technical condition of most of the Russian roads is a powerful incentive for the speedy renewal of fixed assets in the road sector [4].

Over the years, we have the goal to achieve not only sufficient amounts of road construction, but also to improve financing mechanisms in parallel with changes in management in the road sector. This implies the application of a new approach to investment with a view to the technical re-equipment of the road industry enterprises.

Speaking about the innovative potential and the implementation of innovative projects capable to ensure the competitiveness of the Russian economy, it is necessary to understand with the aid of which modern financing instruments innovation will be

implemented to solve the problems of the transport complex development in the Russian Federation.

To ensure the financing of road facilities, it is efficient to create sources of stable cash receipts in the road sector. On the one hand, this is possible due to the creation of trust funds, which would be formed of revenues from the payment of excises for fuel and lubricants, transport tax and other revenues from the exploitation and using of motor roads, on the other hand, through the using of mechanisms of public-private partnership (PPP), where private investment would become one of the main sources of funding for technical upgrading of the road sector.

Studying the experience of developed and rapidly developing countries, the changes can be traced in such industries as road and utilities, rail and pipeline transport, electricity, ports, airports, previously completely state-owned and evaluated as a cardinal. The reason for these changes is, on the one hand, the fact that a lack of funds was appeared in the state budgets not only for further development, but also for simple maintenance of effective functioning of these industries and, on the other hand, the impossibility of privatization because of their strategic, social and socio-political significance. This contradiction served as the basis for creating and implementing the concept of public-private partnership (PPP) in business practice.

Despite the fact that today in Russia, public-private partnership, from a legal point of view, can only be exercised on the basis of the law on concessions, this kind of partnership may act in such forms as governmental contracts, rent, financial rent (leasing), public-private ventures, production sharing agreements, concession agreements [4].

The main features determining PPPs include, firstly, that the goal of this cooperation is the national and international socially significant projects implementation in various fields of activity based on the state and business structures interaction for a long-term basis, and secondly, the public-private partnership principle is based on the pooling of resources and the distribution of risks among participants [5].

In a broad sense, the most diverse interaction forms between business and power structures can be attributed to the basic PPP forms - from creating charity funds to subsidizing the real sector of the economy. In practice, a narrower approach is often used when PPP is understood as an equitable, mutually beneficial cooperation between the state and private business in the process of building public infrastructure and providing public services, subject to the sharing of risks and responsibilities [5].

The main spheres of PPP application are, first of all, those that traditionally belong to the state jurisdiction, for example, public goods (transport, communal, social infrastructure, cultural objects); public services (maintenance of public facilities, housing and communal services); objects of ecological sphere; law enforcement services; objects of social sphere (education, health, social protection).

At the same time, this system of relations causes many disputes among scientists and practitioners. To date, there is no specific definition, no single understanding of the essence of public-private partnership. Thus, some experts consider PPP as a form of indirect privatization on the grounds that the advanced economies experience often indicates a redistribution of powers between the state and private business, with the broad powers transfer, related to the ownership, operation, construction and financing of facilities. In this case, cases of subsequent partial or complete privatization of such objects are not uncommon.

Other scientists consider PPP as a special, full-fledged form of state facilities privatization replacement, which allows, on the one hand, to realize the entrepreneurial initiative potential of private capital, on the other hand, to retain state's control functions in socially significant sectors of the economy. At the same time, the state remains the owner of the objects, attracting private capital to solve a variety of problems [6].

In connection with the existing contradictions in Russia, it is necessary to develop its own strategy for applying public-private partnerships with a unified PPP project management system, including regulatory support, financing mechanisms for various options for interaction between the state and private business, providing privileges and guarantees to

private investors, training specialists to work in this area, the distribution of risks between partners in partnerships.

In modern conditions of reforming the domestic economy, the study of the processes of development and regulation of forms of financing investment projects is an actual direction. Along with such methods of financing as credit and budget financing, self-financing, corporatization, leasing became widespread and applied, which creates additional competition in the financial services market due to its dual nature: on the one hand, it is a kind of capital investment, since it involves investing in material assets in order to generate income, on the other hand, it preserves the features of the loan, since it is provided on the basis of pay, urgency, and repayment. In emerging economies, leasing often becomes an alternative to bank lending for the acquisition of fixed assets, thereby allowing companies not to increase their debt to the bank, i.e. is an additional form of long-term financing. This is particularly important in the current structure of liabilities of Russian banks, which does not allow to direct attracted financial resources into long-term projects related to the road sector.

Structural reorganization of the domestic economy is impossible without significant activation of investment processes in various areas of economic activity. Under the existing conditions, leasing, as an alternative to direct investment, on the one hand, and the form of public-private partnership, on the other, is an effective financial tool that can help quickly use the achievements of scientific and technological progress in the construction, repair and further maintenance of roads.

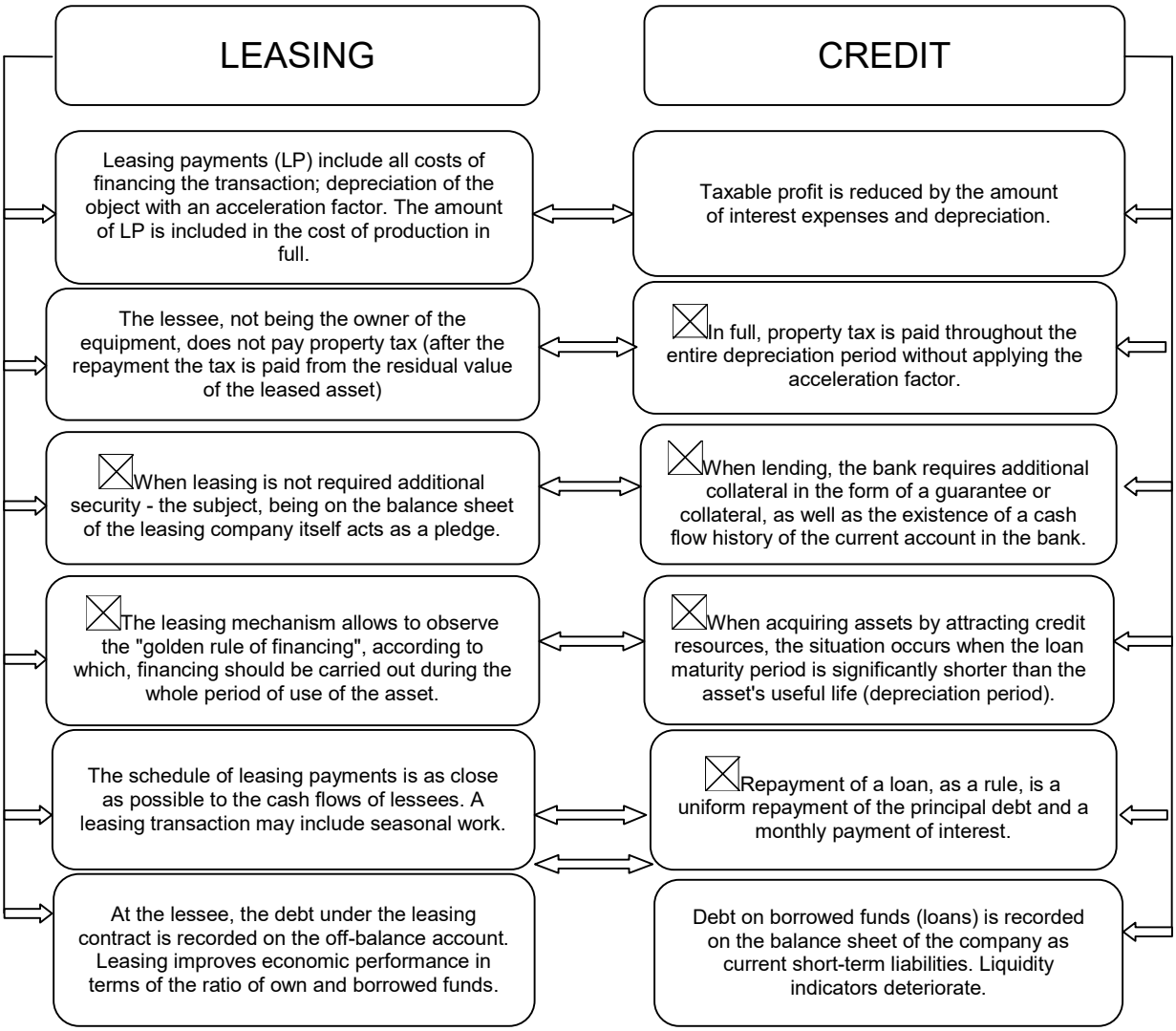
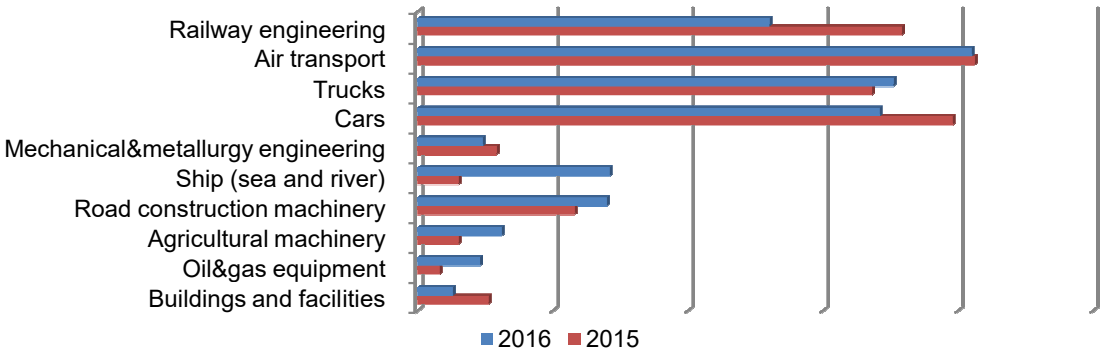


Figure 1 – Comparing the leasing and credit

When acquiring fixed assets from enterprises, as a rule, there is a choice between buying a fixed asset at the expense of a bank loan and acquiring it in leasing. The economic efficiency of leasing for a lessee is the possibility of using tax advantages. First of all, it is an opportunity to include leasing payments in the cost of production, which reduces the profit tax, as well as the ability to apply accelerated depreciation of the leased asset, which reduces the property tax. The advantages of using leasing in comparison with bank lending are shown in table 1.

The leasing importance for economic development lies in its ability to be an effective financial instrument for acquiring and updating fixed small and medium-sized enterprises assets, as well as for financing multimillion-dollar transactions in transport (for example, leasing of road machinery, aircraft), oil production (leasing drilling installations), etc. To date, a significant part of all leasing transactions in Russia are transactions on road transport, rail transport, road construction equipment, aircraft engineering, power equipment, as well as equipment intended for mining (Figure 2).



Source: compiled by the author according to «Expert RA».

Figure 2 – Key market segments share in the new business [7]

Leasing helps to sell equipment. With the advent of leasing for the equipment manufacturing companies, new sales opportunities for their products have been opened. Many foreign firms use the mechanism of international leasing when delivering their equipment to customers.

The main leasing operations advantage is that enterprises are able to modernize or increase their fixed assets without realizing adequate one-time capital investments, either from own funds or from borrowed funds.

For the enterprises of the road economy, the leasing mechanisms attractiveness is explained by the fact that the purchase of machinery and equipment reduces the need for own starting capital, that is, one does not have to pay for the necessary equipment, which frees the user's liquid funds, increases working capital to expand production and without a sharp financial strain allows you to update fixed assets. Also, leasing allows to observe the *«golden rule of financing»*, according to which the period of external financing should correspond to the period of use of the asset.

The choice of using leasing as one of the mechanisms for updating the fixed assets of road enterprises can be dictated by the fact that it is a procedure for raising borrowed funds in the form of a long-term loan provided in kind and repaid in installments, has established itself as an effective mechanism for attracting investments in road construction and the sphere of road maintenance, housing and communal services and passenger communication.

Taking into account the fact that the introduction of innovative technologies and equipment in road construction through the use of preferential leasing mechanisms is a form of state support for domestic manufacturers of machinery and materials for which there are wide opportunities for the sale of products, the importance of positive aspects inherent in leasing transactions in the sphere construction, repair and maintenance of roads.

The advantages of acquiring road-building machinery for road enterprises under leasing agreements are: attributing leasing payments to the cost of production and work, which leads to a reduction in the taxable base (taxes on profits and on property); use of accelerated depreciation, which increases the possibility of prompt updating of obsolete equipment and technical re-equipment of production. At the same time, the term of the leasing agreement is much less than the standard operating life of the property and the client does not pay the property tax in full due to accelerated depreciation; VAT on the leasing agreement is fully set off; the debt under the leasing contract is accounted for on off-balance accounts and does not worsen the liquidity indicators of road enterprises in terms of the ratio of own and borrowed funds; the system of leasing payments flexibility is ensured: a delay in the first payment, a gradual increase or decrease in payments, an orientation to seasonality of work is possible, which is quite important for road enterprises; the risk decreases when developing innovative products: in case of insufficient demand, it is possible to return the leased property to the lessor (in case of using operational leasing), which is also an important factor for the road industry enterprises.

Should note the economic and social effect of the implementation of preferential leasing programs: providing with workplaces for about 6 thousand people; reduction of harmful substances emissions into the atmosphere due to the using in the supplied equipment of modern engines that comply with the ecological standard "EURO-3 and above"; an increase in the receipt of taxes in the Russian Federation budget for more than 2 billion rubles [8].

Despite of the obvious advantages of using leasing, organizations involved in the maintenance and operation of highways are not actively updating their machinery through leasing contracts. The reasons for this lie in the insufficient financing of repair and maintenance of highways; participation in the repair and maintenance of roads of enterprises that won the auction, but do not have a sufficient set of equipment and qualified specialists; decisions to purchase imported equipment because of low consumer qualities of domestic, etc. The latter circumstance should be paid special attention. For 10 years, the share of equipment of Russian manufacturers by main types has decreased more than 2 times, while domestic production technology is in demand due to the relatively low cost and the presence of an extensive service network. On the sum of consumer properties, such as price and quality, after-sales service, it is not a leader in the Russian market, and if the approaches to the quality of production and maintenance of machinery are not revised, domestic producers will be forced out of the market by foreign competitors.

Also, in order to attract extra budgetary funding and improve the road management system, significant changes have been made to the legislation. The federal law «About Roads and Road Activity in the Russian Federation and on Amending Certain Legislative Acts of the Russian Federation» [9], aimed at regulating relations in the use of highways, including on a fee basis, was adopted; the federal law «About the State Company Russian Highways» [10], the main purpose of which is trust management of federal roads transferred to it; creation of the State Transport Leasing Company and the Investment Fund.

Based on the above mentioned issues, we can note that an important task for the further development and application of leasing, as a form of funding for technical re-equipment of road enterprises, is to legitimize the benefits provided by the Law on Leasing and remove legislative barriers that impede the development of leasing. It is necessary to take into account and critically evaluate all provisions of the current legislation aimed at providing leasing with advantages in the field of regulating economic activity, especially the advantages associated with taxation, customs and currency regulation. Along with this, it is necessary to overcome numerous difficulties, so that leasing schemes work efficiently, according to the laws of the market. For this, it is necessary to develop not only financial, but also operational leasing, as well as a set of accompanying and additional after-sales services; Using of leasing schemes with flexible schedules of leasing payments and seasonal adjustment; improvement of mechanisms of state financing of leasing operations at reduced rates, etc.

Conclusion. The problems of road economy development discussed in the article and the using of leasing as a form of financing projects for the technical re-equipment of the road sector make it possible to conclude that the enterprises which build, maintain and repair roads need appropriate conditions for the successful development of the industry. These conditions can be ensured by the interconnection of infrastructure elements in the banking system and the system of relations between state and market mechanisms. In this regard, we believe that to further the effective operation of the industry, it is necessary to introduce forms of public-private partnership, which has become one of the main instruments of public administration in the world. The events of the last decade and a half have definitely shown that integration of the economic potential of private entrepreneurship and the state's possibilities is necessary to solve the most complicated socioeconomic, structural, technological and other strategic tasks of Russia's development, to realize its national interests and to ensure an enabling environment for life activity. The advantages of using PPP forms are obvious, therefore, the accelerated creation of a legal basis for wider use of leasing schemes and other forms of public-private partnership in which partnership with the private sector can bring great benefits through effective quality of service, while allowing the authorities to legislate distribution rights, responsibilities and risks between the state and the investor in the implementation of various transport projects.

REFERENCES

1. «Transport Strategy of the Russian Federation for the period up to 2030» order dated November 22, 2008 No. 1734-r / Official site of the Federal Agency for Federal Property Management Rosavtodor, 2011.
2. The project «Fundamentals of the concept of reforming the road economy of the Russian Federation» [Electronic resource] / Official website of the Federal Agency for the Roads «Rosavtodor», 2013. - Access mode:
3. http://rosavtodor.ru/information.php?id=100
4. Information and analytical materials for the meeting of the Public Council under the Ministry of Transport of the Russian Federation on the issue «The state and prospects of the public net-work roads development» [Electronic resource] / Ministry of Transport of the Russian Federation, 2010. – Mode of access: https://www.mintrans.ru
5. Marketing research of the Russian market of construction and road machinery by Global Reach Consulting [Electronic resource]. Access mode: http://marketing.rbc.ru/
6. Chonka A. Public-private partnership: symbiosis of the state and business [Electronic resource] / Legal portal «Arkon», 2010. - Access mode: http://arkon-group.ru/see.php?see=56
7. Bondar N.N. Experience of public-private partnership in the transport sector: achievements and setbacks. [Electronic resource] / Legal portal «Arkon», 2012. - Access mode: http://arkon-group.ru/see.php?see=53
8. R. Romanovsky «The leasing market for the 2016» [Electronic resource] / Rating agency Expert RA, 2016. – Mode of access: https://raexpert.ru/researches/leasing/2016/part1
9. Sadykov V.V. «Evaluation of the efficiency of renewal of the technical park of road enterprises with the use of the leasing mechanism: the results of 2010» [Electronic resource]. Access mode: http://rosavtodor.ru/shownews/
10. Federal Law «About Roads and Road Activities in the Russian Federation and on Amending Certain Legislative Acts of the Russian Federation» No. 257-FZ of 08.11.2007 [Electronic resource]. Access mode: http://rosavtodor.ru/docs/
11. Federal Law «About State Company Russian Highways and on Amendments to Certain Legislative Acts of the Russian Federation» No. 145-FZ of July 17, 2009 [Electronic resource]. Access mode: http://rosavtodor.ru/docs/Osnovnye_dokumenty/

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.08

ECONOMETRIC FORECAST OF AGRIBUSINESS ACTIVITY IN CONTEXT OF FOREIGN DIRECT INVESTMENTS' ATTRACTION

Lytvyn Rostyslav, Research Assistant
Lviv National University of Veterinary Medicine and Biotechnologies
named after S.Z. Gzhytskyj, Lviv, Ukraine
E-mail: lytvynr@ukr.net

ABSTRACT
The main task of economic processes projection in agricultural enterprises is more relevant and vital in recent years with application of applied econometric methods and tools. In represented research paper, these methods are used to forecast primarily economic indicators of LLC «Agrol» and its activity where foreign direct investments (FDI) were attracted from Poland. The linear trend model, the parabolic trend model and the exponential trend model were elaborated from the period from 2000 to 2009 in this scientific study using applied statistical tools STATGRAFICS and EXCEL spreadsheets. And with assistance of these models forecast for key economic indicators on the basis of data of essential indicators of LLC «Agrol» that is located in village of Zhornyska, Yavoriv district, Lviv region, around 55 kilometres away from the border with Poland 2010 and 2011 was made. All models with probability p=0,95 are adequate experimental data for researched 2000-2009 years, that allow to make the forecast of the main economic indicators of the researched enterprise in terms of FDI attraction in the region by these models for 2010 and 2011 years. Moreover, it should be noticed, because of small amount of input data, analysis of regression equations coefficients have more qualitative rather than quantitative influence upon resulting variable.

KEY WORDS
Agriculture, foreign direct investment, forecast, linear trend model, parabolic trend model, exponential trend model.

Accordingly to statistical data of agricultural enterprises of Lviv region of Ukraine that are located in cross border locality with Poland provided by Bureau van Dijk Ruslana database for researched 2000-2009 years, presented in tables (1) in this applied study calculate main dynamics and trend models and calculate predicted values and their estimates for forthcoming two years with application of the applied statistical tools STATGRAFICS and EXCEL spreadsheets.

To urgent issues of FDI attraction processes in agriculture of the economy have dedicated one's researches many prominent scientists, among them: R. Ramamurti, N. Hashai [1], J. Jones, C. Wren [2], R. Lytvyn [3] and others. In this represented research paper one's attention is paid to study of Ukraine's agricultural enterprises primary economic indicators projection, where FDI were inflowed and another developing economies in context of globalization with assistance of some applied econometric methods, that are displayed in scientific works of: V. Yeleyko, O. Yeleyko, I. Kopych, R. Bodnar, M. Demchyshyn, O. Synytskyy, A. Chemerys [4-7], G. Cerulli [8], H. Erken, M. Kleijn [9], O. Bjerkholt, A. Dupont-Kieffer [10], P. Wang [11] and C.F. Lee, J.C. Lee [12].

Input data of the models:

Table 1 – Dynamics of LLC «Agrol» primarily activity indicators

Year	y_{11} mln. UAH.	y_{12} mln. UAH	y_{13} mln. UAH	y_{14} mln. UAH	y_{15} Persons
1	2	3	4	5	6
2001	0,225	3,209	0,346	1,985	10
2002	0,854	13,649	0,984	3,469	12
2003	1,006	19,849	1,222	3,639	34

1	2	3	4	5	6
2004	-0,071	0,750	0,171	3,354	15
2005	0,354	3,118	0,577	3,736	19
2006	0,364	3,207	0,545	5,619	19
2007	1,374	9,286	1,628	8,901	20
2008	9,106	23,725	9,483	18,230	14
2009	5,391	29,247	6,075	24,614	31

Source: https://ruslana.bvdep.com/
Notes: y_{11} – net profit of LLC «Agrol», mln. UAH; y_{12} – cost of sales revenue (turnover) of LLC «Agrol», mln. UAH; y_{13} – cash flow of LLC «Agrol», mln. UAH; y_{14} – assets cost of LLC «Agrol», mln. UAH; y_{15} – quantity of employees at LLC «Agrol», persons.

Thus linear ($\tilde{y}^{lin}$), parabolic ($\tilde{y}^{par}$) and exponential ($\tilde{y}^{exp}$) trend models will look like:

$$\tilde{y}_{11}^{lin} = -1{,}78797+0{,}77415\cdot t \quad (1)$$
$$\tilde{y}_{11}^{par} = 2{,}05038-1{,}3195\cdot t+0{,}20936\cdot t^2 \quad (2)$$
$$\tilde{y}_{11}^{exp} = \exp\{-2{,}0749+0{,}36773\cdot t\} \quad (3)$$
$$\tilde{y}_{12}^{lin} = 2{,}13964+1{,}92852\cdot t \quad (4)$$
$$\tilde{y}_{12}^{par} = 18{,}165-6{,}81258\cdot t+0{,}87411\cdot t^2 \quad (5)$$
$$\tilde{y}_{12}^{exp} = \exp\{1{,}08108+0{,}17386\cdot t\} \quad (6)$$
$$\tilde{y}_{13}^{lin} = -1{,}79647+0{,}82665\cdot t \quad (7)$$
$$\tilde{y}_{13}^{par} = 2{,}30164-1{,}40869\cdot t+0{,}22353\cdot t^2 \quad (8)$$
$$\tilde{y}_{13}^{exp} = \exp\{-1{,}58363+0{,}33320\cdot t\} \quad (9)$$
$$\tilde{y}_{14}^{lin} = -4{,}12711+2{,}4598\cdot t \quad (10)$$
$$\tilde{y}_{14}^{par} = 7{,}16424-3{,}69912\cdot t+0{,}61589\cdot t^2 \quad (11)$$
$$\tilde{y}_{14}^{exp} = \exp\{0{,}30590+0{,}28922\cdot t\} \quad (12)$$
$$\tilde{y}_{15}^{lin} = 13{,}8333+1{,}1\cdot t \quad (13)$$
$$\tilde{y}_{15}^{par} = 12{,}6429+1{,}74935\cdot t-0{,}06493\cdot t^2 \quad (14)$$
$$\tilde{y}_{15}^{exp} = \exp\{2{,}53968+0{,}06939\cdot t\} \quad (15)$$

Where: $\tilde{y}_i$ (i=11,12,…,15) – regulatory or averaged values of the researched indicators; t – time.

Relevant predicted values and their estimates based on trends (1) – (15) were calculated, that are displayed in table (2).

It is necessary to notice that the closer the values of ME, MSE and MAE to zero, the better will be calculated forecasts value of the appropriate indicators.

Table 2 – Forecasting values and estimation indicators of LLC «Agrol»

Indicator	Indicator forecast		ME	MSE	MAE
	2010	2011			
1	2	3	4	5	6
mln. UAH					
$\tilde{y}_{11}^{lin}$	5,953	6,728	0	4,5472	1,7148
$\tilde{y}_{11}^{for}$	9,792	12,869	0	3,0471	1,2994
$\tilde{y}_{11}^{exp}$	4,965	7,172	0,8869	5,6557	1,3227
mln. UAH					
$\tilde{y}_{12}^{lin}$	21,425	23,353	0	71,4555	7,8853
$\tilde{y}_{12}^{for}$	37,450	48,994	0	45,3075	5,6839
$\tilde{y}_{12}^{exp}$	16,771	19,956	4,0210	83,4522	7,3988
mln. UAH					
$\tilde{y}_{13}^{lin}$	6,470	7,297	0	4,7309	1,7954
$\tilde{y}_{13}^{for}$	10,568	13,854	0	3,0209	1,3078
$\tilde{y}_{13}^{exp}$	5,745	8,017	0,8029	5,4556	1,3746
mln. UAH					
$\tilde{y}_{14}^{lin}$	20,471	22,931	0	15,4835	3,5549
$\tilde{y}_{14}^{for}$	31,762	40,997	0	2,5022	1,4437

1	2	3	4	5	6
$\tilde{y}_{14}^{exp}$	24,486	32,699	0,6605	8,0253	2,0953
Persons					
$\tilde{y}_{15}^{lin}$	24,833	25,933	0	51,9333	5,3630
$\tilde{y}_{15}^{for}$	23,643	24,029	0	51,7890	5,4592
$\tilde{y}_{15}^{exp}$	25,370	27,192	1,1116	53,4749	4,8416

Notes: ME – mean value of the error; MSE – mean square value of the error; MAE – mean absolute value of the error.

Net profit forecast of LLC «Agrol» with the least error receive on the basis of parabolic trend model (3.52):

$$\tilde{y}_{11,2010}^{forecast} = 9{,}792 \text{ mln. UAH i } \tilde{y}_{11,2011}^{forecast} = 12{,}869 \text{ mln. UAH}$$

Cost of sales revenue (turnover) forecast of LLC «Agrol» with the least error receive with the assistance of parabolic trend model (3.55):

$$\tilde{y}_{12,2010}^{forecast} = 37{,}450 \text{ mln. UAH and } \tilde{y}_{12,2011}^{forecast} = 48{,}994 \text{ mln. UAH}$$

Cash flow cost forecast of LLC «Agrol» with the least error receive on the basis of parabolic trend model (3.58):

$$\tilde{y}_{13,2010}^{forecast} = 10{,}568 \text{ mln. UAH and } \tilde{y}_{13,2011}^{forecast} = 13{,}854 \text{ mln. UAH}$$

Assets cost forecast of LLC «Agrol» with the least error receive with the assistance of parabolic trend model (3.61):

$$\tilde{y}_{14,2010}^{forecast} = 31{,}762 \text{ mln. UAH and } \tilde{y}_{14,2011}^{forecast} = 40{,}997 \text{ mln. UAH}$$

Quantity of employees forecast of LLC «Agrol» with the least error receive on the basis of parabolic trend model (3.64):

$$\tilde{y}_{15,2010}^{forecast} = 23{,}643 \text{ persons and } \tilde{y}_{15,2011}^{forecast} = 24{,}029 \text{ persons,}$$

as well as on the basis of linear trend model (3.63):

$$\tilde{y}_{15,2010}^{forecast} = 24{,}833 \text{ persons and } \tilde{y}_{15,2011}^{forecast} = 25{,}933 \text{ persons}$$

Linear paired and multiple regression equations dependence of net profit of LLC «Agrol» (y_{11}) on influence of the studied variables indicators based on data in table (1) were elaborated:

$$\tilde{y}_{11} = -0{,}64134+0{,}23121\cdot y_{12}\,, \quad (16)$$
$$R^2 = 0{,}602297;\ F = 10{,}6011$$
$$\tilde{y}_{11} = -0{,}15670+0{,}95836\cdot y_{13}\,, \quad (17)$$
$$R^2 = 0{,}998444;\ F = 4491{,}68;$$
$$\tilde{y}_{11} = -0{,}65676+0{,}33524\cdot y_{14}\,, \quad (18)$$
$$R^2 = 0{,}734376;\ F = 19{,}3530$$
$$\tilde{y}_{11} = -0{,}06308+1{,}02200\cdot y_{13}-0{,}02965\cdot y_{14}\,; \quad (19)$$
$$R^2 = 0{,}999787;\ F = 14093{,}6$$
$$\tilde{y}_{11} = -0{,}04596-0{,}00434\cdot y_{12}+1{,}02743\cdot y_{13}-0{,}02704\cdot y_{14}; \quad (20)$$
$$R^2 = 0{,}999857;\ F = 11637{,}8$$

Regression models (17) – (20), have good credibility, it is a sign of the determination coefficients R^2, its value is greater than 0,7 and F – criteria that is more greater than F_{table} , but equation (16) has an average probability or credibility, as its value of the multiple determination coefficients is more greater than 0,6 and less than 0,7.

Analysis of the paired regression equations (16) – (18) indicates positive influence upon net profit of LLC «Agrol» y_{11} such indicator variables as cash flow cost y_{13} ($в_{13}$=0,95836), assets cost of LLC «Agrol» y_{14} ($в_{14}$=0,33524) and cost of sales revenue (turnover) of LLC «Agrol» y_{12} ($в_{12}$=0,23121).

Analysis of the multiply regression equation (19) indicates that while increase of cash flow cost of LLC «Agrol» at 1 mln. UAH and some constant or average – assets cost value of LLC «Agrol» y_{14} it is expected that net profit of LLC «Agrol» will average increase at 1,022 mln. UAH, at the same time assets cost of LLC «Agrol» y_{14} will increase at1 mln. UAH abide by constant or average cash flow cost value of LLC «Agrol» y_{13} it is expected that net profit of LLC «Agrol» y_{11} will average decrease at 0,02965 mln. UAH.

Regression coefficients' values of the multiply regression model (20) argue some positive influence on net profit of LLC «Agrol» y_{11} cash flow cost of LLC «Agrol» y_{13} ($в_{13}$=1,02743) and negative impact – assets cost of LLC «Agrol» y_{14} ($в_{14}$=-0,02704) and cost of sales revenue (turnover) of LLC «Agrol» y_{12} ($в_{12}$=-0,00434).

Separately, one's should point out that analysis of influence of factor variables on resulting multi variable regression equation (20) has a qualitative, rather than quantitative character.

CONCLUSION

In this research study linear, parabolic, and exponential trend models of agricultural enterprise LLC «Agrol» of Lviv region, Ukraine primary economic indicators were presented. All the models with probability *p*=0,95 are adequate experimental data for 2000-2009, that enable to make the projection of the main economic indicators of the researched agribusiness where FDI were inflowed by these models for 2010 and 2011. However, it should be noticed, because of small amount of input data analysis of regression equations coefficients have more qualitative than quantitative influence upon resulting variable.

REFERENCES

1. Ramamurti R., Hashai N. The future of foreign direct investment and the multinational enterprise – Emerald Group Publishing. – 2011. – 452 p.
2. Jones J. Foreign direct investment and the regional economy. – Ashgate. –2006. – 248 p.
3. Lytvyn R. Econometric forecast of agricultural sector investing in Lvov region // Russian Journal of Agricultural and Socio-Economic Sciences. – 2014. – Vol.7(31). – P. 3-7.
4. Yeleyko V.I. Ekonometriya.: Navchal'nyj posibnyk. – Lviv: 2007. – 349 s.
5. Yeleyko V.I., Yeleyko O.I., Synytskyy O.S., Chemerys A.O. Ekonometrychni metody prognozuvannya. – K.: Vydavnytstvo UADU, 1998. – 115 s.
6. Yeleyko V.I. Ekonomiko-statystychni metody modelyuvannya I prognozuvannya. – K.: 1988. – 88 s.
7. Yeleyko V.I., Osnovy ekonometriyi. – Lviv.: TzOV «MARKA Ltd», 1995. – Ch. 1. – 192 s.
8. Cerulli G. Econometric evaluation of socio economic programs. – Springer.-2015.-308 p.
9. Erken H. Location factors of international R&D activities: an econometric approach // Economics of innovation and new technology. . – 2010. – Vol. 19(3). – P.203 – 232.
10. Bjerkholt O. Problems and methods of econometrics. – Routledge. – 2009. – 149 p.
11. Wang P. Financial econometrics econometrics. – Routledge. – 2009. – 320 p.
12. Lee C.F. Handbook of financial econometrics and statistics. – Springer.-2015.-2903 p.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.09

ECONOMIC AND LAW BASIS FOR FORMATION OF LOCAL BUDGET INCOMES: A STUDY ON THE EXAMPLE OF MUNICIPAL DISTRICTS AND RURAL SETTLEMENTS IN RUSSIA

Krasova E.V., Candidate of Economic Sciences
Vladivostok State University of Economics and Service, Vladivostok, Russia
E-mail: elena_krasova@rambler.ru

ABSTRACT
Formation of incomes of local budgets is the important direction of the Russian budgetary policy that is characterized by the constant overcoming of chronic shortage of funds. The main scientific and practical problem of the article is a number of difficulties in filling of local budgets. In Russia firstly this applies to the local budgets in far agricultural areas – municipal districts and rural settlements, where the economic potential is rather low. The purpose of the article is to disclose the economic and law basis for formation of local budget incomes (on the example of municipal districts and rural settlements). Methodological basis of the research are the theses of modern finance theory, fundamental principles of budget policy, the Russian concept of formation of local budgets. The article presents the most widespread types of municipalities in Russia – municipal districts and rural settlements as subjects of the budgetary system, considers the administrative and law foundations for formation of local budget incomes, studies the features of taxes' collection and fees in favor of local budgets.

KEY WORDS
Municipal districts, rural settlements, agricultural areas, local budget, local budget incomes, economic basis, law basis, budgetary system, federal taxes, local taxes.

In order to fulfill proper functions and provide comprehensive social and economic development of the territories, the governments of subjects in Russian Federation use the resources of regional and local budgets. In Russian Federation, in accordance with the principles of territorial organization, there are 85 subjects of RF, including 22 republics, 50 regions, 10 autonomous regions, 3 cities of federal significance – Moscow, St. Petersburg and Sevastopol, 22406 municipalities. A municipal formation is a city or rural settlement, or several settlements united by a common territory. In this territory there is a local government, also there are municipal property, a local budget and elected departments of local government (Dvoryadkina, Belikova and Aragilian, 2015).

Rural settlement is one or several villages, in which local government is realized directly by the population or through lawful elections («About General Principles…»). The number and the structure of municipalities in Russia are shown in table 1.

Table 1 – The number of settlements in Russia and Primorsky Region by types, 2016

Number of municipalities	In Russia as a whole, units	In Russia, percentage share	In Primorsky Region, units	In Primorsky Region, percentage share
Total, including:	22406	100,0	158	100,0
Municipal districts	1788	8,0	22	13,9
City districts	852	3,8	12	7,6
Urban settlements	1592	7,1	23	14,6
Rural settlements	18177	81,1	101	63,9

Source: Federal State Statistics Service of Russia.

As you can see, municipal districts and rural settlements are the most prevalent types of municipalities in Russia. Therefore, one of the most acute problems in formation of Russian budgets is to determine the role and functions of municipal and rural budgets in the

budget system of Russian Federation. These budgets are called the local budgets (Afanasiev, Belenchuk and Krivogov, 2012). On the one hand, local budgets are the integral part of the country's financial system, and on the other hand, they are the financial basis of local government, which is not part of the system of state government in accordance with the Constitution of Russian Federation (Papelo and Goloshevskaya, 2014).

RESULTS AND DISCUSSION

Formation of incomes of local budgets has the same nature and is organized according to the same principles as the Federal budget. However, due to the specific nature of the Russian territorial organization, it has a number of features. In order to create a local financial system, to fill local budgets, and to protect the financial interests of municipal districts and rural settlements, the Council of municipal entities is formed in each subject of the Federation (Dementiev, 2016).

Each municipal district and rural settlement develops its Statute that is affirmed by the representative authority and represents the main legal document that defines the procedure for formation of local government, the economic and financial basis of the local government authorities, as well as guarantees for participation of the population in solving of local problems. The economic basis of local government includes: municipal property, local budgets, and property rights of municipalities. Incomes from privatization of municipal property are transferred to the local budgets. Local government must ensure the balance of local budgets and compliance with all requirements for the implementation of the budget process (Kayurov, 2013; Mogilev, 2013).

Speaking about the features of the budget process in municipal districts and rural settlements, it is necessary to distinguish issues that are managed by different types of municipalities. This differentiation of authorization is indicated by Russian Federal Law No. 131 «About General Principles of Organization of Local Government in Russian Federation». Local issues of the local settlements include: formation, approval, execution and control of the budget; establishment, modification and cancellation of local taxes and fees; possession, use and disposal of property; organization of electricity, heat, gas and water supply for the population; organization of collection and removal of domestic waste and garbage; statement of rules for improvement of territory of the settlement («About General Principles…»).

The Budget Code of Russian Federation clearly specifies the types of tax and non-tax incomes that make the basis for filling of local budgets, as well as the standards by which the amount of collected taxes is distributed among budgets of different levels.

Incomes for local budgets include revenues from local taxes and fees, revenues from federal and regional taxes and fees, non-tax payments, financial supports, as well as budget deficit financing. These funds are transferred to local budgets in accordance with the standards established by the Budget Code of Russian Federation («Budget Code…») (Figure 1).

It should be better to examine in detail the types, features and mechanism of tax collection in favor of local budgets.

At present time the Tax Code of Russian Federation (Article 15) provides for the following types of local taxes («Tax Code…»): Land tax; Tax on the property of individuals; Trade fee.

Organizations and individuals who have land plots on the right of full ownership, the right of perpetual use or the right to lifelong inheritance pay the Land tax. The object of taxation here are land plots located within a municipal district or rural settlement. The tax base for the Land tax is defined as the cadastral value of land plots in accordance with the land legislation of Russian Federation for the beginning of January each year. The Land tax rate is 0,3% for agricultural land, housing land and engineering infrastructure purchased for housing construction, land for personal farming (plant growing or cattle breeding), gardening, as well as for dachas and land for defense, safety and customs needs of the State («Tax Code…»; Yurchenko, 2010).

The tax on the property of individuals is completely transferred to the budget of municipal districts. Individuals who own property rights for housing, garages, installations and others pay it.

Organizations and individual entrepreneurs who conduct entrepreneurial activities in different business spheres pay the Trade fee. Enterprises and entrepreneurs engaged in agricultural production are released from the payment of the Trade fee.

In addition to the local taxes, budget of municipal districts and rural settlements are filled by funds from federal and regional taxes that are distributed between the federal, regional and local budgets in accordance with the standards established by the Budget Code of Russian Federation: Tax on incomes of individuals; Agricultural tax; Tax on the alternative revenue; Government fees.

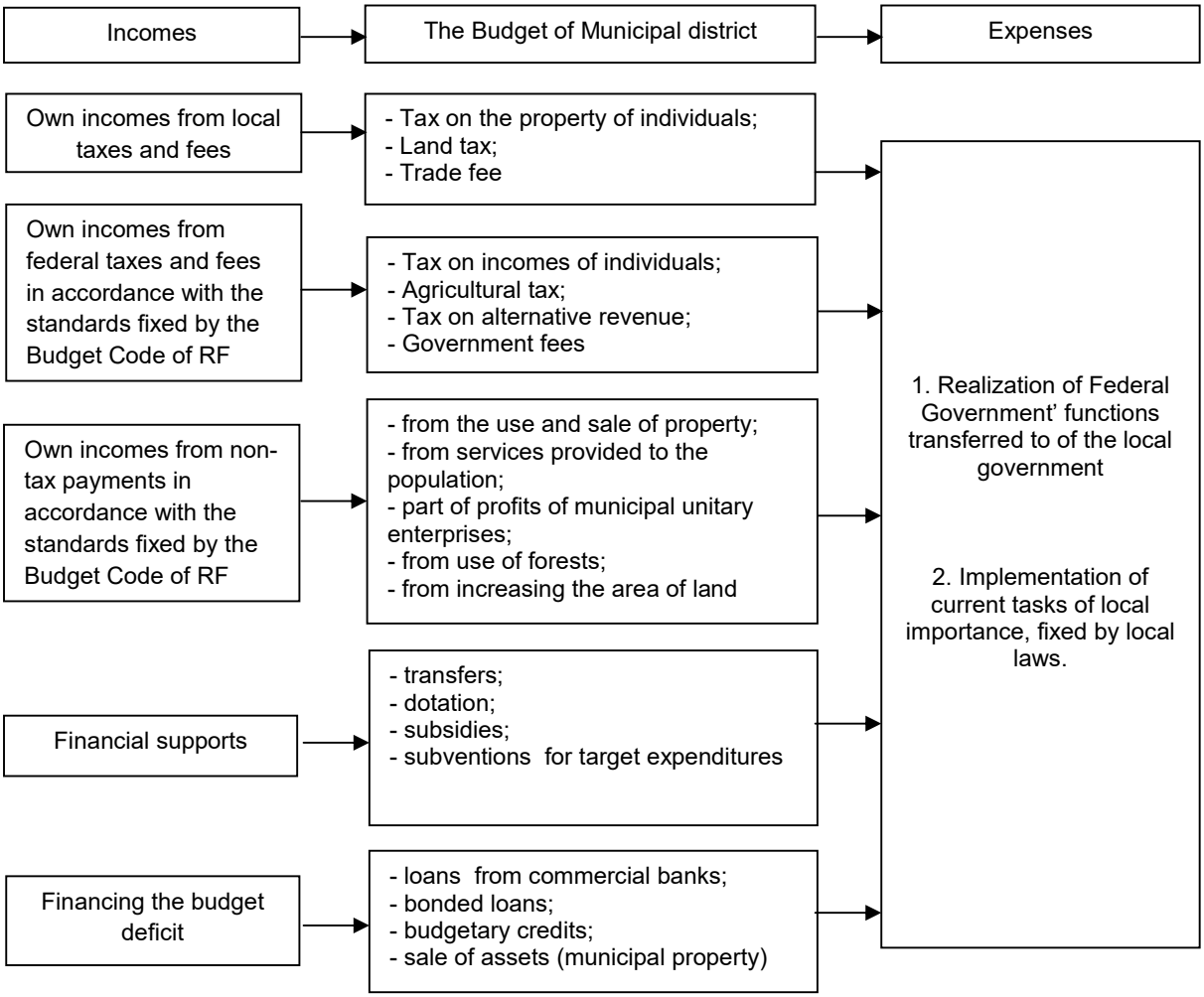


Figure 1 – The scheme of formation of incomes and realization of expenses of the local budget (on the example of municipal district)

In this paper, it should be interesting to study the Agricultural tax that is paid by organizations and individual entrepreneurs who produces agricultural products. Agricultural commodity producers include organizations and individual entrepreneurs that produce agricultural products, make the primary and subsequent processing of such products, and provided the 70% share of revenue from the sale of agricultural products. The object of taxation is income reduced by the amount of expenditure. The tax rate is 6% at present time. The mechanism of levying the Agricultural tax, as well as building a healthy local financial system, has particular importance for remote lands, including in the border areas (Astakhova and Aikhele, 2016).

From the table 2 you can see that the further settlement from big cities and closer to uninhabited territories, the more the state leaves collected taxes in the local budget. This is explained by the objective difficulties that the economic entities and local budgets have in the process of economic activities: bad development of transport, poor socio-economic infrastructure, remoteness from urban and municipal centers, dependence of agricultural labor on weather and climate, terrain and other uncontrollable conditions (Korotaeva, 2012; Konvisarova and Uksumenko, 2016).

Table 2 – Tax incomes of municipal districts' budgets with indication of deduction rate according to the Budget Code of Russian Federation

Types of Taxes	Deduction Rate for the Budgets of District
Local Taxes	
Land tax	100%
Tax on the property of individuals	100%
Federal Taxes	
Tax on incomes of individuals levied on the territories of urban settlements	5%
Tax on incomes of individuals levied on the territories of rural settlements	13%
Tax on incomes of individuals levied on far territories	15%
Tax on the alternative revenue for some kinds of economic activity	100%
Agricultural tax levied on the territories of urban settlements	50%
Agricultural tax levied on the territories of rural settlements	70%
Agricultural tax levied on far territories	100%

In the Russian legislation there are special deduction rates for the budget of rural settlements (Table 3).

Table 3 – Tax incomes of rural settlement' budgets with indication of deduction rate according to the Budget Code of Russian Federation

Types of Taxes	Deduction Rate for the Budgets of Settlement
Local Taxes	
Land tax	100%
Tax on the property of individuals	100%
Federal Taxes	
Tax on incomes of individuals	2%
Agricultural tax	30%

Non-tax incomes of municipal districts and rural settlements are formed on the base of non-tax payments. According to Article 62 of the Budget Code of RF, 100% of the following receipts remain in the local budget: income from the use of property; income from the sale of property; income from the provision of services; part of the profits of municipal unitary enterprises after payment of taxes; payment for use of forests; payment for increase of the area of land plots in private ownership, etc.

For budgets of municipal districts, urban and rural settlements, the standards of deduction rates for above types of non-tax incomes are at least 50% («Budget Code…»).

CONCLUSION

Thus, municipal districts and rural settlements implement the local government management for the benefit of the population, independently form and fill in the local financial system, realized through the local budget. We can say that the local budget is a financial basis for the implementation by local government of their functions and powers. The main sources of income of local budgets are taxes: land tax, tax on the property of individuals, tax on incomes of individuals, agricultural tax. The Budget Code of Russian Federation clearly

indicates the order how the incomes of the local budget can be formed. Russian budget legislation provides the distribution of collected federal taxes in favor of local budgets. Special regulations are used for this.

REFERENCES

1. Dvoryadkina E.B., Belikova O.A., Aragilian I.V. (2015). Budgets of rural areas in the structure of regional fiscal and budgetary subsystems // Agrarian Bulletin of the Urals. No. 3 (133). P. 48-53.
2. Russian Federal Law «About General Principles of Organization of Local Government in Russian Federation». October 6, 2003, No. 131 (last version) [Electronic resource] // Official site of company «ConsultantPlus». URL: http://www.consultant.ru/document/cons_doc_LAW_44571.
3. Formation of local government in Russian Federation for January 1, 2016 [Electronic resource] // Site of the Federal Service of State Statistics. URL: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/
4. Afanasiev M.P., Belenchuk M.P., Krivogov I.V. (2012). Budget and budget system: the textbook. Moscow: Publ. house YURAYT. 490 p.
5. Papelo V.N., Goloshevskaya A.N. (2014). Budgetary system of the Russian Federation: the textbook. Novosibirsk. 224 p.
6. Dementiev D.V. (2016). Budgetary system of Russian Federation: the textbook. Moscow: Publ. house Knorus. 332 p.
7. Kayurov E.A. (2013). Some aspects of increasing the effectiveness of system of forming the incomes for local budgets in Russia // Actual Problems of Russian Law. No. 9. pp. 1115-1122.
8. Mogilev S.V. (2013). Analysis of socio-economic factors of local budget revenues // Finance and Credit. No. 47 (575). P. 58-65.
9. Budget Code of Russian Federation. Federal Law No. 145-FZ, July 31, 1998 (last version) [Electronic resource] // Official site of company «ConsultantPlus». URL: http://www.consultant.ru/document/Cons_doc_law_19702.
10. Tax Code of Russian Federation. Federal Law No. 146-FZ, July 31, 1998 (last version) [Electronic resource] // Official site of company «ConsultantPlus». URL: http://www.consultant.ru/document/cons_doc_LAW_19671.
11. Yurchenko T.V. (2010). Revenues of the budgets of rural settlements as a factor of development of rural areas // Strategy for Sustainable Development of Russian Regions. No. 4. P. 91-96.
12. Astakhova E.V., Aikhele D.V. (2016). Features of international business in the border areas // Azimuth of Scientific Research: Economics and Management. Vol. 5. No.3(16). P. 14-17.
13. Korotaeva E.A. (2012). Problems of economic independence of local budgets in rural settlements // Bulletin of the Udmurt University. Series Economics and Law. No. 2-2. pp. 150-154.
14. Konvisarova E.V., Uksumenko A.A. (2016). Problems of Financing Road Economy in the Context of Russian National Security // National Security / Nota Bene. No. 2. P. 276-285.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.10

ОСНОВНЫЕ ТЕНДЕНЦИИ РАЗВИТИЯ АГРОПРОМЫШЛЕННОГО КОМПЛЕКСА В УСЛОВИЯХ РЫНОЧНОЙ ЭКОНОМИКИ

THE MAIN TRENDS OF AGRO-INDUSTRIAL COMPLEX'S DEVELOPMENT IN THE CONDITIONS OF MARKET ECONOMY

Астахова Е.*, кандидат экономических наук
Astakhova E., Candidate of Economic Sciences
Владивостокский государственный университет экономики и сервиса, Владивосток, Россия
Vladivostok State University of Economics and Service, Vladivostok, Russia

Партида Э., специалист образовательных проектов
Partida E., Specialist of Educational Projects
Университет Клермонт, Калифорния, США
Claremont Graduate University, California, USA

*E-mail: evastahova1@yandex.ru

АННОТАЦИЯ
Агропропромышленный комплекс, который объединяет производство и переработку сельскохозяйственной продукции, а также продовольственный рынок, является ведущим звеном процесса продовольственного обеспечения государства, одной из важнейших составляющих экономической безопасности и независимости государства. Особый статус агропропромышленный комплекс занимает в экономике при реализации национальных конкурентных преимуществ на международных товарных рынках. Развитие агропромышленного комплекса в современных экономических условиях происходит на основе агропромышленной интеграции, комплексирования, комбинирования и кооперирования. Все эти процессы происходят путем взаимосвязи и взаимозависимости, обусловливая формирование и развитие агропромышленного комплекса. Результатом интеграции различных отраслей на общегосударственном уровне является агропромышленный комплекс на региональном, межотраслевом и, а также формирование сценария развития АПК при мощной государственной поддержке. Научно-теоретической основой для углубления исследований послужили методы научной абстракции, анализа и синтеза, методы количественной и качественной оценки, с помощью которых были определены особенности в деятельности агропромышленных предприятий в условиях современной рыночной экономики. Материал отражает основные подходы к совершенствованию системы АПК благодаря интеграционным процессам в аграрном секторе экономики. Авторы анализируют направления развития, формы и виды интеграции аграрного комплекса с целью повышения эффективности его функционирования. Сформированы принципы, задачи и направления интеграции АПК. Определены теоретические основы организации интеграционных процессов в аграрной сфере, систематизирована роль государственной поддержки АПК.

ABSTRACT
The agro-industrial complex, which unites the production and processing of agricultural products, as well as the food market, is the leading link in the process of food security of the state, one of the most important components of economic security and state independence. Special status agro-industrial complex is in the economy of the Russian Federation in the implementation of national competitive advantages in international commodity markets. The development of the agro-industrial complex in the current economic conditions takes place on the basis of agro-industrial integration, combination and cooperation. All these processes occur through the interconnection and interdependence that determine the formation and

development of the agro-industrial complex. The result of the integration of various industries at the national level is the agro-industrial complex at the regional, inter-sectoral and national level, and the formation of a scenario for the development of the agro-industrial complex with strong state support. The scientific-theoretical basis for deepening the research was the methods of scientific abstraction, analysis and synthesis, methods of quantitative and qualitative assessment, with the help of which specific features were determined in the activities of agro-industrial enterprises in the conditions of a modern market economy. The material reflects the main approaches to the improvement of the AIC system due to integration processes in the agricultural sector of the economy. The authors analyze the development trends, forms and types of integration of the agricultural complex with the aim of increasing the efficiency of its functioning. The principles, tasks and directions of agro industrial complex integration have been formed. The theoretical foundations of the organization of integration processes in the agrarian sphere are determined; the role of state support of the agro industrial complex is systematized.

КЛЮЧЕВЫЕ СЛОВА
сельское хозяйство, интеграция, рыночная экономика, агропромышленный комплекс, общественное производство.

KEY WORDS
Agriculture, integration, market economy, agro-industrial complex, social production.

Важнейшей проблемой современной экономики является остановка спада агропромышленного производства, обеспечение продовольственной безопасности государства и достижения рациональных норм потребления продуктов питания на душу населения. Рост популярности здорового образа жизни, индивидуализация рациона определяют повышение спроса на функциональное и персонализированное питание, продукцию органического сельского хозяйства. Следствием роста покупательной способности населения ведущих стран, прогресса диетической науки, роста информированности населения о медицинских эффектах паттернов питания стало развитие рынка органических продуктов питания. Рост рынков здорового питания также обусловлен широким распространением болезней, обусловленных неправильным питанием, в развитых странах.

Глобальное потепление климата влечет за собой снижение агроклиматического потенциала планеты, и многие районы традиционного земледелия становятся непригодными для сельского хозяйства, в том числе из-за опустынивания одних территорий и затопления других, что меняет природные условия во многих районах, делая их пригодными для обитания теплолюбивых/влаголюбивых вредителей и возбудителей болезней. Все это ведет к новым экономическим рискам для агробизнеса, обусловливая трансформацию издержек на адаптацию к природным факторам из «предсказуемых условно постоянных» в «слабо предсказуемые» переменные издержки.

В этой ситуации России необходимо своевременно занять твердые позиции на мировых рынках сельскохозяйственной продукции, включая как сырье, так и продукцию глубокой переработки. Драйверами для этого являются модернизация крупных предприятий, оптимизация использования агроклиматического потенциала, концентрация товарного сельского хозяйства в южных регионах. Приоритетными рынками должны стать страны с развивающейся экономикой (прежде всего, Ближний и Средний Восток, Южная и Юго-Восточная Азия, Центральная Африка, а также страны Евразийского экономического союза), где покупательная способность населения растет быстрее, чем возможности национальных АПК.

Экономическая глобализация в условиях субсидирования сельскохозяйственного производства в развитых странах приводит к подавлению роста АПК развивающихся стран, усилению их зависимости от импорта сырья, технологий, оборудования и готовой продукции. Направления повышения эффективности деятельности

агропромышленного комплекса необходимо сопровождать совершенствованием его функционально-компонентной и территориальной структуры, развитием агропромышленной интеграции, вертикальной и горизонтальной кооперацией, комплексированием и комбинированием производства, формированием зон и районов товарного производства различных видов сельскохозяйственной продукции, реформацией всего агропромышленного комплекса, зональных внутри- зональных, межотраслевых и внутриотраслевых подкомплексов.

Однако трансформации в агропромышленном комплексе должны иметь регулируемый и планомерный характер. Поэтому задача экономической роли государства заключается в том, чтобы структурная перестройка в агропромышленном комплексе происходила на основе конструирования таких моделей агропромышленных структур, обеспечивающих наиболее рациональное и высокоэффективное использование аграрно-ресурсного потенциала, стабильное наращивание производства агропромышленной продукции, максимальное насыщение рынка продовольственными товарами и полную обеспеченность ими населения РФ.

Достижения конструктивной экономики, экономической и социальной географии, экономической математики и кибернетики позволяют проектировать модели различных агропромышленных комплексов, которые в современных условиях развития производительных сил и научно-технического прогресса способны обеспечить высокую эффективность агропромышленного производства. Развитие агропромышленного комплекса происходит на основе агропромышленной интеграции, комплексирования, комбинирования и кооперирования. Все эти процессы происходят путем взаимосвязи и взаимообусловленности, которые обусловливают формирование и развитие агропромышленного комплекса.

Исследование проблем комплексообразования и закономерностей формирования и развития агропромышленного аграрно-территориальных комплексов постоянно находятся в центре внимания науки и практики. Познание законов и особенностей территориальной организации агропромышленного производства агропромышленной интеграции, вертикальной и горизонтальной интеграции, комбинирования и комплексирования производства позволяет создавать такие организационно-хозяйственные структуры, которые обеспечивают высокую эффективность агропромышленного производства. Их развитие позволяет раскрыть новые дополнительные источники увеличения производства продукции, повышение экономической эффективности производства и увеличения поступлений в государственный бюджет.

Интеграционные формирования - это единственные производственно-хозяйственные комплексы, в которых вся хозяйственная и коммерческая деятельность осуществляется на основе вертикальной и горизонтальной кооперации, специализации и концентрации производства и переработки сельскохозяйственной продукции. Как следствие общественного и территориального разделения труда происходит как на общем народнохозяйственном уровне, так и на уровне отдельных территорий, предприятий и хозяйств.

В процессе создания комплексов и их развития, благодаря взаимосвязанному, скомплектованному, скопированному и сбалансированному развитию промышленных и сельскохозяйственных предприятий, создаются лучшие условия для высокоэффективного использования природных, производственных, финансовых и экономических ресурсов. При комплексном размещении промышленных комплексов и развития интеграции достигается значительная экономия капитальных вложений, уменьшается протяженность инженерных коммуникаций, дорог, уменьшается площадь земли для застройки, создаются благоприятные условия для социально-экономического развития территорий.

Итак, агропромышленные комплексы - это наиболее оптимальная форма территориальной организации агропромышленного производства, рассматриваются наукой и практикой как наиболее прогрессивные высокоэффективные формы организации агропромышленного производства. Именно поэтому, когда

осуществляется структурная перестройка и реформирование агропромышленного комплекса, необходимо дальнейшее совершенствование комплексного развития отраслей сельского хозяйства, пищевой и перерабатывающей промышленности, рационализации технологических, производственных и экономических связей.

При исследовании комплексов сформировались следующие основные направления их исследований: теоретический, методологический и прикладной.Теоретические исследования направлены на обобщение объективных законов, закономерностей и особенностей материального производства и их проявление в агропромышленном комплексе, раскрытие специфических особенностей экономики и организации агропромышленного производства и его оптимального сочетания с промышленным. В процессах методического характера раскрываются методы и приемы исследований особенностей развития и территориальной организации агропромышленного производства, структурно-динамического анализа его структурных преобразований. Прикладные исследования посвящены в основном анализу и оценке различных форм агроформирования и экономической эффективности функционирования.

Агропромышленный комплекс - составляющая структурная часть хозяйственного комплекса. Он должен представлять собой структурно завершенную, сбалансированную, интегрированные, взаимосвязанную, высокоэффективную систему, способную полностью обеспечить население продуктами питания, а внешнюю торговлю - экспортными товарами. Основной составляющей агропромышленного комплекса является сельское хозяйство, важная составная часть, одна из основных, жизненно важных отраслей хозяйства и сфер материального производства, которая специализируется на производстве продуктов питания для населения, сырья для промышленности и экспортных товаров для внешней торговли. В этой области производится более 50% продукции АПК.

Второй его важной отраслью является пищевая и перерабатывающая промышленность. Третьей - области промышленности, производящих для сельского хозяйства и пищевой промышленности основные средства производства (сельскохозяйственные машины и технологическое оборудование) и предметы труда (минеральные удобрения, химические мелиоранты, пестициды, гербициды, горюче-смазочные и другие материалы).

Гармоничное и сбалансированное развитие составляющих агропромышленного комплекса базируется на тесных технологических, экономических и организационных связях между ними. В прошлом они развивались на плановой основе. Планирование производства и поставок сельскохозяйственным предприятиям промышленных средств производства и предметов труда, обеспечивает постепенное наращивание продукции земледелия и животноводства, эффективное функционирование всех составляющих частей агропромышленного комплекса. Однако в условиях его структурной перестройки и реформирования нарушились экономические связи между промышленными и сельскохозяйственными предприятиями. Большой диспаритет цен на промышленную и сельскохозяйственную продукцию привел к ухудшению экономических взаимоотношений между промышленными и сельскохозяйственными предприятиями.

Дезинтеграция привела к нарушению целостности, структурной завершенности и сбалансированности всех составляющих агропромышленного комплекса. Поэтому основная задача состоит в том, чтобы, используя рыночные регуляторы, с помощью паритета цен, наладить нормальные экономические взаимоотношения между всеми составляющими агропромышленного комплекса.

Решающее значение в формировании нового структурно завершенного агропромышленного комплекса имеет агропромышленная интеграция. Она предусматривает углубление таких технологических, экономических, организационных и других связей между сельскохозяйственными, промышленными предприятиями и развитие различных агропромышленных формирований, которые обеспечивают более рациональное и высокоэффективное использование всего производственного

потенциала. В условиях рыночной экономики агропромышленная интеграция приобретает новые черты, поскольку интеграционные процессы связаны с изменениями собственности экономических взаимоотношений между сельскохозяйственными предприятиями, в организационной структуре производства и другими факторами. Агропромышленная интеграция - процесс органического слияния промышленного и сельскохозяйственного производства, обеспечивает повышение экономической эффективности агропромышленного производства.

Интеграционные формирования - это единственные производственно-хозяйственные комплексы, в которых вся хозяйственная и коммерческая деятельность осуществляется на основе вертикальной и горизонтальной кооперации, специализации и концентрации производства и переработки сельскохозяйственной продукции. Как следствие общественного и территориального разделения труда происходит как на общем народнохозяйственном уровне, так и на уровне отдельных территорий, предприятий и хозяйств. Результатом интеграции различных отраслей на общегосударственном уровне является агропромышленный комплекс, на региональном - зональные и внутренне зональные территориально-производственные комплексы, на межотраслевом - специализированные агропромышленные комплексы. На местном уровне - это агропромышленные объединения, агрофирмы, агрокомбинаты и другие интеграционные формирования. В последних, как правило, интегратором выступает промышленное предприятие (рис 1).

Рисунок 1 – Модель интеграции АПК

Границы агропромышленных формирований состоят в зависимости от их сырьевых зон, глубины специализации хозяйств, размеров производства продукции.

Итак, на основе вышесказанного можно выделить основные черты агропромышленного комплекса. Первой и главной особенностью является наличие постоянных технологических, экономических и организационных связей между сельским хозяйством и промышленностью как по линии производства и переработки сырья, так и по линии комплексной переработки и утилизации отходов. Другие важные черты заключаются в взаимосвязанности и пропорциональности развития сельскохозяйственных и промышленных предприятий, объединенных одной программой развития производства всех подразделений, образующих то или иное агроформирования (производства, хранение, переработка или перераспределения). Для отечественного АПК результаты его развития и конвергенции с мировой системой определяются выбором стратегии и конкретных механизмов конкурентоспособной стратегии в глобальном экономическом пространстве. Предметом государственной политики должно стать управление и планирование в агропромышленном комплексе, придания процессу развития агропромышленного комплекса контролируемой, планомерного и регулируемого характера.

БИБЛИОГРАФИЯ

1. Осипов В.А. Ключевые факторы развития и современная структура предпринимательства в России //Экономика и предпринимательство. -2017.- №3-1 (80-1). С. 541-544.
2. Ворожбит О.Ю., Зубова Н.В., Корень А.В. Структура предпринимательской среды: определяющие факторы//Вестник Тихоокеанского государственного университета. -2010. -№4. -С. 121-128.
3. Россия: ключевые вопросы и стратегии //Сайт Организации экономического сотрудничества и развития по вопросам малого и среднего бизнеса и предпринимательства. URL: http://www.veb.ru
4. Титова Н.Ю., Ворожбит О.Ю. Взаимодействие предпринимательских структур как инструмент повышения региональной конкурентоспособности//В сборнике: Образование в XXI веке: путь к новым кризисам .-Материалы II международной научно-практической конференции. 2014. С. 73-76.
5. Беспахотный В. Проблемы модернизации АПК / В. Беспахотный // Экономика с.-х. и перераб. предприятий.-2016.-№7.-С.7-10.
6. Голубев А. Научные основы инновационного развития АПК /А.Голубев // АПК: экономика, управление. -2015.-№10.-С.30-36.
7. Матвеев Д. Организационно-экономический механизм освоения достижения научно-технического прогресса в сельском хозяйстве /Д.Матвеев // АПК: экономика, управление. -2016.-№9.-С.81-87.
8. Прогноз научно-технологического развития агропромышленного комплекса Российской Федерации на период до 2030 год – [Электронный ресурс] – Режим доступа: https://www.hse.ru/data/2017/02/06
9. Urban Agriculture Impacts: Social, Economic, and Health: A Literature Review – [Электронный ресурс] – Режим доступа: http://ucanr.edu/sites/UrbanAg/
10. Statistics on Urban Agriculture in California– [Электронный ресурс] – Режим доступа: http://ucanr.edu/sites/UrbanAg/Research/Statistics/

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.11

АЛГОРИТМ ЭВАЛЬВАЦИИ И ПРЕДУПРЕЖДЕНИЯ ХОЗЯЙСТВЕННЫХ РИСКОВ ОРГАНИЗАЦИЙ АГРОБИЗНЕСА

ALGORITHM OF EVALVATION AND PREVENTION OF ECONOMIC RISKS OF AGRIBUSINESS ORGANIZATIONS

Матвеев В.В.*, **Макарова Ю.Л.**, **Базарнова О.А.**, кандидаты экономических наук
Matveev V.V., Makarova Y.L., Bazarnova O.A., Candidates of Economic Sciences
Среднерусский институт управления, Российская академия народного хозяйства и государственной службы при Президенте России, Орёл, Россия
Central Russian Management Institute, Russian Academy of National Economy and Public Administration under the President of Russia, Orel City, Russia
*E-mail: information@ranepa.ru

АННОТАЦИЯ

В сложившихся макроэкономических условиях на деятельность организации агробизнеса возложена большая ответственность, в том числе по обеспечению продовольственной безопасности национальной экономики. Достижение поставленных задач возможно только в условиях полной стабильности их деятельности и отсутствия непредвиденных условий функционирования. Однако, деятельность аграрных формирований является достаточно специфичной, поскольку находится в тесной взаимосвязи с природно-климатическими и биологических особенностями животных и растений. Подобная специфика обуславливает зарождение и развитие в их деятельности множества непредвиденных и плохо контролируемых факторов - хозяйственных рисков, оказывающих прямое влияние на уровень предпринимательского дохода. В этой связи в статье предложен авторский алгоритм эвальвации хозяйственных рисков организаций агробизнеса, основанных на мониторинге и включающий методики оценки, как общепроизводственных рисков, присущих деятельности любых хозяйственных субъектов, так и специфических рисков агробизнеса. Предложенный алгоритм позволит сформировать специализированный фонд денежных средств для минимизации и предупреждения негативных последствий влияния хозяйственных рисков, который дает возможность руководителям подразделений выбирать между четырьмя группами своевременных и эффективных управленческие решений, основанных на устранении, выявленных проблемных аспектов в детальности предприятий.

ABSTRACT

In the current macroeconomic conditions, the agribusiness organization has a great responsibility, including ensuring food security of the national economy. Achievement of this goal is possible only in the conditions of stability of their activity and absence of unforeseen conditions of functioning. But, the activity of agrarian formations is quite specific, because it is closely related to the natural and climatic and biological characteristics of animals and plants. Such a specificity allows the emergence and development in their activities of many unforeseen and poorly controlled factors - economic risks that directly affect the level of entrepreneurial income. In this connection, the author proposed an algorithm for the assessment of economic risks of agribusiness organizations based on monitoring and includes methods for assessing both general production risks inherent in the activities of any business entities and specific risks of agribusiness. This algorithm will allow to form a specialized fund of funds to minimize and prevent the negative consequences of the impact of business risks, which enables department heads to choose between five groups of timely and effective management decisions based on elimination, identified problem aspects in the detail of enterprises.

КЛЮЧЕВЫЕ СЛОВА
Хозяйственные риски, организации агробизнеса, эвальвация рисков, управленческие решения, мониторинг рисков.

KEY WORDS
Economic risks, agribusiness organizations, risk assessment, management decisions, risk monitoring.

Деятельность организаций агробизнеса существенно разниться с деятельностью семейных фермерских хозяйств и индивидуальных предпринимателей, поскольку в структуру агробизнеса входят только крупномасштабные предприятия, деятельность которых связана производством, хранением, распределением и подработки сельскохозяйственного сырья и доведением его до потребителя. При этом с целью повышения эффективности функционирования в агробизнесе процесс управления возложен на административный наемный персонал [15; стр. 260]. В результате, в категорию «организации агробизнеса» могут быть отнесены только средние и крупные сельскохозяйственные организации, осуществляющие свою деятельность на инициативной, рисковой основе с целью максимизации финансового результата.

Отличительной особенностью агробизнеса как вида предпринимательской деятельности являются наличие большего количества и уровня хозяйственных рисков. [20] Так, помимо общепроизводственных рисков, присущих всем видам экономической активности, они подвержены влиянию специфических рисков, связанных с биологическими и природно-климатическими условиями особенностями животных и растений. В общем виде риски организаций агробизнеса можно сгруппировать по следующим классификационными признакам (Рисунок 1).

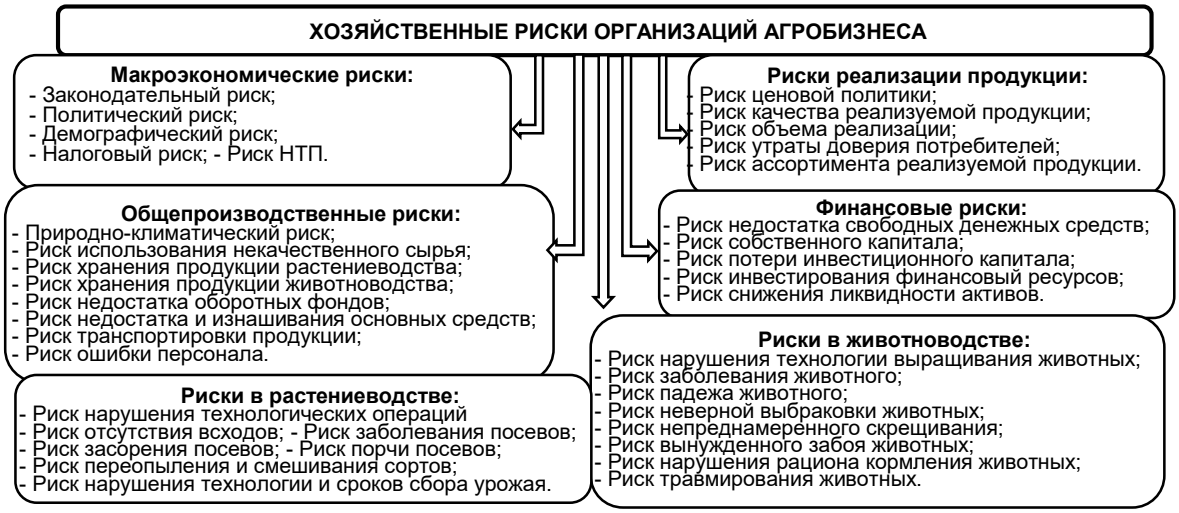


Рисунок 1 – Классификация хозяйственных рисков организаций агробизнеса

Наличие множества хозяйственных рисков обуславливает потребность в их сокращении и предупреждении. [3; стр. 322] При этом в условиях ограниченной финансовой стабильности аграрных формирований особую актуальностью приобретает внедрение в деятельность предприятия низкозатратных инструментов минимизации рисков. Одним из которых является процесс принятия управленческих решений, основанный на мониторинге рисков [2; стр. 83]. Он зарекомендовал себя как наиболее эффективный с минимальным уровнем управленческих издержках [1; стр. 279].

Однако, практическая адаптация данного инструмента в деятельности организаций агробизнеса в научно-методической литературе отсутствует. [5; стр. 32] В связи с этим нами разработан авторский алгоритм принятия управленческих решений,

основанный на мониторинге, основной целью которого является минимизация и предупреждение рисков.

Все вышеуказанные бизнес-риски организаций агробизнеса, с одной стороны, имеют сходства, так как образуются путем взаимодействия идентичных факторов [7; стр. 98], а с другой стороны, степень взаимодействия и взаимосвязи этих факторов друг с другом определяет отличительные особенности всех вышеуказанных рисков, прямо влияющие на эвальвацию рисков. [6; стр. 99]

В общем понимании под эвальвацией рисков необходимо понимать комплекс взаимосвязанных действий, направленных на идентификацию и анализ причинно-следственных связей и факторов формирования рисков, с целью определения объема изменения предпринимательского дохода в зависимости от уровня искомых бизнес-рисков. [11; стр. 1116] При этом сама методика эвальвации, согласно концепции «Риск-неопределённость», сводится к стоимостной оценке факторов риска, путем сравнения текущих показателей деятельности организации с их нормативными, плановыми, максимальными или средними значениями (Рис. 2).

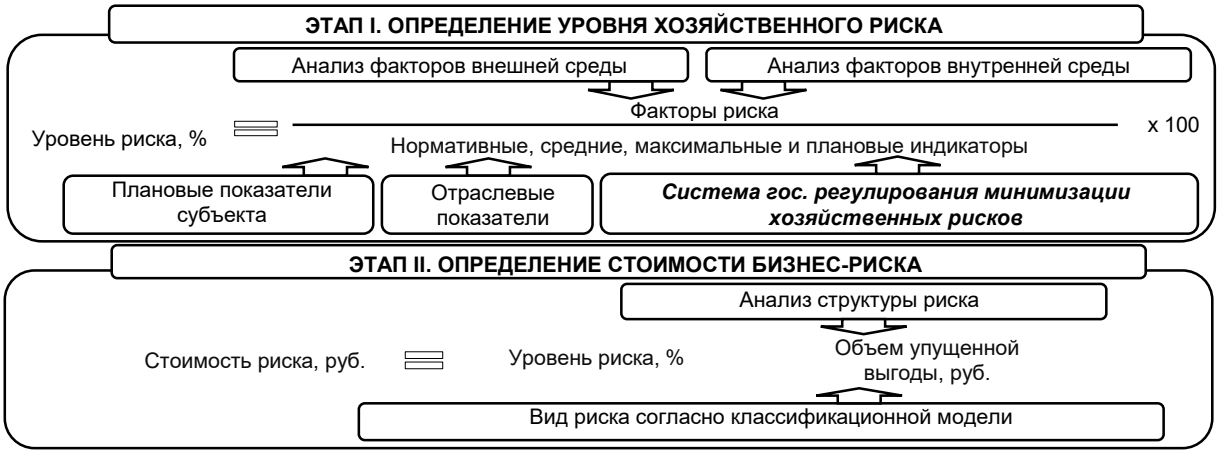


Рисунок 2 – Порядок стоимостной эвальвации риска [8; стр. 84]

Таким образом, стоимостная эвальвация хозяйственных рисков, согласно концепции «Риск-неопределённость» [4; стр. 60], осуществляется последовательно в 2 этапа. На первом этапе, путём соотношения внешних и внутренних факторов формирования рисков с их нормативными, плановыми, максимальными или средними индикаторами, получают процентное значение уровня хозяйственного риска. Затем, на втором этапе, полученное значение сопоставляют с объёмом упущенной прибыли и получают стоимость возможных потерь при проявлении данного хозяйственного риска. [10; стр. 100]

$$\Delta\text{ПД}_{\text{ОБЩ.ПР.}} = \begin{cases} \text{СР}_{\text{ПК}} = \dfrac{\sum \text{ПУ}_N}{N} + \text{УП}_1 \\ \text{СР}_{\text{ИНС}} = \left(0{,}33 * \left(1 - \dfrac{\text{КР}_{\text{К2}}}{\text{КР}_{\text{О2}}}\right) + 0{,}33 * \left(1 - \dfrac{S\text{сп}_{\text{И}}}{S\text{сп}_{\text{Т}}}\right) + 0{,}33 * \dfrac{\text{К}_{\text{СР}}}{\text{К}_{\text{О2}}}\right) * \text{Зпхт}_2 + \text{УП}_2 \\ \text{СР}_{\text{ХПР}} = \sum (\text{Пеу}_{N3} * \text{Зпхт}_3 + \text{УП}_3) \\ \text{СР}_{\text{ХПЖ}} = \sum (\text{Пеу}_{N4} * \text{Зпхт}_4 + \text{УП}_4)\,, (1) \\ \text{СР}_{\text{ОБПФ}} = \left(1 - \dfrac{\text{ОБПФ}_{\text{И}}}{\text{ОБПФ}_{\text{Н}}}\right) * \text{З}_{\text{ТО5}} + \text{УП}_5 \\ \text{СР}_{\text{ОС}} = \left(0{,}25 * \left(1 - \dfrac{\text{КР}_{\text{К6}}}{\text{КР}_{\text{О6}}}\right) + 0{,}25 * \dfrac{\text{А}_{\text{Н}}}{\text{ОС}_{\text{п}}} + 0{,}25 * \dfrac{\overline{\text{СИ}_{\text{Т}}}}{\overline{\text{СПИ}}} + 0{,}25 * \left(1 - \dfrac{\text{ОС}_{\text{И}}}{\text{ОС}_{\text{Т}}}\right)\right) * \text{З}_{\text{ТО6}} * \text{УП}_6 \\ \text{СР}_{\text{ТП}} = \sum (\text{Пеу}_{N7} * \text{З}_{\text{ТО7}} + \text{УП}_7) \\ \text{СР}_{\text{П}} = \left(0{,}2 * \left(1 - \dfrac{\text{КР}_{\text{Т}}}{\text{КР}_{\text{О}}}\right) + 0{,}2 * \left(1 - \dfrac{\text{КР}_{\text{УК}}}{\text{КР}_{\text{О}}}\right) + 0{,}2 * \left(1 - \dfrac{\text{КР}_{\text{ПК}}}{\text{КР}_{\text{О}}}\right) + 0{,}2 * \left(1 - \dfrac{\text{ОТ}_{\text{Т}}}{\text{ОТ}_{\text{Р}}}\right) + 0{,}2 * \left(1 - \dfrac{\text{СВ}_{\text{Т}}}{\text{СВ}_{\text{Р}}}\right)\right) * \text{З}_{\text{ТО7}} + \text{УП}_7 \end{cases}$$

где где $\Delta ПД_{ПР.}$ – изменение предпринимательского дохода в зависимости от уровня общепроизводственных рисков, руб.; $СР_{ПК}$ – стоимость природно-климатического риска, руб.; $СР_{ИНС}$ – стоимость риска использования некачественного сырья и материалов, руб.; $СР_{ХПР}$ – стоимость риска хранения продукции растениеводства, руб.; $СР_{ХПЖ}$ – стоимость риска хранения продукции животноводства, руб.; $СР_{ОБПФ}$ – стоимость риска недостатка оборотных производственных фондов, руб.; $СР_{ОБПФ}$ – стоимость риска недостатка и устаревания основных средств, руб.; $СР_{ТП}$ – стоимость риска транспортировки продукции, руб.; $СР_{П}$ – стоимость риска ошибки персонала, руб.; $ПУ_{N}$ – суммы полученных убытков в прошлых n-периодах при аналогичных явлениях, руб.; $КР_{Кj}$ – количество работников, необходимых для выполнения поставленной технологической задач(и) (в пределах j-го риска), уровень квалификации которых соответствует занимаемой должности, чел.; $КР_{Оj}$– общее количество работников, требуемых для выполнения поставленной технологической задачи (в пределах j-го риска), чел.; $КР_{Т}$ - текущее количество работников, чел.; $КР_{О}$ – общее количество работников, требуемых для выполнения всех технологических операций, чел.; $КР_{УК}$ – количество работников, уровень квалификации которых соответствует занимаемой должности, чел.; $КР_{ПК}$ – количество работников, прошедших повышение уровня квалификации, чел.; $ОТ_{Т}$ – текущей уровень оплаты труда работников организацией, руб.; $ОТ_{Р}$ – средний региональный уровень оплаты труда в данных организациях, руб.; $СВ_{Т}$ – текущий уровень стимулирующих выплат, приходящийся на 1-го сотрудника, руб.; $СВ_{Р}$ – средний уровень стимулирующих выплат по региону в организациях данного типа, руб. $Sсп_{И}$ – объем имеющихся специализированных помещений для хранения сырья и материалов, $м^3$; $Sсп_{Т}$ – объем требуемых специализированных помещений для хранения сырья и материалов, $м^3$; $К_{О}$ – общее количество контрагентов, поставляющих сырье и материалы, шт.; $К_{СР}$ – количество контрагентов, поставляющих сырье и материалы с сомнительной репутацией, шт.; $Пеу_{N}$ – процент естественной убыли по n-ой культуре или n-ой категории продукции и виду животных; $ОБПФ_{И}$ – стоимость имеющихся оборотных производственных фондов, руб.; $ОБПФ_{Н}$ – стоимость нормируемых оборотных производственных фондов, руб.; $А_{Н}$ – сумма накопленной амортизации, руб.; $ОС_{П}$ – первоначальная стоимость основных средств, руб.; $СИ_{Т}$ – текущий срок использования объектов основных средств, лет; СПИ – срок полезного использования объектов основных средств, лет; $ОС_{Т}$ – количество требуемых основных средств, шт.; $ОС_{И}$ – количество имеющихся основных средств, шт.; $З_{ПХТj}$ – затраты на приобретение (производство), хранение и транспортировку сырья и материалов (продукции) (в пределах j-го риска), руб.; $З_{ТОj}$ – затраты на выполнение всех технологических операции (в пределах j-го риска), руб.; $УП_{j}$ – упущенная прибыль (в пределах j-го риска), руб. [12; стр. 85]

Для целей выполнения первого этапа и оценки степени комплексного влияния хозяйственных рисков (Рисунок 1) на деятельность в организаций агробизнес нами составлена система уравнений, позволяющая определить объем изменения предпринимательского дохода в зависимости от уровня общепроизводственных рисков (формула 1). [9; стр. 46]

В результате, предложенная система уравнений (формула 1) позволяет определить объем изменения предпринимательского дохода в зависимости от степени влияния на деятельность аграрных формирований общепроизводственной группы рисков.

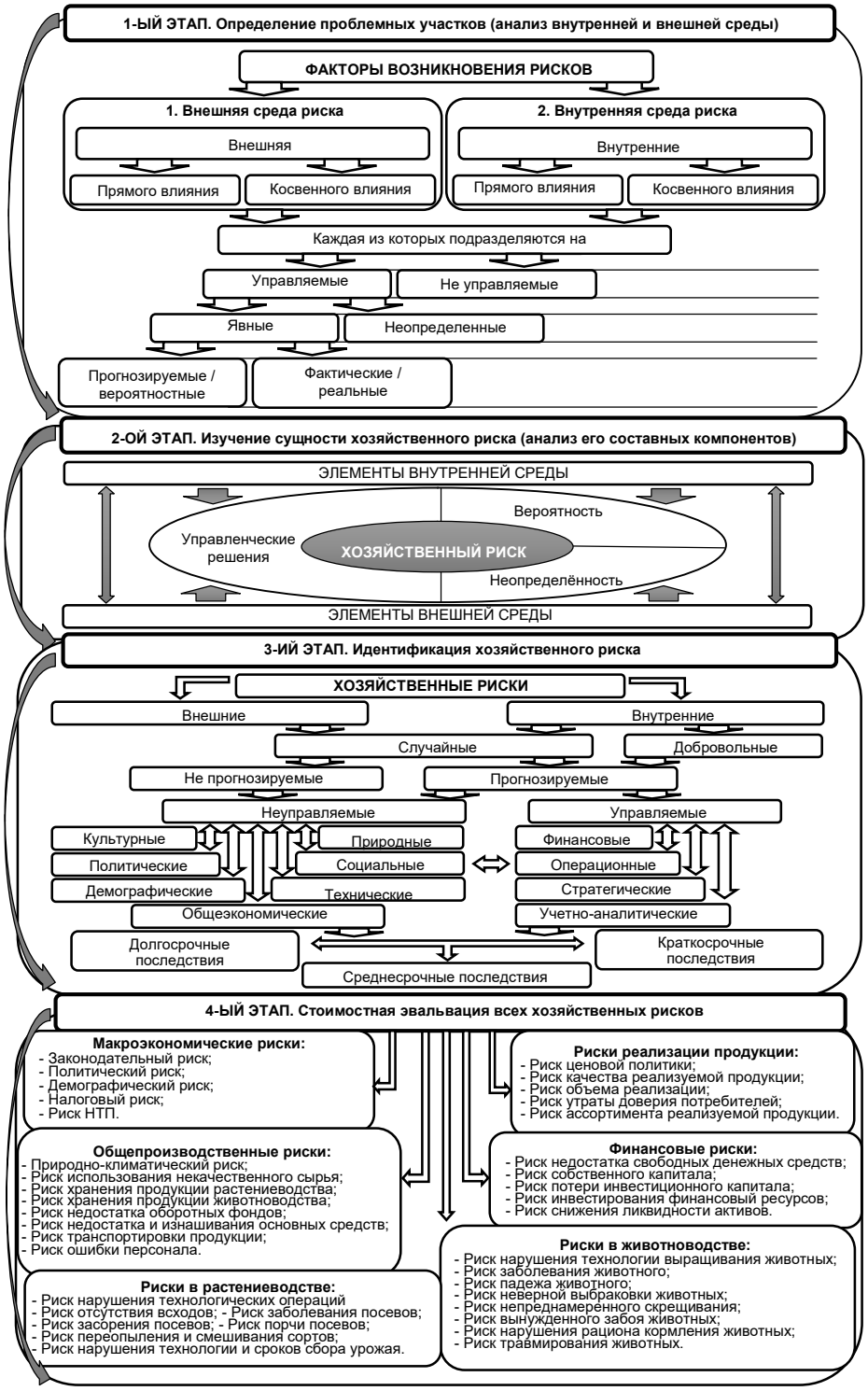
Аналогичная система уравнений должна быть также составлена для оценки степени влияния уровня хозяйственных рисков растениеводства и животноводства на размер предпринимательского дохода. [13; стр. 87]

Полученные стоимостные оценки рисков позволяют выявить максимально возможную сумму денежных средств, которая понадобится организации агробизнеса для ликвидации последствий наступления риск-событий. [14; стр. 1157] Однако, все представленные методики имеет лишь вероятностный характер, так как каждый риск

содержит слишком много переменных и факторов, зачастую не поддающихся планированию и прогнозированию. [19; стр. 7]

Эвальвация рисков является ключевым элементом алгоритма предупреждения рисков. [17; стр. 33] При этом данный алгоритм представляет собой последовательность действий управленческого персонала направленных на идентификацию факторов формирования бизнес-рисков, их стоимостную оценку и применение методов минимизации неблагоприятных последствий на уровень предпринимательского дохода. [18]

Так, алгоритм предупреждения хозяйственных рисков посредством мониторинга представлен на рисунке 3.



5-ЫЙ ЭТАП. Расчет риск-нагрузки (консолидация и суммирование хозяйственных рисков)

$$\Delta ПД_{ОБЩ} = \Delta ПД_{РАСТ} + \Delta ПД_{ЖИВ} + \Delta ПД_{ОБЩ.ПР.} + \Delta ПД_{N}, (4)$$

где $\Delta ПД_{ОБЩ}$ – общее изменение предпринимательского дохода зависимости от уровня хозяйственных рисков организации агробизнеса;

$\Delta ПД_{РАСТ}$ – изменение предпринимательского дохода зависимости от уровня хозяйственных рисков подотрасли растениеводства;

$\Delta ПД_{ЖИВ}$ – изменение предпринимательского дохода зависимости от уровня хозяйственных рисков подотрасли животноводства;

$\Delta ПД_{ОБЩ}$ – изменение предпринимательского дохода в зависимости от уровня общепроизводственных рисков, руб.;

$\Delta ПД_{N}$ - изменение предпринимательского дохода зависимости от уровня прочих хозяйственных рисков.

6-ОЙ ЭТАП. Формирование плана, предусматривающего создание специализированного фонда

Показатели	Ед. изменения	Итого за период		
		План	Факт	Отклонение, %
Денежные средства, направленные: - на оплату приобретенных товаров, работ, услуг	тыс. руб.			
- на оплату труда	тыс. руб.			
- на расчеты по налогам и сборам	тыс. руб.			
- прочие расходы	тыс. руб.			
Приобретение объектов основных средств, доходных вложений в материальные ценности и нематериальные активы	тыс. руб.			
…	тыс. руб.			
Расходы на формирование специализированного форда для ликвидации последствий наступления рисков	тыс. руб.			
Итого расходов	тыс. руб.			

7-ОЙ ЭТАП. Принятие управленческого решения об использовании специализированного фонда

УПРАВЛЕНЧЕСКИЕ РЕШЕНИЯ

- Уклоняться от хозяйственного риска и его неблагоприятных последствий
- Полностью принять хозяйственный риск и его неблагоприятные последствия
- Принять хозяйственный риск и минимизировать его неблагоприятные последствия
- Снижать уровень хозяйственного риска и его неблагоприятные последствия
- Предупреждать хозяйственный риск и его неблагоприятные последствия

8-ОЙ ЭТАП. Контроль за уровнем хозяйственных рисков и специализированным фондом

Предварительный	Текущий	Последующий
До составления плана и формирования специализированного фонда	Во время корректировки плана и возобновления специализированного фонда	При составлении отчета и планов на следующий период

Рисунок 3 – Алгоритм предупреждения хозяйственных рисков в агробизнесе посредством мониторинга

Данный алгоритм предлагает выбрать между следующими вариантами решений:

- Полное уклонение от риска, в данном случае организации основную массу своих затрат использует на уход от риска. Применяется если рассчитанный уровень существенности превышает допустимые нормы, т.е. последствия губительны для организации. Денежные средства в данном случае полностью расходуются на финансирование изменение среды организации, вплоть до смены вида деятельности.

- Смягчение последствий риска. Применятся если рассчитанный уровень существенности находится в опасных пределах для организации, а также последствия наступления риска не столь велики что бы нанести существенный вред или риск только достиг организации и не набрал полной силы. Денежные средства в данном случае расходуются на изменение микросреды организации агробизнеса, а также внутренних факторов.

- Принять данный риск. Применяется если уровень приемлемости бизнес-риска удовлетворяет требованиям организации. В данном случае организация получает определенный уровень риска, т.е. несет затраты только по ликвидации последствий

наступления риска, при этом не тратится на затраты по предупреждению, уклонению и смягчению последствий наступления. Данный прием целесообразен в том случае если риск развивается стремительно, а его предполагаемые последствия не велики.

- Предупреждение рисков. В данном случает риск еще не оказывает влияния на деятельность организации, но потенциально может нанести вред. Рекомендуется расходовать бюджет на формирование систем своевременно оповещения и предотвращения.

Так, предложенная методика управление бизнес-рисками посредством мониторинга в организациях агробизнеса, позволит эффективно идентифицировать, предупреждать, ликвидировать, а также смягчать последствия наступления риск-событий и, как следствие повысит уровень рентабельности организации агробизнеса.

Таким обозом, в результате проведенного исследования нами предложен авторский алгоритм эвальвации и предупреждения хозяйственных рисков, позволяющий своевременно выявлять и идентифицировать риски, а также принимать своевременные и эффективные управленческие решения по их минимизации. Подобные изменения позволят стабилизировать деятельность предпринимательских структур агропромышленного комплекса и достичь стабильного экономического роста экономики РФ.

БИБЛИОГРАФИЯ

1. Бадалова А.Г. Процедура и инструменты мониторинга рисков в проектном риск-менеджменте // Управление финансовыми рисками. - 2015. - № 4. - С. 278-283.
2. Буторин С.Н., Трухин Д.М., Светлакова Н.А. Мониторинг хозяйственных рисков и их влияние на экономическую эффективность сельскохозяйственного предприятия / С.Н. Буторин, Д.М. Трухин, Н.А. Светлакова // Научно-практический журнал Пермский аграрный вестник. - 2016. - № 13. - С. 81-88.
3. Быков А.А. Об анализе риска, концепциях и классификации рисков. / Быков А.А., Порфирьев Б.Н.// Проблемы анализа риска. - 2006. - Т. 3. - № 4. - С. 319-337.
4. Евстратов Р.М. Неопределенность, вероятность, действие как главные составляющие предпринимательского риска / Евстратов Р.М. // Основы экономики, управления и права. - 2013. - № 1 (7). - С. 58-61.
5. Едронова В.Н. Методология финансового мониторинга: оценка национальных рисков / В.Н. Едронова // Финансы и кредит. - 2016. - № 16 (688). - С. 27-39.
6. Елкина О.С. Предпринимательство: макроэкономические риски современной России / О.С. Елкина // Вестник Сибирской государственной автомобильно-дорожной академии. - 2014. - № 2 (36). - С. 94-100.
7. Каменская Е.А. Мониторинг уровня рисков сельскохозяйственного производства // В сборнике: Проблемы и перспективы развития сельского хозяйства и сельских территорий Сборник статей III Международной научно-практической конференции; Под редакцией В.В. Бутырина. - 2014. - С. 98-100.
8. Матвеев В.В. Экономическая сущность категории бизнес-риск и факторы ее формирования //Аграрный научный журнал. 2016. № 4. С. 84-88.
9. Матвеев В.В. Экономическая эффективность субъектов агробизнеса как фактор формирования и развития бизнес-рисков // Экономика сельскохозяйственных и перерабатывающих предприятий. 2016. № 8. С. 45-49.
10. Матвеев В.В. Классификация бизнес-рисков субъектов агробизнеса / В.В. Матвеев // Вестник Орловского государственного аграрного университета. 2017. № 1 (64). С. 99-107.
11. Матвеев В.В. Methods of valuation agricultural risks: the lack seedlings sown crops‘ risk, the risk of animals‘ death, risk of storage products / В.В. Матвеев // Экономика и предпринимательство. 2016. № 3-1 (68-1). С. 1115-1123.
12. Матвеев В.В. Monitoring of specific entrepreneurial risks in the agricultural business / Матвеев В.В. // Russian Journal of Agricultural and Socio-Economic Sciences. 2016. Т. 57. № 9. С. 84-89.

13. Полянин А.В. Рискообразующие факторы производства продукции сахарного производства // Известия Юго-Западного государственного университета. Серия: Экономика. Социология. Менеджмент. - 2013. - № 2. - С. 86-93.
14. Полянин А.В., Попова О.В., Долгова С.А. Алгоритм стратегии развития предпринимательской деятельности организаций АПК // Экономика и предпринимательство. - 2016. - № 3-1 (68-1). - С. 1156-1159.
15. Суворова С.П., Ветрова Л.Н. Минимизация природных рисков в бюджетировании сельскохозяйственных организаций через систему страхования // Известия Международной академии аграрного образования. 2013. № 17. С. 258-261.
16. Филь О.А. Управление рисками проекта / О.А. Филь // Экономика и управление в XXI веке: тенденции развития. - 2014. - № 17. - С. 169-172.
17. Чалдаева Л.А. Организация оценки рисков бизнес-процессов предприятий малого и среднего предпринимательства / Л.А. Чалдаева // Финансовая аналитика: проблемы и решения. - 2013. - № 34. - С. 33-38.
18. Alberts C. J. Common Elements of Risk //Acquisition Support Pro-gram, 2006, 26 pp.
19. Decker R.J., Homeland Security, Key Elements of a Risk, Management Approach, // Defense Capabilities and Management, United States General Accounting Office, October 2001, 10 pages.
20. Ingram D. External and Internal Factors of Financial Risk // Chron Small Business – URL: http://smallbusiness.chron.com/external-internal-factors-financial-risk-4563.html47

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.12

АНАЛИЗ ОРГАНИЗАЦИОННО-ЭКОНОМИЧЕСКОГО МЕХАНИЗМА В СИСТЕМЕ УПРАВЛЕНИЯ АГРАРНЫХ ПРЕДПРИЯТИЙ

ANALYSIS OF ORGANIZATIONAL AND ECONOMIC MECHANISM IN THE MANAGEMENT SYSTEM OF AGRICULTURAL ENTERPRISES

Аль-Раващдех Х.М., кандидат экономических наук
Al-Rawasdeh H.M., Candidate of Economic Sciences
Университет Зарка, Дамаск, Иордания
University of Zarka, Damascus, Jordan

Кузубов А.А.*, кандидат экономических наук
Kuzubov A.A., Candidate of Economic Sciences
Владивостокский государственный университет экономики и сервиса, Владивосток, Россия
Vladivostok State University of Economics and Service, Vladivostok, Russia

*E-mail: alexceyk@gmail.com

АННОТАЦИЯ
Современные условия рыночной экономики характеризуются нестабильностью и неопределенностью внешний среды хозяйствования. Трансформация внешней среды, конкуренция, совершенствование маркетинга стимулируют руководителей изменять и улучшать организационно-экономический механизм управления предприятием таким образом, чтобы создать благоприятные условия для сбалансированной производственно-хозяйственной деятельности. Цель статьи обобщить научные подходы к определению понятия “организационно-экономический механизм”.

ABSTRACT
Modern conditions of market economy characterized by instability and uncertainty in the external environment of management. Changes in the external environment, high competition, development of marketing motivate managers to restructure and improve the organizational and economic mechanism of enterprise management, therefore, to provide a balanced production and business activities. The article aims to summarize the scientific approaches to definition of concepts “organizational-economic mechanism”.

КЛЮЧЕВЫЕ СЛОВА
Механизм управления, предприятие, производственно-хозяйственная деятельность, эффективность управления.

KEY WORDS
Mechanism of management, enterprise, production and business activity, ffectiveness of management.

С динамичным развитием экономики перед управлением лежит одна задача – разработка такого организационно-экономического механизма управления, который разрешил бы сохранить и повысить устойчивое положение предприятия на рынке, оперативно реагировать на развитие внешней среды, стабильно развиваться, удовлетворять потребности потребителей.

Термин “механизм” для характеристики процессов деятельности капиталистической производственной системы впервые применил К. Маркс. Наука активно исследовала процессы, которые непосредственно связаны с формированием экономического (хозяйственного) и организационно-экономического механизма в 60-х годах прошлого века. Весомый вклад в развитие теории “механизма” сделали

А. Онищенко, Б. Пасхавера. Формированию механизма внутрихозяйственных отношений посвятили свои наработки Л.И. Абалкин, В.Р. Боев, А.Г. Зельднер. Следует заметить, что формирование действенного организационно-экономического механизма связано с такими аспектами макро- и микроэкономики, как финансирование, налогообложение, страхования, управления и регулирования. Значительный вклад в разработку этого вопроса внесли Н.П. Шилова, Н.Н. Балашова, Т.В. Ерофеева, Н.В. Варламов, Ф.К. Шакиров, М. Хазан. [2-5]. Изучению сущности организационно-экономического механизма посвящено большое количество исследований, которые отражены в трудах ученых А.А Керашева, Р.А Байбековой, А.А. Князькина, А.А. Полухина, Н.А. Середы [6-10].

В условиях рыночной экономики актуальным для руководителей предприятия является формирование действенного организационно-экономического механизма управления предприятием, который способен обеспечить эффективность управления и конкурентоспособность предприятия. Определяющим фактором для развития и эффективного функционирования аграрных предприятий является успешная деятельность всех его составляющих. На работу любого предприятия значительно влияет действующая система управления производственно-хозяйственной деятельностью. Производственно-хозяйственная деятельность является комплексом научно обоснованных действий, его налаживания и совершенствования с использованием новых технологий, максимально удовлетворяет потребности рынка и обеспечивает доходность субъектов хозяйственной деятельности.

Понятие “механизм” в экономическом словаре обозначенное как “последовательность состояний, процессов, определяющих собой какое-нибудь действие, явление”, или же “система, устройство, определяющее порядок какого-либо вида деятельности”. Механизм управления включает цели управления, элементы объекта и их связи, на которые осуществляется воздействие ради достижения целей [11].

Единого подхода относительно толкования понятия “организационно-экономический механизм” еще не сформировано, поэтому эта проблема не потеряла своей актуальности и сегодня требует исследования и обобщения существующих подходов в отношении дефиниции понятия “организационно-экономический механизм”. Специалистами трактуется разного рода определения этого понятия, некоторые из них представлены в таблице 1.

Таблица 1 – Определение специалистами понятия “организационно-экономический механизм”

Автор	Определение понятия “организационно-экономический механизм”
Полухин А.А.	при исследовании сущности и отраслевых особенностей хозяйствования экономический и хозяйственный механизмы рассматриваются как синонимы и выделяет составляющие экономического механизма: ценообразования, налогообложения, привлечения и использования производственных ресурсов.
Шилова Н.П.	акцентирует внимание на том, что “...с учетом функционирования хозяйственного механизма в рыночных условиях, является подход, который учитывает характерные признаки образа производства и динамику производительных сил в обществе”. Согласно этому выделяют две подсистемы отношений: организационно-экономические и социально-экономические. Целесообразно при таких условиях употреблять термин “организационно-экономический механизм”.
Керашев А.А., Байбекова Р.А.	организационно-экономический механизм рассматривают как составляющую экономического и определяют его как “... часть хозяйственного механизма, которая отражает совокупность организационных, финансовых и экономических методов, способов, форм, инструментов и рычагов, посредством которых осуществляется регулирование организационно-технических, финансово-экономических и производственно-технологических процессов с целью влияния на результат деятельности предприятия”.
Хазан М.	организационно-экономический механизм состоит в единстве государственного регулирования и рыночной саморегуляции, к элементам этого механизма относятся: методы, инструменты, формы, рычаги государственного регулирования и рыночной саморегуляции.

Учитывая отсутствие однозначности в толковании понятия “организационно-хозяйственный механизм” как в отечественной, так и зарубежной литературе, что установлено на основе данных таблицы 1., предложено толкование этого понятия, как совокупности организационных и экономических рычагов, действуют на организационные и экономические параметры системы управления и способствуют получению конкурентных преимуществ, формированию и повышению организационно-экономического потенциала и эффективности деятельности предприятия в целом.

Нерешенным вопросом является проблема определения структуры хозяйственного и организационно-хозяйственного механизма как составляющей хозяйственного механизма. Организационно-хозяйственный механизм лежит в основе функционирования хозяйственного механизма и отражает совокупность экономических и организационно-административных рычагов и методов, с помощью которых осуществляется регулирование финансово-экономических, производственно-технологических и организационно-технических процессов и отношений с целью влияния на конечный результат предприятия.

Система управления аграрным предприятием составляет систему более низкого уровня сравнительно системы управления как комплексной категории. Данную систему рассматривают в составе двух блоков (рис. 1). Первый элемент — это механизм управление производственно-хозяйственной деятельностью, целью которого является достижение установленных целей предприятия. Второй включает механизмы: процессный механизм, организационный механизм, инструментальный аппарат.

Рисунок 1 – Механизм управления производственно-хозяйственной деятельностью аграрных предприятий

Инструментальный аппарат включает методы управления, которые создают ядро управленческой деятельности.

Управление предприятием реализуется всей системой методов, ведь организационные методы основывают предпосылки использования экономических, а социально-психологические восполняют их, образуя необходимую взаимосвязь

средств управления предприятием. Верное владение всеми методами управления даст возможность увеличить рентабельность производства и производительность труда.

Организационный механизм хозяйствования предусматривает: организационно-правовые нормативы и стандарты, которые регулируют и определяют численность работников, структуру управления, оснащение управленческого труда средствами оргтехники, моральное и материальное стимулирования, распределение работ, обязанностей, прав и ответственности органов управления и управленческих работников. Данный механизм основывается на использовании собственных отношений, которые охватывают организацию функционирования системы, и организацию состава управляющей системы. Структура управления закрепляет функции за работниками и структурными подразделениями и регулирует потоки информации в системе. По горизонтали структуру управления разделяют на отдельные звенья, а по вертикали – на ступени управления. Звенья взаимосвязаны прямыми и обратными связями по вертикали и горизонтали. Чем рациональная структура управления, тем эффективнее функционирует вся система [12, 13].

Процессный механизм рассматривает систему в динамике, содержит в себе функции управления, которые отражают сущность и содержание управленческой деятельности на всех уровнях. Основными функциями управления являются: планирование, мотивация, организация, контроль, назначения кадров и их стимулирования. Функции тесно связаны между собой в едином процессе.

Механизм целевого управления включает в себя цели и основные результаты деятельности предприятия, а также критерии выбора и оценки достижения определенных целей и результатов деятельности предприятия.

Формирование целей является функцией самого управления, а их реализация осуществляется как в рамках функционирования управления, так и управляемого объекта [13].

В процессе развития общества, совершенствования технических возможностей и системы производственных отношений, количество рычагов и методов, влияющих на эффективность организационно-экономического механизма, возрастает. Рычаг является средством, с помощью которого обеспечивается сочетание составляющих механизма в единую систему и целостность его функционирования. Функционирование рычагов организационно-экономического механизма осуществляется на основе системы правовых норм, соответствуют действующему законодательству. До рычагов организационно-экономического механизма относятся: организационно-административные и экономические. Организационно-экономические содержащих: кадровое обеспечение, информационное обеспечение и защита информации, организационно-правовую форму и структуру управления. К экономическим рычагам, зачисляют амортизационную политику и политику ценообразования, налогообложения, кредитования и страхования. Организационные и экономические рычаги отличаются от административных тем, что непосредственно не заставляют экономических агентов действовать определенным образом, но делают другое поведение для них невыгодной; допускают лишь возможность выбора решения для оптимизации расходов и улучшения своей деятельности. Применение организационных и экономических рычагов механизма заключается в сочетании объективных и субъективных аспектов человеческой деятельности в контексте постоянного развития на основе внедрения технологических инноваций и повышения эффективности использования производственного потенциала [14, 15].

Управление, как и любой другой вид деятельности, требует конкретной оценки – определение эффективности. Эффективность управления заключается в достижении наиболее выгодного соотношения между результатов деятельности аппарата управления и использованными для получения этих результатов финансовыми и материальными ресурсами. Эффективная система управления предприятием создает благоприятные условия, которые обеспечивают достижение производственным

коллективом поставленных целей и содержат социальные, экономические и психологические элементы.

Экономическая эффективность может определяться по критерию совокупного общественного продукта, в том числе такими формулами:

1) Е=РОП/ПВП, качество управления(Е) отражает совокупность процессов и ресурсов, структуры и процедур, необходимых для реализации всего процесса;

2) Ру=РОП/НОП, результативность управления (Ру) является степенью точности управления, который характеризуется достижением ожидаемого состояния объекта управления, возможностей и фактических результатов их реализации.

3) Еу=Тп/Тр, экономическая эффективность управления(Еу) характеризует динамику роста производительности труда и ресурсов, именно они обеспечивают этот рост; где РОП – реализованный объем производства; ПВП – потенциальные возможности предприятия; НОП – нужный объем производства; Тп – темп прироста производительности труда; Тр – темп прироста фондовооруженности.

Поскольку задачей управления является непосредственное воздействие на управляемый объект для достижения поставленных целей, эффективность управления в таком случае может быть оценена по степени достижения этих целей, качеству планирования, по эффективности вложений и конечным результатом производственной деятельности. Чаще всего при рассмотрении оценки эффективности управления используют показатели уровня доходности, по тенденции увеличения или уменьшения этого показателя. Критерии эффективности управления находятся в тесной связи с информацией и целями предприятия. Поскольку информация также является результатом действия, то она является “выходом” системы управления предприятием. Следовательно, эффективность системы управления предприятием зависит от функционирования и использования каждого элемента системы управления – применение научно обоснованных и передовых методов управления, полнотой информационного обслуживания, рациональностью организационной структуры, квалификации управленческих кадров и их умением по решению конкретных проблем управления.

Выводы и перспективы дальнейших исследований. Успешная производственно-хозяйственная деятельность в значительной мере зависит от производственной, организационно-хозяйственной и управленческой структур. Незначительные изменения в производственной структуре, если они не нашли отражение в организационно-хозяйственной, вносят диспозиции в системе управления аграрным предприятием и приводят к определенным проблемам. Поэтому для согласованности всех составляющих производственно-хозяйственной деятельности требуется разработка действенного организационно-экономического механизма управление предприятием. Учитывая отсутствие однозначности в толковании понятия “организационно-экономический механизм” как в зарубежной, так и отечественной профессиональной литературе, установлено его понимание как совокупности рычагов, эффективность функционирования которых зависит от методов управления, что в конечном итоге определяет состояние предприятия и достижения им поставленных целей.

БИБЛИОГРАФИЯ

1. Шилова Н.П. Организационно-экономические аспекты развития интегрированных агропромышленных формирований. Воронеж: Воронежский ГАУ, 2013. 244 с.
2. Балашова Н. Н. Организационно-экономические направления формирования производственного потенциала / Н. Н. Балашова, Т. В. Ерофеева // Аграрный вестник Урала. - 2007. - №6 (42). - С. 92-93.
3. Варламов Н.В. Совершенствование организационно-экономических отношений на сельскохозяйственных организациих /Н.В. Варламов, А.А. Полухин// Материалы международной научно-практической конференции Социально-экономические

преобразования в аграрном секторе региона: Итоги и перспективы. Орел, 2005. с. 148-151
4. Шакиров Ф.К., В.А. Удалов, С.И. Грядов и др. Организация сельскохозяйственного производства. – М.: Колос, 2001. – 504 с.
5. Хазан М. Организационно-экономический механизм развития в системе управления предприятием // Проблемы теории и практики управления, 2006. №2. С. 96–103
6. Керашев А.А., Байбекова Р.А. Организационно-экономические аспекты создания и эффективного функционирования вертикально-интегрированных формирований в АПК // Вестник Адыгейского гос. ун-та, 2007. №1. С. 54 – 60
7. Князькина А.А. Понятие и состав организационно-экономического механизма стимулирования инвестиционной активности в АПК // Фундаментальные исследования. – 2015. – №2-6. – С. 1246-1251
8. Полухин А.А. Организационно-экономические основы энергосбережения в сельском хозяйстве/А.А. Полухин, А.В.Алпатов, А.Н.Ставцев и др.- Орел: изд-во Картуш, 2013. - 132 с.
9. Полухин А.А. Организационно-экономический механизм модернизации сельского хозяйства России/ А.А. Полухин// Аграрная Россия. – 2012 - №5 с. 23-29
10. Середа Н.А. Организационно-экономический механизм воспроизводства технического потенциала в сельском хозяйстве/ Н.А. Середа// Международный технико-экономический журнал. – 2012. - №4. – с. 32-36
11. Частухина Ю.Ю., Дубина Г.И., Князькина А.А. Эффективность государственной поддержки как инструмента кредитно-инвестиционного механизма АПК // Аграрная наука. – 2014. – №7. – С. 9–11
12. Кузубов А. А., Шашло Н. В., Чжан Ю. Функциональная роль экономического анализа в условиях инвестиционно-инновационного развития аграрной экономики // Научное обозрение: теория и практика 2017. №8. С. - 76-86
13. Максимец Н. Управление эффективностью сельхозпроизводства / Н. Максимец, Е. Юричева // Экономика сельского хозяйства России. - 2006. - N9. - С. 14.
14. Павленко Н.Е. Экономический механизм эффективного развития сельского хозяйства: монография /Н.Е. Павленко; РАСХН, ГНУ ВНИИЭСХ. - Белгород: Белгородская областная типография, 2010. - 512 с
15. Шашло Н.В., Аль-Раваждех Х.М. Обеспечение продовольственной безопасности на макро- и микроэкономическом уровнях как важнейший приоритет аграрной политики государства // Территория новых возможностей. Вестник Владивостокского государственного университета экономики и сервиса. 2017. Т. 9. №3 (38). С. 109-120.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.13

POLITICAL SUBJECTIVITY PHENOMENON OF STUDENT-AGE YOUTH

Kulikov S.P.*, Candidate of Sociological Sciences
Moscow Aviation Institute (National Research University), Moscow, Russia

Shchitov K.V., Chairman
Moscow City Duma's Commission for Physical Culture, Sports and Youth Policy, Moscow, Russia

*E-mail: ncsrm@mail.ru

ABSTRACT
The article addresses the phenomenon of the political subjectivity of student-age youth and the impact on student-age youth as a social group through the educational system of higher vocational training institutions. It is concluded that, without the participation in young student associations, it is impossible to shape a good professional, much less an innovative scientist, from a simple student.

KEY WORDS
Education, student days, political culture, factor, youth, discourse.

Today student-age youth are the most important social and political unit. This particular status of youth in the arena of political discourse is linked to a number of factors. These include, first and foremost, the possibility of influencing on student-age youth as a social group through the educational system of higher vocational education. Student-age youth are also a positive environment for the emergence, development and implementation of various innovative ideas. It is today's students that will become the foundation of the future of our society and determine in many ways what it will be. Although the intellectuals' environment hasn't been numerous in all historical eras, it has always been an elitist and decisive factor in the progress and prosperity of the nation as a whole. In addition, it is important to note that, in terms of modern psychology, the final stages of human personality shaping is chiefly associated with the student age, a period that is favourable to the development of values, since major stereotypes have not yet been formed or are fairly flexible. Moreover, it is also important that the student environment seek to participate actively in the political life of the community by seeking to organize social and political processes in accordance with their own perceptions and values. These factors make it possible to speak of the special nature of the representation of student youth in the social and political government system.

It is important to note that youth and the political system of society are not functioning in isolation, and in the process of political socialization, young people do not simply absorb the norms, somehow converting them into personal values, but enrich, alter, transform them, returning them to the society in an altered, more appropriate modern state, thus affecting society and the political situation. Society shapes a citizen in the process of political socialization, solving, first of all, educational tasks, but a properly nurtured citizen, then creates a new society that combines in its idea the reasonable tradition as well as the necessary innovation. What the future society will be depends entirely on how the work with young people, especially students, is organized today.

In our country, research on various aspects of youth issues has been conducted for a considerable period of time. The heightened interest of political scientists and sociologists in youth and youth policy is due, first of all, to the special nature of youth representation in the political arena, which is defined here as a phenomenon of political subjectivity of student-age youth. Let us consider the origin of these views.

The works of Russian scientists on the issues of youth policy are similar in concept and direction to those of Western European and American scientists. In general, political scientists share the view that young people are a reflection of the future development of society. However, in our country, the scientific consideration of youth issues has long been under ideological oppression, which has not contributed to the full reflection of the real social concerns of the subject.

The first significant studies of youth political subjectivity began in the years of 1900-10. Three main areas of focus can be identified in the works of this period. First, young people are viewed as carriers of youth-age characteristics. It is not the young people themselves, but a period of "youth", i.e., the time-stage that the individual dwells in. This concept was discussed in the works of L.S. Vygotsky, A.N. Leontev, G. Stanley Hall, C. Bühler. The second area of research is youth as a sociocultural group with its own individual and exclusive properties (E. Spranger, R. Benedict, B. Malinovsky, M. Mead etc.) The third approach considered youth from the point of view of generation alternation and succession (sociologists of Marxist school such as K. Mannheim, M. Scheler, G.B. Lukács). Further research on youth reflects the social and political processes associated with the global revolutionary changes that led to the establishment of the socialist camp. The scientific works here could also be divided into three major groups. This classification was based on a review of a particular type of youth. In the first group, researchers devoted their work to the issues of the so-called working youth. This category was virtually forgotten in Tsarist Russia, and in the 1920s it became crucial. "A Teen Worker" (Aryamov I.A., 1928), "Work and Everyday Life of Teenagers" (Zaitsev V.A., 1926), "Working Youth's Life" (Kogan B.B., Lebedinsky M.S., 1929) were released. Research for this category was aimed at understanding the specific needs of young people, the dependency of social inclusion, the nature and working conditions. A second group of researchers considered early youth movements. Based on the sad life lessons of a bygone era, scientists attempted to offer the state effective mechanisms for the creation of youth communities whose activity would be aimed at the good of the state rather than at harming it. For example, "Revolution and Youth" by A.B. Zalkind [1] is devoted to this issue. The third social category, which had attracted researchers, which was the most organized was young people who are studying. The study of young people who are studying at that time took place in the context of the establishment of a universal educational system that was to be used in the Soviet educational institutions. Among the most important and relevant scientific concepts, we should mention the concept of child and juvenile collective upbringing and re-education by the Soviet teacher, A.S. Makarenko. The concept called for the creation of youth groups of the united by ideologised tasks that would ensure that young people were kept from any kind of anti-state and anti-social sentiment and that they would educate them in a spirit of respect and love for their nation. The later idea of the communist human upbringing, developed by V.A. Sukhomlinsky, is also important and considers the needs of secondary and higher technical education. In his educational concept, Sukhomlinsky relied on the strength of human, especially ideological, social and political disciplines and the educational influence of the student body as an organized group. In the early 1990s, these works were labeled overly politicized, aimed at the total subordination of the ideology of the regime. However, it is noteworthy that, until now an consistent scientific and practical concept of educating young people hasn't been offered.

At present, research on youth issues has not only preserved its relevance, but has also become essential for the socio-economic and political development of the country. Since the collapse of the USSR and the establishment of the democratic regime in the country, young people have become one of the most numerous organized social groups in the state. All major processes in the country depend on its socio-economic behavior and, in particular, its electoral activity. The direction of research on youth has changed, and several factors have been involved. First, with the adoption in 1991 of the Law «On General Principles of State Youth Policy in the USSR», which enshrined the interpretation of state youth policy as the activities of the state "with a view to creating socio-economic, institutional and legal conditions and guarantees for the social development and advancement of young citizens, their fullest realization in the interest of society as a whole" [2]. Secondly, with a change in understanding of the youth's problems. In the past, it was commonly believed that social and, especially, political problems could be confined to some particular young people, or, at least, to small groups of asocials, but in the early 1990-s, it was more daring to speak of social and political problems of Russian youth in general. Much of this change in approach was due to the rather complex socio-economic situation that deprived young people of active support on the part the State and presented them with the task of survival. However, this statement does not speak of the inhumane nature of the Russian society's youth policy of this period. All civil society was under difficult circumstances. And while the economic problems of citizens were key, the large-scale ideological crisis was as much a concern to political scientists as the former one: "To survive and to preserve itself on the planet, mankind will have to reinvigorate

the old and find new values, adopt a new paradigm of life, new thinking, new rules of co-existence and new morality" [3]. These words of I.M. Ilyinsky can be attributed precisely to the ideological crisis, which has greatly aggravated the political situation in the country, making it unstable, and attempts by the authorities to establish a dialogue with the people were not constructive. The core issue of the youth environment, which is sensitive to all societal cataclysms, has become nihilism, denial of authority, non-recognition of moral values and social as well as political apathy.

Considering social and political activity of the youth, attention needs to be given to the formation of a young person's political culture. Unfortunately, methodologists today have no consensus as to its formation, as well as to the relationship between political culture, beliefs and behavior. Of course, the role of the higher education institution is important in this work, which, first of all, is the force of the educational disciplines of the humanitarian profile to form a political culture. However, even a high level of political culture can be combined with an apathetic civic position. In addition to knowledge and perceptions, there must also be a proper level of political activism and activity, and here the leading role belongs to extracurricular educational work, which contributes to the implementation of the perceptions acquired to the personal directions of activity. The extracurricular educational work of a higher educational institution is a systematic approach whose basic core is youth organizations and associations. They ensure the political socialization of students by guiding youth activity into the necessary direction of the political system. However, their work will not be successful unless the proposed (by the authorities) initiatives are in conformity with the personal views and values acquired through the "classroom interaction" process which is the basis of the political culture. We believe that in order for youth policies to succeed, the young people must be guided by the following: Political consciousness, built on the ideals of humanism, democracy, tolerance and political activism, which seeks to change the reality towards the adoption of these principles. Only youth student inter-university associations can give the young person the first experience of successful political activity and make the student a real actor [in the sociological sense] in the political arena.

REFERENCES

1. Zalkind A.B. Revolution and youth. Moscow, 1924, p.35.
2. The USSR Law «On General Principles of State Youth Policy in the USSR» // Izvestiya. 1991, May 2. P. 2
3. Sheregi, Arefyev, 2003; Current drug problems in young people's environment, 2004.
4. Ovchinnikov V.V. Student's Self-government in Russia: sociological analysis: Thesis for the candidate of sociological sciences. Moscow, 2007.
5. Novikov S.V. The national economy is a large-scale organizational socio-economic system. "Vestnik of University". 2014. No.6. Pp. 125-132.
6. Sorokin A.E. Innovation and Technology management in the organization of science-intensive production. "Innovatsii". 2016. No.10 (216). Pp. 132-136.
7. Novikov S.V. Framework for the management of state and municipal orders. Training manual for students / Moscow, 2012.
8. Volkov Y.G. Role of creative social practices in the development of united activities in Russian society. Int. Journal of Env. and Sc. Ed. 2016. 11. No.16. Pp. 9398-9409.
9. Kulikov S.P. The patriotic education of youth as the main focus of youth policy. Vestnik of Moscow State Regional University. Series: Pedagogy. 2015 No. 2. Pp. 140-145.
10. Yurkina L.V. The harmonious educational space of the technological higher educational institution is the key to building citizenship. Eur. Soc. Sc. J. 2013. No.3(31). Pp. 55-60.
11. Kulikov S.P. The patriotic education of youth as the main focus of youth policy. Vestnik of Moscow State Regional University. Series: Pedagogy. 2015 No.2. Pp. 140-145.
12. Zolotukhina E.B. Sales management of the chain retail establishments. International Journal of Applied Business and Economic Research. 2017. Vol. 15. Issue 11. pp. 19-27.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.14

TAX ANALYSIS OF MARRIED WOMEN HAVING AN INCOME FROM ONE EMPLOYER

Wijaya Suparna
Polytechnic of State Finance STAN, Indonesia
E-mail: sprnwijaya@pknstan.ac.id

ABSTRACT
Tax regulation applied in Indonesia for married women having an income from one employer and choosing to exercise tax rights and obligations jointly with her husband, is different with to those choosing to exercise rights and obligations separately from her husband, in term of the calculation of income tax payable. This paper aims to understand the regulations of taxation for married women having an income from one employer, both of which exercise tax rights and obligations jointly with her husband or separately from her husband, related to tax provisions, the calculation of income tax, and the impact of the implementation of different regulations for both. This study uses descriptive qualitative research. The method used in this research is qualitative method with descriptive approach. The result of the study indicates that there are significant differences in tax payments between the two married women. Furthermore, married women having an income from one employer knows the consequences of each regulation applied to her so that they have the discretion to determine the choice whether to exercise them jointly with her husband or separately from her husband, without any coercion of situations and conditions.

KEY WORDS
Tax, married women, income, regulations.

Nowadays, the increase of the number of working women in Indonesia is due to the current development in this era of globalization that provides many opportunities for married women who want to work to earn money for the family. The supply and demand of female workers increase with the improvement of the level of women's education that cannot be separated from the role of those who fight for the fate of Indonesian women to get the widest opportunity in achieving high education. Another factor affecting the increase of today's number of working women is economic growth leading to higher cost of living when it is only supported by a single worker in the family; thus, it encourages married women to enter jobs, (Blundell et al, 2000). Nowadays, the high number of married women who enter the world of work is not separated from their status as tax subject who requires them to meet the taxation aspect (Eissa and Hoynes, 2004).

Article 2 of the Constitution No. 6 of 1983, which had changed several times currently with the Constitution No. 16 of 2009 on General Terms and Procedures of Taxation, mention that every tax subject who has met the subjective or objectives requirements, are required to register themselves to Directorate General Tax office and are given Tax Identification Number (TIN). Those who have been registered as subject tax as mandated in Constitution, do not distinguish sex in the fulfillment of taxation rights and obligations so that the position between man and women are equivalent. However, the problems arise in counting tax for married women choosing to exercise tax rights and obligations jointly with her husband and married woman choosing to exercise rights and obligations separately from her husband, (Eissa and Hoynes, 2006).

Regulations of Indonesian taxation apply family as an economic entity, it means that the income or the loss of all family members is combined as a taxable entity and the fulfillment of tax obligations is done by the head of the family. For married women who choose to exercise their rights and obligations of taxation separately from their husbands, the married woman must perform self-assessment system in which they have to register, count, calculate, pay, and report the amount of tax owed irrespective of taxation rights and obligations of her husband, including the ownership of TIN (NPWP) and reporting of Annual

Tax Return (SPT). The implementation of a separate self-assessment is limited to the exercise of rights and obligations in the field of taxation (Meyer and Rosenbaum, 2000). But the relationship between husband and wife still exists in the calculation of income tax payable. In its practice in Indonesia, there are quite a lot of couples who use separated scheme of TIN (NPWP) due to the number of married women who work, causing the wives prefers to be a career woman rather than a housewife.

Based on the results of a survey conducted by "accenture", a firm of management consultant, technology services and outsourcing present the survey results conducted to career women from 32 countries around the world, including Indonesia. The survey was conducted online to 4,100 career women from medium to large companies in 32 countries, each country contributing an average of 100 respondents. The results obtained from the survey, as many as 42% of women in Indonesia prefer to work than to stay at home, although they do not have financial problems. (Quoted from bisnis.liputan6.com).

State Personnel Agency (BKN) of 2015 also recorded that 29.50% of government structural officials are held by women. Even in the wider scope, as much as 46.03% professionals, managerial and technicians are women. In politics, female council members are around 17.32%. While in the Micro and Small Industry (IMK), the role of women as business actors in the Indonesian economy is quite significant. Data result from the Micro and Small Industries (IMK) survey of 2015 by the Central Bureau of Statistics (BPS), show about 42% of IMK businesses are managed by women, while the remaining 58% are managed by men. In detail, female business actors in IMK are more visible in micro scale industry; industry that employs 1 to 4 people. In this category, as many as 44.12% of business actors are women. Meanwhile, in small scale industries that employ 5 to 19 people are only about 16.37% of female workers (Quoted from Thematic Gender Statistics: Gender Inequality in Economy, KPPPA-BPS, 2016). With this number, the potential role of women in development is very big and it can be a significant contributor in economic development.

Taxation laws in Indonesia also align gender equality between men and women, especially for married women. The main reason why the provision of taxation obligations for married women is the gender equality itself. In the case of the fulfillment of tax obligations, unmarried women who have their own income are required to register themselves to the Directorate General of Taxes office and for such registration will be granted TIN (NPWP) as a means of tax administration used as a self-identification or taxpayer identity to exercise tax rights and obligations as written in Article 2 of the Income Tax Law. Meanwhile, for women who have been bound by marriage, then they are given the freedom to determine whether to fulfill their own tax obligations or to follow the obligation of their husband taxation as written in Article 8 paragraph (2) letter c Income Tax Law i.e. husband and wife income are separately taxed if in the case of a wife choosing to exercise her own taxation rights and obligations. The separated fulfillment of the rights and obligations from the husband is not only in the circumstances of the wife chooses to be separated on her willingness but also in the case of husband and wife have separate lives based on the judge's decision as well as husband and wife entered into separation agreements of property and income, (Ruggie, 2014).

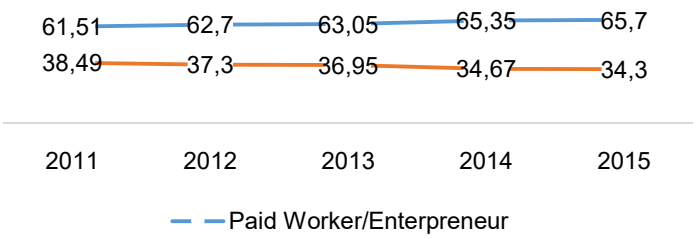


Figure 1 – The Percentage of Working Women with Marital Status Based on the Job Status, 2011-2015

The development of the taxation provisions for married women, as regulated in Article 8 of Constitution No. 7 of 1983 on Income Tax has been amended several times, respectively by (i) Constitution No. 7 of 1991, (ii) Constitution No. 10 of 1994, (iii) Constitution No. 17 of 2000, and (iv) Constitution No. 36 of 2008. The separate taxation of husband and wife is regulated in Constitution No. 10 of 1994; only in case husband and wife have separated life and it is written by husband and wife based on separation agreement of property and income. In the case that the wife wishes to exercise her own taxation rights and obligations, it is regulated after the fourth amendment i.e. Constitution No. 36 of 2008. One of the reasons underlies the enactment of freedom for wives to choose to exercise their own taxation rights and obligations, is the increase of married women status that have jobs from year to year.

THEORETICAL FRAMEWORK

In Article 8 of Constitution No. 36 of 2008, concerning the Fourth Amendment to Constitution No. 7 of 1983 on Income Tax, it is stipulated provisions on the rules of income tax for married women, in terms of:

1. Husband Exercises the Tax Obligations as Head of Family (KK).

The definition of the head of family here is the head of the household who is responsible for decision making concerning the problems in the family both the problems that come from outside or from inside. Almost all women expressly state that men are the head of the family. The head of the family is carried by a father, a husband, or a brother. The exception that mentions the head of a family other than the man is the mother. The position of the mother as the head of the family occurs when the husband dies. In the taxation rules, the definition of the head of the family is more likely to be in a status within the family in which the rights and obligations of taxation of husband and wife are not separately sought. Implementation of taxation is enough to use the TIN (NPWP) of the husband. A wife can use husband's TIN (NPWP) as a means of tax administration without having to register herself to become a taxpayer to obtain TIN (NPWP) on her own name, which in other words the wife follows the husband's TIN (NPWP).

Basically, the tax system in Indonesia, according to the Income Tax Law, places the family as an economic entity, it means that the income or loss of all family members is combined as a taxable entity and the fulfillment of tax obligations is carried out by the head of the family. The husband as head of the family has the responsibility to report on their annual tax return (SPT) by incorporating all income received or accrued by his wife and other family members so that the wife has no the obligation to submit their annual tax return (SPT).

2. Husband and Wife have lived apart by Judge's decision (HB).

What is meant by husbands and wives to live apart according to the judge's decision is to divorce. Calculation of Taxable Income (PKP) and the tax imposition shall be made by each individual. The status of the taxation of the husband and wife shall be changed into the status of Unmarried (TK) including the calculation for the amount of non-taxable income (PTKP), only for themselves as a taxpayer and for family members who become dependents of each individual. If the wife previously has the same TIN (NPWP) with the husband's TIN (NPWP), whose tax code of administration is "001" or "999", it may be proposed for the elimination of TIN (NPWP) so that the wife can re-register to get a new TIN (NPWP) for herself. For dependence of the child, if the husband and wife have children, will be subjected to agreement whether the child is borne by husband or wife.

3. Husband and Wife Perform Written Agreement of Secession Separation (PH).

Marriage / prenuptial agreement (prenuptial agreement) is an agreement made before the marriage took place. The Marriage Law regulates the issue of marriage agreement in Article 29 of Constitution No. 1 of 1974. According to the Civil Code, with the existence of marriage, since then, the wealth of the previous property and the joint property with the husband and wife become one, unless there is a marriage agreement. The marriage agreement contains agreements on the separation of assets, income, and debt and as well as related to child custody. Separate treasury agreements result in husbands and wives

becoming different individuals before the law. The same case happens with the tax law. If an unmarried husband and wife undertake a separation agreement of property and income in writing before marriage, then the wife should have her own TIN (NPWP) as mentioned in Article 2 paragraph (1) UU KUP and the calculation of tax payable is calculated based on the net income of husband and wife which is then calculated proportionally in accordance with the net income of each husband and wife. The wife who entered into the property separation agreement shall submit the Annual Income Tax Return (SPT) of the individual taxpayer in her own name separate from her husband's Annual Tax Return (SPT).

4. Wife Chooses to Exercise her Own Taxation Rights and Obligations (MT).

Provisions concerning the imposition of Income Tax for wives who choose to exercise their own taxation rights and obligations are regulated in Constitution No. 36 of 2008 concerning the Fourth Amendment to Constitution No. 7 of 1983 on Income Tax. Article 8 paragraph (3) stating that the net income of husband and wife as referred to in paragraph (2) points 2 and 3 shall be taxed on the basis of the merging of the husband and wife net income and the amount of tax to be paid by each husband and wife shall be calculated in accordance with the ratio of their net income. Circular Letter of General Tax Director Number: SE-29/PJ/2010 concerning Completion of Annual Income Tax Form of Individual Taxpayer for Married Women Conducting Separation Agreement of Property and Revenue, or Those who Choose to Exercise their Own Taxation Rights and Obligations, also describes rules and procedures for calculating income tax applicable to married women who choose to exercise their own taxation rights and obligations. The rules are as follows:

- It is compulsory to submit the Annual Income Tax Return of individual Taxpayer on her own name which is separate from the Annual Income Tax Return of her husband;
- The reported income is all income received or earned by a married woman within a taxable year, excluding the income of a minor child;
- The calculation of income tax payable in the Annual Income Tax Return of married women is based on the merging of the husband and wife's net income and the amount of income tax payable to the wife is calculated in accordance with the ratio of net income between husband and wife;
- The calculation of income tax payable for the above married woman also applies to married women as employees who have income solely received or obtained from an employer who has taxed by income tax of Article 21;
- The assets and liabilities/debts reported in the Annual Income Tax Return of the married woman are assets and liabilities owned/held at the end of the tax year;
- The procedure of filling the Annual Tax Return for married women is in accordance with the guidance of filling the Annual Tax Return of the Personal Taxpayer stipulated in Regulation of the Director General of Taxation No.34/PJ/2009 as lastly amended by Regulation of the Director General of Taxation No.36/PJ/2015.

METHODS OF RESEARCH

This study uses descriptive qualitative research method. The method used in this research is qualitative method with descriptive approach. Sugiyono (2016) argues that qualitative research method is a method used to examine the natural object condition, where the researcher is a key instrument, data collection technique is conducted in combination (triangulation), data analysis is inductive, and the result emphasis more on generalization. Firdaus (2017) argues that descriptive method is a method to examine the status of an object (can be human, event, etc.). Descriptive method learns about the issues of society as well as certain situations. This method is *ex ost facto*, it means that the data are collected after all the events have been completed/under way. Sugiyono (2016) argues that qualitative research is holistic (whole, integral) based on the overall social situation under study, include synergy aspects of the place, actors, and activity. According to KBBI, analysis is an investigation of an event (composition, deeds, etc.) to find out the real situation (cause and effect, the core problem, and so on).

DISCUSSION OF RESULTS

Income Tax Treatment of Married Woman Having an Income from one Employer. The application of tax laws for married women having an income from an employer follows the rules of Article 8 paragraph (1) of the Income Tax Law whose income is deemed final if it meets the requirements: (i) the income is received or obtained from one employer, (ii) has been taxed by income tax under Article 21 on Income Tax, (iii) has no relationship with the business or the free employment of the husband or other family members.

If the income received by a married woman does not meet the three conditions, then the income should not be considered final and should be backed by the husband's income. For example, a wife who works as a doctor in an X Hospital owned by her husband, then in the calculation of taxes, the net income of married women should be merged with the husband's net income.

Practically, there are two conditions for married women in the fulfillment of their taxation rights and obligation, (Meyer and Rosenbaum, 2001). The first condition, if the married woman chooses to exercise the taxation rights and obligations following the husband (spouse to husband). It means that the status of the tax obligation is borne to the Head of Family (KK); the husband as the head of the family is responsible for the tax obligations. In the ownership of TIN (NPWP), there is only one TIN (NPWP), it is husband's TIN (NPWP). Wife may use husband's TIN (NPWP) as a means of tax administration by affixing the code of branch "001" or "999" in the last three digits of the husband's TIN (NPWP), if it is necessary, the filling requirement in NPWP is at the company or institution where the married woman is working.

Therefore, the married women do not need to register themselves to get their own TIN (NPWP). Income that has been taxed by income tax under Article 21 are final. Thus, the net income received or earned by the wife is not combined with the husband's net income, in the case of the calculation of the income tax payable. For example, an employee of Bank Mandiri who works as a teller and has been taxed by Article 21 on Income Tax for the income she receives. If she follows her husband, she does not need to submit the Annual Tax Return; it is only tax obligation which is made by the husband. While the tax that is already taxed by the company is considered as final and is reported in the annual tax return for private person of husband in Appendix III Part A numeral of 15 SPT 1770 or Appendix II Part A numeral of 13 SPT 1770 S.

The second condition if the married woman chooses to exercise the taxation rights and obligations separately from her husband. Taxation regulation of this married woman refers to Article 8 paragraph (2) letter c of the Income Tax Law; if the wife is willing to choose to exercise her own taxation rights and obligations; where the husband and wife income are taxed separately. The relationship of husband and wife is still visible in the calculation of the tax payable.

Article 8 Paragraph (3) of the Income Tax Law explains how the tax calculation between husband and wife who choose to exercise the taxation rights and obligations separately; the net income of the husband and wife is taxed on the basis of the merged net income of husband and wife, and the amount of tax which must paid by each husband and wife is calculated in accordance with their net income ratio. In addition, in the Income Tax Act, the taxation laws of married women who choose to exercise the rights and obligations separately from their husbands are also regulated in SE-29/PJ/2010 concerning the Inclusion of Income Tax Statement of Individual Taxpayers for Married Women Conducting the Agreement Separation of Property and Income or Who Choose to Exercise Their Own Taxation Rights and Obligations. The obligation to report annual tax return is not only done by husband but also wife. Each of them conveys the amount of income received or earned in a tax year.

If we carefully observe it, married women who work as an employee in a company, institution or agency with the good intention of registering for a TIN (NPWP) on its own behalf, will feel aggrieved because it is likely to pay a tax shortfall compared to an employee whose TIN (NPWP) is inducted into husband. Most of women who have a job before

marriage, they have already had TIN (NPWP) of their own due to the requirements submitted by the company where they worked. The reason is not to be subjected to Article 21 with a higher rate of 20% than the rate applied to ordinary taxpayers who have NPWP. The rule refers to Article 21 of the Income Tax Law No. 38 of 2008 and Regulation of the Minister of Finance No. 252/KMK.03/2008 Article 20 paragraph (1) stating that the recipients of income, who are taxed by Article 21 Income Tax, who do not have TIN (NPWP) shall be subject to withholding of Article 21 Income Tax at a rate higher 20% compared to which is applied to ordinary taxpayers who have NPWP. Paragraph (2) states that the amount of Income tax of Article 21 that must be taxed against employees who have TIN (NPWP) is 120% of the total of income tax; in which it should be taxed due to Article 21 where the taxpayers have TIN (NPWP). On that basis, employers of a company, institution, or agency prefer to register themselves in order to get TIN (NPWP) rather than having to bear higher taxes than those who already have NPWP.

Calculation of Income Tax Payable. The calculation of income tax payable, for married women having an income from one employer here, is based on two conditions which been described previously. The legal basis underlies the calculation of income tax for wives who choose not to be separated is in Article 8 paragraph (1) of the Income Tax Law where the tax of the wife's income is final, while the wife who chooses to exercise her taxation rights and obligations is in Article 8 paragraph (3) of the Income Tax Law and its explanation and SE-29/PJ/2010. The following is the presentation of the examples of tax calculations payable for each of the conditions of married women who have an income from one employer but have different way in fulfillment of taxation rights and obligations.

Condition I (The wife does not exercise her own taxation rights and obligations). Mr. Surnama and Mrs. Surila is a married couple who each works as a civil servant (PNS) in one of the government agencies in the city of Surabaya. Both of them have dependents of three children who are still going through education. Mr. Surnama's net income during the year is amounted to IDR 357.175.416 and Mrs. Surila net income is amounted to IDR 241.836.144. Mr. Surnama's TIN (NPWP) is 06.677.878.3-589.000 and Mrs. Surila's TIN (NPWP) is 06.677.878.3-589.001. Mrs. Surila is willing to have the fulfillment of taxation rights and obligations separately from Mr. Surnama. Here is the calculation of income tax 21 if the wife does not exercise her own taxation rights and obligations:

Husband
Husband's net income=IDR 357.175.416
PTKP (K / 3)=IDR (72.000.000)
PFM=IDR 285.175.000 (Rounding)
Income tax payable:
5% x IDR 50.000.000=IDR 2.500.000
15% x IDR 200.000.000=IDR 30.000.000
25% x IDR 35.175.000=IDR 8.793.750
IDR 41.293.750

Wife
Wife's net income (considered as final)=IDR 241.836.144
PTKP (TK/0)=IDR (54,000,000, 00)
PFM=IDR 187.836.000
Income tax payable:
5% x IDR 50.000.000=IDR 2.500.000
15% x IDR 137.836.000=IDR 20.675.400
IDR 23.175.400

In this condition, the net income received or obtained by the wife is not merged with the husband's net income because it is considered as final, because it comes from one employer, namely the government agency of Surabaya City. So that in the calculation of tax payable, there is no relationship with each other (final). Tax of income tax 21 by the Surabaya government agency, will be presented to the wife as proof of tax deduction in a piece of evidence. At the end of the year, in the time of the Annual Income Tax Return report,

the piece of evidence that has been submitted to the wife will be used as a tax credit for Income Tax 21 so that the amount to be paid is nil.

Condition II (The wife exercises her own taxation rights and obligations). Condition II uses the same illustration with the condition I. However, TIN (NPWP) of each couple is different because the wife chooses to exercise taxation rights and obligations separately from her husband. Mr. Surnama's TIN (NPWP) is 12.345.678.9-678.000 and Mrs. Surila's TIN (NPWP) is 88.999.000.2-675.000. By using the same illustration with condition I, the calculation of income tax 21 is when the wife chooses to exercise her own taxation rights and obligations; it is presented in the following description:

Husband's net income=IDR 357.175.416
Wife's net income=IDR 241.836.144
Total net income=IDR 599.011.560
PTKP (K/I/ 3)=IDR (126.000.000)
PFM=IDR 473.011.000

Income tax payable:
5% x IDR 50.000.000=IDR 2.500.000
15% x IDR 200.000.000=IDR 30.000.000
25% x IDR 223.011.000=IDR 55.752.750
IDR 88.252.750

Income tax payable borne by husband:
IDR 357.175.416 x IDR 88.252.750=IDR 52.622.878
IDR 599.011.560

Income tax payable borne by wife:
IDR 241.836.144 x Rp88.252.750=IDR 35.629.871
IDR 599.011.560

Table 1 – Comparison of Income Tax Payable of 21 between Condition I and Condition II
(In units of Rupiah)

ITP 21	Condition I		Condition II		
	Income tax Payable	Lack of Payment	Income tax Payable	Credit Tax	Lack of Payment
Husband	41.293.750	Nil	52.622.878	41.293.750	11.329.128
Wife	23.175.400	Nil	35.629.871	23.173.400	12.454.471

From case illustration of condition I and condition II which have been presented above, we can know that income tax payable of Article 21 by husband and wife in each different condition. Condition I is if the wife does not choose to exercise taxation rights and obligations separately from husbands, it states that income tax should paid by the husband is IDR 41.293.750 and the income tax should be paid by the wife is for IDR 23.175.400. There is no income tax that is underpaid by them so it is stated that lack of payment is nil. This is because no more payments after the end of the year, so that the Annual Income Tax Return of the husband is nil. Therefore, there is no Income Tax of Article 29 should be paid by the husband.

While in the second condition when the wife chooses to exercise taxation rights and obligations separately from her husbands, income tax payable by a husband is IDR 52.622.878 and wife is IDR 35.629.871. Mrs. Surila's income tax of Article 21 which has been taxed by the employer is IDR 23.175.400. But Mrs. Surila's chooses to exercise taxation right and obligation by herself, and then her income tax is IDR 35.629.871. Income tax that has been taxed by the employer can be used as a tax credit by Mrs. Surila. Capital tax obligations Surila are as follows.

Income tax payable = IDR 35.629.871
Tax Credit (Income tax 21) = (IDR 23.175.400)+
Lack of Payment of the Income Tax= IDR 12.454.471

Due to the lack of payment to the income tax, then Mrs. Surila shall pay to the state treasury with due date of March 30 in the next tax year. In the table above, it can be concluded that there is a significant underpayment of income tax between them. Condition I mentions that the lack of payment is nil. While the condition II shortly mentions the lack of payment is IDR 11.329.128 to Mr. Surnama and IDR 12.454.471 for Mrs. Surila.

Why the difference between income tax payable condition I and condition II can actually happen? If elaborated mathematically, the most influencing factor is the calculation of PKP and income tax rate layers. In condition II, the calculation of income tax payable for husband and wife who exercise taxation rights and obligations separately is by combining the husband and wife net income and then reduced by PTKP. This causes the number of married couple combined income taxable, after deducting with PTKP, the amount is IDR 50.000.000 will be charged the lower rate (5%) only once. The rest will be subject to the rate of 15%. However, on the condition I, PKP is up to IDR 50.000.000; it will be charged the lower rate twice, in the time of calculation of income tax payable of the husband and income tax payable of the wife. So, the part of PKP that should have taxed 15% rate is subjected to a low rate of 5%.

CONCLUSION AND SUGGESTIONS

Based on the discussion, it can be concluded that the provision of taxation for married women having an income from one employer in which it has been deducted by Article 21 on Income Tax under Article 8 paragraph (1) of the Income Tax Law is considered as final if the income of the wife is received or obtained solely from one employer and have no relationship to the husband's free business or work. Report of Annual Income Tax Return (SPT) for married women having an income from one employer is still exercised by her husband as long as the wife does not choose to exercise the taxation rights and obligations separately.

If the wife chooses to exercise the tax separately from her husband, the wife must perform self-assessment to calculate her self-payable tax and must submit the Annual Income Tax Return (SPT) regardless of the obligation of the husband to submit the Annual Income Tax Return (SPT). The net income for married couples who exercise separate taxation rights and obligations is done by combining the net income of each husband and wife and the amount of tax payable; it is calculated in accordance with their net income ratio. Laws regulating married women who wish to exercise their taxation rights and obligations separately from their husbands are provided in Article 8 paragraph (2) letter c and paragraph (3) of the Income Tax Law and SE-29/PJ/2010.

The consequence of applying different taxation rules of the two conditions of the married woman is that if the married woman who works from one employer then chooses to exercise her taxation rights and obligations separately from her husband, it will have an impact on the amount of tax greater than the married woman who choose to exercise the taxation rights and obligations jointly with the husband. Therefore it causes a gap in terms of taxation rules. Because, the existing taxation rules of Indonesia put the family as an economic unity.

The implementation of regulation concerning tax obligations for married woman having an income from one employer, have not yet met the point of justice. Taxation rules in Indonesia still use the family as an economic unity that can be taxed even though the wife wants to choose to exercise taxation rights and obligations separately from her husband and have her own TIN (NPWP). Whereas, before the tax law, they are independent taxpayers so that both are obliged to submit their Annual Income Tax Return (SPT).

It is suggested to hold counseling and dissemination through print and online media such as advertisements on media or being on-air on radio and television delivered by tax officials as an extension of the government's hand on the consequences of tax rules for married women who choose to exercise taxation rights and obligations separately from her husband. In addition, the Tax Office should actively provide understanding for taxpayers especially for married women who wish to register themselves to get TIN (NPWP) on their behalf and invite Human Resources Development (HRD) from companies and treasurer of

salary from central or local government work unit, which is located in its working area to give more deeply counseling and dissemination about the provisions of taxation related to married women, so that the information provided can be disseminated.

REFERENCES

1. Sugiyono, 2016. Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Bandung : Alfabeta Bandung
2. Blundell, R., Duncan, A., McCrae, J., & Meghir, C. (2000). The labour market impact of the working families' tax credit. Fiscal Studies, 21(1), 75-104.
3. Eissa, N., & Hoynes, H. W. (2004). Taxes and the labor market participation of married couples: the earned income tax credit. Journal of public Economics, 88(9), 1931-1958.
4. Ruggie, M. (2014). The state and working women: A comparative study of Britain and Sweden. Princeton University Press.
5. Meyer, B. D., & Rosenbaum, D. T. (2001). Welfare, the earned income tax credit, and the labor supply of single mothers. The quarterly journal of economics, 116(3), 1063-1114.
6. Eissa, N., & Hoynes, H. W. (2006). Behavioral responses to taxes: Lessons from the EITC and labor supply. Tax policy and the economy, 20, 73-110.
7. Meyer, B. D., & Rosenbaum, D. T. (2000). Making single mothers work: Recent tax and welfare policy and its effects (No. w7491). National bureau of economic research.
8. Firdaus, 2017. Dasar-Dasar Penelitian. Jakarta : BPPK
9. Dokumen Publik atau Peraturan Perundang-Undangan
10. Undang-Undang Nomor 36 Tahun 2008 tentang Perubahan Keempat atas Undang-Undang Nomor 7 Tahun 1983 tentang Pajak Penghasilan.
11. Undang-Undang Nomor 16 Tahun 2009 tentang Perubahan Keempat atas Undang-Undang Nomor 6 Tahun 1983 tentang Ketentuan Umum dan Tata Cara Perpajakan.
12. Peraturan Pemerintah Nomor 74 Tahun 2011 tentang Tata Cara Pelaksanaan Hak dan Pemenuhan Kewajiban Perpajakan.
13. Peraturan Menteri Keuangan Nomor 243/PMK.03/2014 tentang Surat Pemberitahuan.
14. Direktorat Jenderal Pajak. Peraturan Direktur Jenderal Pajak Nomor PER-51/PJ./2008 tentang Tata Cara Pendaftaran Nomor Pokok Wajib Pajak bagi Anggota Keluarga.
15. Peraturan Direktur Jenderal Pajak Nomor: Per-36/Pj/2015 tentang Perubahan Ketiga atas Peraturan Direktur Jenderal Pajak Nomor
16. Per-34/Pj/20130 tentang Bentuk Formulir Surat Pemberitahuan Tahunan Pajak Penghasilan Wajib Pajak Orang Pribadi dan Wajib Pajak Badan Beserta Petunjuk Pengisiannya.
17. Peraturan Direktur Jenderal Pajak Nomor: Per-38/Pj/2013 tentang Perubahan Atas Peraturan Direktur Jenderal Pajak Nomor
18. Per-20/Pj/2013 tentang Tata Cara Pendaftaran dan Pemberian Nomor Pokok Wajib Pajak, Pelaporan Usaha dan Pengukuhan Pengusaha Kena Pajak, Penghapusan Nomor Pokok Wajib Pajak dan Pencabutan
19. Pengukuhan Pengusaha Kena Pajak, serta Perubahan Data dan Pemindahan Wajib Pajak.
20. SE-29/PJ/2010 Tentang Pengisian Surat Pemberitahuan Tahunan Pajak Penghasilan Wajib Pajak Orang Pribadi bagi Wanita Kawin yang Melakukan Perjanjian Pemisahan Harta dan Penghasilan atau yang Memilih untuk Menjalankan Hak dan Kewajiban Perpajakannya Sendiri.
21. Putusan Mahkamah Konstitusi Nomor : 69/PUU-XIII/2015 Tahun 2015 tentang Pengujian Undang-Undang Nomor 5 Tahun 1960 tentang Peraturan Dasar Pokok-Pokok Agraria dan Undang-Undang Nomor 1 Tahun 1974 tentang Perkawinan.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.15

INNOVATIVE SYSTEM MANAGEMENT MECHANISM IN THE EARLY STAGES OF INNOVATION

Novikov S.V.*, **Gavrilova I.S.**, Candidates of Economic Sciences
Moscow Aviation Institute (National Research University), Moscow, Russia
*E-mail: ncsrm@mail.ru

ABSTRACT
One of the main management elements in the development and implementation of innovation is the various organizational and economic interactions aimed at acquiring and transferring knowledge and technology between developing, productive, scientific and educational organizations. The quality, intensity, and early timing of the developing enterprises entering into the interaction network determine the achievement of "breakthrough" improvements, the long-term efficiency and desired performance of the final high-tech products. The model of innovation management change process in the early stages of the product development cycle is based on systematic and coordination-oriented approaches using Robust Portfolio Modeling. The results of the study are as follows: the main stages of project evaluation and selection, management procedures for developing the process of selecting the potential scientific and innovative networks, the tools for their implementation, and the system of interrelation between the major stages of the innovation development cycle. The field of application of the research results is management and planning systems of enterprises working in the early stages of the innovation cycle, where originators and sources of innovation may be the users themselves.

KEY WORDS
Innovation, stages, life cycle; management processes, systematic approach, Robust Portfolio Modeling, scientific and innovative networks.

Market demands to reduce the development cycle time and increased competition in the market for high technology producers have led to the need of further change of organization and management in the design processes of the life-cycle stages of innovation. The increasing complexity of innovation systems makes traditional management processes inoperative for innovation, leads to delays in entry into the market and, as a result, unexpected expenditures.

The main setbacks of current management processes can be identified as:

- Low percentage of conceptual management decisions in the early stages of the life cycle of innovative products development;
- Belated involvement of external developers and suppliers to the life-cycle stages of innovative product development;
- Low contribution of external sources to research and technology; only the local specification for customers' requests, etc.

The development of networking among developers, manufacturers, suppliers, higher educational institutions, etc. takes place in isolation from the selection of priority innovative programmes and projects. These issues are usually dealt with later, in the further stages of the life cycle of an innovation project or in order to take part in competitive procedures [1]. Often the need to take into account the many horizontal and vertical connections - both within the innovation system and in the interaction with the external environment - increases the time spent on the project implementation and, as a result, reduces its efficiency in operation.

The results of the development assessment and acceleration of the life-cycle processes for the creation of the innovation; the expansion of external sources for scientific and applied research, as well as the development of technology in the manufacturing of

products, have shown that the solution to the current situation is to apply the systematic approach to a number of key elements, such as:

- Identification of priorities in the evaluation of innovative projects, taking into account the range of possible prospects, alternative ideas;
- To reduce the turnaround time for new developing innovative technologies from the point of view of the competitiveness of the process;
- Establishment and development of networking, as well as restructuring of the existing networks, starting from the early stages of innovative projects and programmes;
- Expansion of management tools to attract external sources aimed at building various networks, including technology platforms;
- Restructuring of the product development process as an activity from the product vision that originates from the customer's needs, etc.

This requires changes and improvements in the traditional methodology for the selection of programmes and projects based on investment assessment, as well as the search for new strategic innovative solutions in the context of uncertainty and diversity of choice.

When choosing a system of criteria for evaluating innovative projects in life cycle stages, the requirements for finding attractive projects and evaluating them in a context of incomplete information are mandatory. The difficulties of selection also arise in determining the benefits of one project before another, because in a decision-making process, where a combination of qualitative and quantitative characteristics and the possibility of using a cost-sharing effect and unique characteristics of an innovative project are taken into account, when it is implemented with the existing enterprise projects.

In the proposed study, the selection of design solutions in the context of limited resources and perhaps incomplete information on the relative importance of the evaluation criteria and the functionality of the projects is given by the Robust Portfolio Simulation approach [2].

The proposed model for management changes in innovation in the development of high-tech products, taking into account the assessment and selection of innovative ideas, includes a system of criteria for "innovative attractiveness" of projects and criteria for the selection of potential associate contractors in scientific and innovation networks. This allows integrating the processes of identifying the priorities of innovative ideas and building the cooperation networks, starting from the early stages of innovative programming in project selection.

The intensity and quality of such interactions are getting more significant in assessing the level of innovation systems, which are currently presented as scientific and cooperating networks based on interaction within a broader system that consists of external developers, suppliers, distributors, customers, etc.

The scientific and cooperating network is a combination of scientific, educational and industrial organizations and companies associated with strong partnerships and a unified by a common specific goal.

In scientific networks, the focus is on maintaining and implementing a complete innovation cycle, from generating new knowledge to translating it into a specific product or technology. They are implemented within the project chains that are developed within the network to maximize the initial stages of the innovation cycle (generic, marginalized, pre-competitive research) and are progressing through the stages life cycle of innovative products and beyond. Such networking interactions are particularly relevant if it is a major innovation project of representatives of scientific institutions, industry, institutions of higher education, invested from different sources, and ensuring vast involvement. The use of the portfolio modeling method does not only reveal promising innovative fields of research, but also a possible network architecture for the management of the innovation system in the early stages. Project evaluation in terms of cooperation with scientific and industrial enterprises will also be important for attracting investment in the project, as this interaction points to future demand by industry and consumers. Cooperation also shows that there is a necessary interest in scientific organizations with the status and the expertise to successfully

implement the objectives of an innovative project. Thus, rather than separating the processes of selection of innovative ideas, programmes, projects and networking in the management and planning of innovative development, it is advisable to unite them over time; this will make it possible to focus on ideas around which you can build a new network architecture [3].

Taking into account the above characteristics of the management procedural schemes for the evaluation and selection of innovative projects in enterprises, it is proposed to build the model for implementing management changes in innovation activity in high-tech product development with consideration of network management architecture for the innovation cycle stages, which includes:

- Pre-Selection of projects for consideration by thematic priorities;
- Consolidated (enlarged) evaluation of selected projects by the criteria of innovation;
- Assessment of networking interaction opportunities in project selection;
- Investment and project risk assessment;
- Final selection of the project (projects) of the innovation.

The main criteria for selecting priority innovative ideas may be novelty, feasibility, consumer value. The criteria system also includes the potential cost and cost of the long-term idea for the enterprise; a requirement for an enterprise's capacity to implement the idea; the difference between the ideas and the existing developments; the ability to execute a plan in the context of undefined and critical project parties on time and in a cost-effective manner; etc. Further selection of priority and value, pre-selected innovative ideas includes an assessment of the set of the criteria for evaluating innovative ideas and networking criteria that have already been chosen.

To assess the value of network cooperation, a system of qualitative and quantitative criteria has been used that takes into account the competencies of the development researchers: level of the specialist in a thematic field; public image of the researcher's business; the level of competence of the author's idea, the experience of participating in networking; the extent of interest in participating in the project, etc.

The set of management procedures for the selection of scientific and cooperation networks in the shaping of the project includes the following management decision blocks:

- Consistent multi-criteria consumer selection of potential partners for shaping a scientific and cooperation networks and efficient information exchange at the design and implementation stages of innovative products/technologies;
- Selection of ways and principles of information interaction in the science and cooperation network to maintain and enhance the competitiveness of the enterprise;
- Testing of management procedures in the approval of the list of innovative ideas, taking into account the scientific and cooperation networks as projects;
- Development of a portfolio of orders for innovative enterprise development.

It has been accepted in the study that scientific and cooperation networks (technology platforms, clusters, strategic alliances, etc.) are a communication tool aimed at intensifying efforts to build prospective innovative technologies, new products (services), as well as at attracting additional resources for research and development through the participation of all parties concerned (business, science, state, civil society).

Conclusion. The development of organization and management in the innovation system, starting from the early stages of the innovation cycle, as well as the prospects for their development, offer new ideas for improving innovation processes. The diversity of economic models of management in the design and development of this type of product highlights the development of the network management architecture. Design processes are presented as a network based on interaction within a broader system consisting of competitors, suppliers, distributors, consumers, and so forth.

The proposed adaptation model of management change implementation in innovation includes a cumulative assessment of innovative ideas and assessment of potential associate contractors in the science and innovation network from the early stages of the life cycle. Communication is provided in the network of collaborators of major participants in the design and implementation of an innovative project, a programme for all stages of the life cycle.

The introduction of a model for management changes in innovation in Russian enterprises will make it possible to strengthen decision-making on coordination of the interaction of a significant number of parties involved in the process, particularly in the practical application of emerging new products and technologies, to minimize time frames, costs of project design and implementation, taking into account their long-term efficiency and desired performance.

Integrational formations are particularly important in moving to the market, providing financial resources, acquiring new technologies, sharing risks and achieving other opportunities and resources beyond the capabilities of separate enterprises.

REFERENCES

1. Gavrilova I.S., Novikov S.V. Contract System in state procurements: theory and practice. Moscow, 2017.
2. Zakharova L. F., Novikov S.V. Management of competitive selection of high-tech science and technology projects. Moscow, 2016.
3. Novikov S.V. The national economy is a large-scale organizational socio-economic system. Vestnik of University. 2014. No.6. pp. 125-132.
4. Tikhonov A.I., Novikov S.V. Institutional aspects of state personnel policy in Russia. Management and business administration. 2017. No.2. Pp. 25-32.
5. Korzhueva L.M. Development of regulatory frameworks and preconditions for the formation of an innovative educational complex. Collection: The post-crisis outlines of innovative processes. Material of the Tenth Drucker Readings. 2010. pp. 237-241.
6. Novikov S.V. Innovation policy of an institution of higher education in the field of public-private partnership. Dvigatel'. 2011 No. 6. pp. 46-47.
7. Gavrilova I.S., Kanaschenkov A.A., Meshankov D.V. Business philosophy of innovative companies. Science of XXI century - a glance into the future, I international scientific and practical conference. 2016. pp. 17-21.
8. Kanaschenkov A.A., Gavrilova I.S., Meshankov D.V. Business integrity and the culture of modern innovation companies. Science of XXI century - a glance into the future, I international scientific and practical conference. Pp. 23-26.
9. Novikov S.V. Innovative methods for work process design in a high technology enterprise Russian Journal of Agricultural and Socio-Economic Sciences. 2017. Vol. 68. №8. pp. 114-117.
10. Mindlin, Y.B. Innovative territorial clusters//International Journal of Economics and Financial Issues, 2016, 6(S8), pp. 251-256
11. Zolotukhina E.B., Bakharev V.V., Kapustina I.V., Novikov S.V., Lygina N.I. Sales management of the chain retail establishments. International Journal of Applied Business and Economic Research. 2017. Vol. 15. №11. pp. 19-27.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.16

EMPLOYEE PROMOTION PLANNING IN ANALYTICAL HIERARCHY PROCESS PERSPECTIVE: STUDY ON NATIONAL PUBLIC PROCUREMENT AGENCY

Ayuningtyas Adreng Kusuma*, **Saleh Choirul**, **Noor Irwan**
Faculty of Administrative Science, University of Brawijaya, Indonesia
*Email: adrengkusuma@gmail.com

ABSTRACT
The promotion process is part of the career development conducted by Civil State Apparatus Employee (*Pegawai Aparatur Sipil Negara*) which should be implemented by applying merit system. Employee-related strategic decision making has not applied merit system as mandated in applied laws. It occurred due to Public Service Appointment Board (*Badan Pertimbangan Jabatan dan Kepangkatan*) not possessing assessment model and criteria which could be used to support promotion process implementation in the appropriate structural position based on employee competence and performance. This study aims to describe and analyze assessment criteria and subcriteria required to be considered in State Civil Servant Officers promotion planning by applying Analytical Hierarchy Process (AHP) method in National Public Procurement Agency (*Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah*). This study uses the explanative quantitative univariate method. Data collection technique used questionnaire instrument. Analytical tool used was AHP. Research result exhibits that ASN employee promotion planning using assessment model is described as follows: (1) Employee Performance Assessment consist of Employee Work Performance element with three criteria and Employee Work Behavior with twenty-three criteria; and (2) Evaluation of Employee Promotion Implementation with eleven criteria. Through the use of AHP methods employee, promotion planning could be utilized as a tool for Baperjakat to produce employee decisions that will be promoted objectively and effectively.

KEY WORDS
Employee promotion, assessment, model, criteria, Analytical Hierarchy Process.

In carrying out government duties and national development, it required the support and professionalism of the State Civil Service Officer (ASN) owned by each Government Agency. One of the efforts made by the Government nurturing professional, qualified and competent ASN employees is through career development. Employee promotion is part of the employee development function and as a follow-up of the employee performance assessment results.

In order to achieve the accuracy of the employee promotion process in structural positions, it is necessary to have a merit system with the principle that a person's placement, promotion, and retirement is done on the basis of objective standards and tests of Performance and ability (Tjokroamidjojo, 1995, in Prasodjo and Rudita, 2014: 15). According Sunaryo (2014: 2) Merit system is the most appropriate mechanism in the development of human resources bureaucracy because it provides an illustration of bureaucratic management proportionally and professionally. Highly competent and contributing employees will have greater opportunity to gain career development than less competent employees.

Implementation of personnel management starting from planning, recruitment, career development, rewards and dismissals or retirement to date is still not fully based on competence and performance considerations. The elements of seniority and subjectivity still dominate in every placement. Employee placements are still determined political officials preference or like/dislike (Prasodjo and Rudita, 2014: 13). The main problem with performance Assessment is that assessors are highly subjective and it is difficult to achieve consistency between ratings given by different assessors because the notion of performance

is often unclear, which in turn, increases subjectivity (Armstrong and Taylor 2014: 340). Therefore, it takes a wise thinking and decision making in the process of employee promotion and performance Assessment as the basis of appreciation and professionalism in managing good governance as mandated in Law Number 5 Year 2014 on State Civil Apparatus.

National Public Procurement Agency (LKPP) is a non-ministerial government institution established by the President in 2008 through Presidential Regulation No. 106/2007. Under the Presidential Regulation, LKPP is the only Government Agency that has the task of developing and formulating Government procurement. Personnel strategic decision making in LKPP is determined by the Public Service Appointment Board (Baperjakat). Various considerations or policies are required to ensure that an appropriate and strategic posture for a selected person to occupy the position.

So far, strategic decision-making process related to promotion in structural positions in LKPP has no assessment model and criteria that can be used to support promotion process implementation in structural positions according to employee competence and performance. The assessment model used by Baperjakat consideration in making promotion decisions on structural positions only based on one or two assessment criteria without considering other assessment criteria. This raises the high degree of decision-making subjectivity, whereby human decision makers will be constrained on like and dislike factors (spoil system).

Based on the described phenomenon, it is necessary to form an assessment method that can take into account the various criteria or considerations in each assessment. It is conducted to reduce the subjectivity of the decision-making process in employee promotion. Employees who possess the competence and other considerations could be selected in the promotion process. Therefore, Baperjakat as a strategic decision maker in personnel field requires knowledge and information that supports decision making and capable to produce an alternative decision, either through decision support system or compound criteria analysis by AHP method. In this regard, this study aims to describe and analyze criteria and subcriteria of assessment that need to be considered in the employee promotion planning through the implementation of the AHP method in LKPP.

LITERATURE REVIEW

Human Resource Planning. Human resources are one of the main assets of the organization that plays an important role in organization development. Human resources must be managed properly. In human resource planning, the focus of attention is the specific steps taken by management to ensure that the organization is available to the appropriate employees to occupy the various positions, positions and work in achieving the goals and objectives of the organization (Siagian 2015: 41).

Employee Promotion. Promotion is the process of movement from one Work to another within a higher hierarchy of authority and responsibility to the authority and responsibility that have been given to the workforce in the past (Noe et.al., 2007: 299). According to Siagian (2005: 169), promotion is an employee transferred from one Work to another whose responsibilities are greater, higher level office hierarchy and greater income. According to Siagian (2005: 170), organizations generally use two main bases in considering employees to be promoted namely work performance and seniority. According to Law Number 5 Year 2014 Article 72 paragraph 1 explains that the promotion of civil servants is done based on objective comparison between competence, qualifications, and requirements needed in the position, performance assessment, leadership, cooperation, creativity and consideration from Performance Assessment Team of Government Civil Servant (PNS), regardless of gender, ethnicity, religion, race, and class. In the implementation of civil servant promotion, to occupy a structural position there are criteria or conditions based on Government Regulation No. 13 of 2002 on the Appointment of Civil Servants in Structural Positions, to be appointed in a structural position then a civil servant must meet several requirements, which are described as follows:

1. Registered as Civil Servant, possessing rank at least 1 (one) level below the determined rank level;
2. Possess the qualifications and education level specified;
3. All elements of the performance Assessment are at least of good value in the last two years;
4. Possess the competence required in appointed office, physically and mentally healthy;
5. In addition to these requirements, Civil Servants should consider the following factors: seniority in rank, age, education and training; and experience.

According to Siagian (2009: 176), the terms of promotion include experience, level of education, loyalty, honesty, responsibility, work performance and initiative, and creativity. According to Manullang (2001: 101), there are some common requirements of qualifying for selection, including expertise, experience, age, gender, education and training, physical/health conditions, talents, and character.

Analytical Hierarchy Process. AHP is one of the decision-making methods developed by Saaty. The basis of AHP method is to acknowledge problems, the purpose of making decisions, determining criteria, sub-criteria and alternatives to determine the best priority related to the criteria and subcriteria in decision making (Saaty, 2008: 84). According to Kusrini (2007), some principles in solving problems using AHP include:

1. Create a hierarchy. Complex systems can be understood by breaking them into supporting elements, arranging elements hierarchically and combining them.
2. Assessment criteria and alternatives. Criteria and alternatives are done by comparing pairs. According to Saaty, for a variety of issues, a scale of 1 to 9 is the best scale for expressing opinions and making pairwise comparisons of some elements. This scale can facilitate the relative calculation between objects with a high degree of accuracy and required in AHP. The value and definition of qualitative opinion from Saaty comparison scale can be measured using the analytical table as exhibited in Table 1.

Table 1 – Pairing Comparison Assessment Scale

Importance Rank	Description/ Definition
1	Criterion / Alternative A is as important as Criteria / Alternative B
3	Criterion / Alternative A is slightly more important than Criteria / Alternative B
5	Criterion / Alternative A is more important than Criteria / Alternative B
7	Criterion / Alternative A is significantly more important than Criteria / Alternative B
9	Criterion / Alternative A is absolutely more important from Criteria / Alternative B
2, 4, 6, 8	When in doubt between two adjacent values

Source: Saaty (2008:86).

3. Set priorities. For each criterion and alternative, a pairwise comparison is required. The relative comparison values of all the alternative criteria can be adjusted to the predetermined judgment to generate weight and priority. Weights and priorities are calculated by manipulating matrices or solving mathematical equations.
4. Logical Consistency. Consistency has two meanings. First similar objects can be grouped according to uniformity and relevance. Second, it concerns the level of relationship between objects based on certain criteria.

METHODS OF RESEARCH

The research method used is quantitative research which aims to describe and analyze the criteria of Assessment of employee promotion by using careful measurement technique that is AHP method so that will yield the conclusion. This research is a survey research by using questionnaires as the main data collection tool, interviews, and literature study. The research was conducted in LKPP Office, Jakarta. The sampling technique uses a non-probability sample technique with the selected sample or purposive sample. This study used two questionnaires with two different types of samples,

determination of assessment criteria questionnaire on 10 samples. Weighted criteria assessment questionnaire with a total sample of 30 people. Analysis of research data was conducted using AHP and the resulting data will be analyzed in univariate manner, which is an analysis of independent variables without comparing with other variables. As a result, description and explanation of criteria and subcriteria assessment used in planning promotion of employees were obtained.

RESULTS AND DISCUSSION

Description of Respondent's Characteristics. The respondent characteristic of the assessment criteria determination is described as follows: 40.0% of respondents aged over 50 years, 50.0% of respondents occupy the position as Senior High Official and is the chairman and member of Baperjakat, 50.0% of respondents have rank/group of Major Supervisor (IV/d), 40.0% respondents have recent Bachelor's education level and most 60.0% work in the Main Secretariat work unit. The characteristics of respondents in weighing the assessment criteria were 43.3% aged between 31-35 years, 73.3% of respondents occupied the position as Supervisory Officials with 53.0% having rank/class of Penata (III / c), 56.7% of respondents had Masters level and 43.3% working on the Main Secretariat work unit.

Data Analysis of Assessment Criteria Determination. In any decision-making will be preceded by identifying the problem to be solved. The use of the AHP method begins with the identification of the problem and then describes it to be the main elements to support the chosen decision. These elements could be utilized as alternatives or subcriteria in determining the alternatives priority. The process of hierarchy compilation involves the assessment of some experts in the field of human resource management as well as LKPP personnel decision-makers so that problems can be described in the hierarchy appropriately.

The result of the assessment criteria exhibits experts' agreement on employee performance Assessment consists of 2 (two) elements: Employee Work Performance with an average weight of 55% and Employee Work Behavior with an average weight of 45%. Elements of Employee Performance consists of 3 (three) criteria, namely work quality, quantity and time. This is in line with the statements of Bernardin and Russell (1993: 107) and Simamora (2004: 612) that the main criteria used in performance Assessments include work quality, quantity, and time. Elements of Employee Behavior consists of 5 (five) criteria derived from Core Values LKPP which are Integrity, Professionality, Compliance, Orientation to stakeholders and Team Work. These five criteria have sub-criteria with a total of 23 (twenty-three) criteria. The use of Core Values of LKPP as a criterion in the element of employee's work behavior because in addition to the performance achieved, the employee should uphold the core value in each behavior in carrying out its work. This is in accordance with Armstrong's opinion (2009: 68) which emphasizes that assessing how well individuals retain the core values of an organization is an integral part of performance management.

Furthermore, the experts evaluated the proposed criteria for employee promotion implementation from several sources, namely Law Number 5 Year 2014, Government Regulation Number 11 Year 2017, Government Regulation No. 13/2002, Siagian (2009) and Manullang (2001). Based on the results of the assessment, employee promotion implementation assessment consists of 11 (eleven) criteria: rank/class, age, formal education, leadership training, technical and functional training, employee performance Assessment, competency assessment, Work experience, physical and spiritual, and disciplinary punishment. After the criteria and subcriteria assessments are considered feasible, a hierarchy of employee performance assessment and employee promotion assessment was formed to be used in LKPP as presented in Figure 1 and Figure 2 below.

Weighted Assessment Criteria and Subcriteria Data Analysis. After determining the criteria and subcriteria in hierarchy form, the weighing was conducted by 30 (thirty) respondents consisting of Administrator and Supervisory Officers to determine the

importance of each assessment criterion and subcriteria by using the Saaty scale to produce a pairwise comparison matrix. The result of weighting criteria and subcriteria of employee performance Assessment and employee promotion implementation Assessment is presented in Table 2.

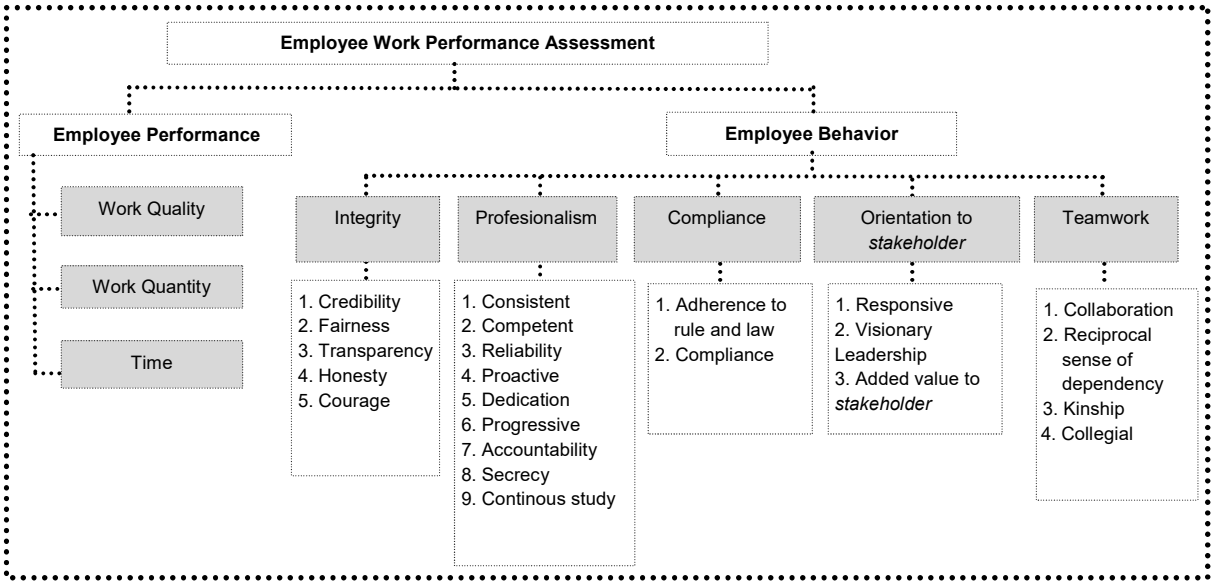


Figure 1 – Employee Work Performance Assessment

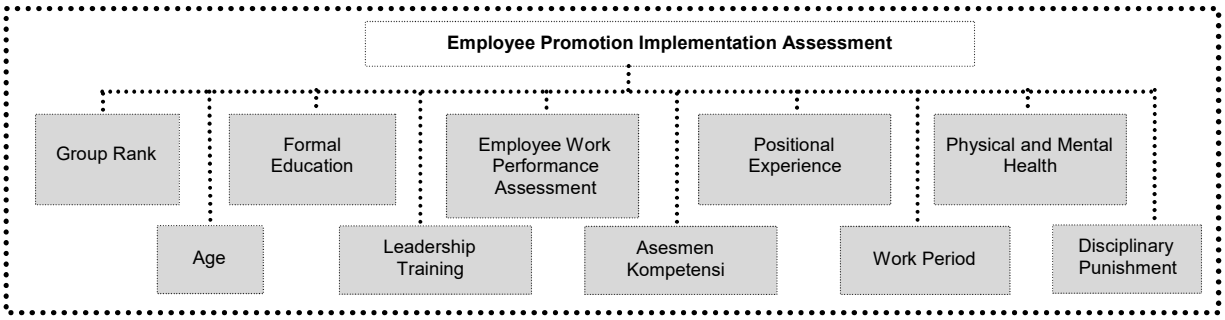


Figure 2 – Employee Promotion Implementation Assessment

Employee performance Assessment exhibits three criteria on Employee Performance element indicate that work quality weighed to 0.6426 or 64.26%. Work Quality is an activity undertaken by employees who have met the various requirements, specifications, and expectations that have been established (Hasibuan, 2007: 45). Employee work quality is seen when employees prioritize quality of work processes and results. Employee Behavior exhibits honesty subcriteria obtained the highest weight, out of 23 subcriteria, at 0.1551. Honesty is the forerunner of a civil servant to be able to build high integrity. Being honest during work is done through working with others honestly and truthfully and presenting complete and accurate information and complying with applicable regulations.

In the assessment of employee promotion implementation, competency assessment criteria obtained the highest weight at 0.1937. Government Regulation No. 13 Year 2002 stated that the requirement to be appointed in a structural position is to have the required Work competence. One method used was competency examination known as an assessment center. It is a standardized assessment method to measure the competence and successful prediction of civil servants in the position to be occupied. The Assessment Center results will determine the classification of candidates for structural officials whether candidates meet the minimum requirement or not to fulfill the Work requirements. This is in accordance with the opinion of Fillipo (1994) which states that the central objective of an

Assessment Center is selection and promotion decisions by identifying the strengths and weaknesses of candidates for development purposes.

Table 2 – Criteria and Sub Criteria Weighing Analysis on Assessment of Employees Work Performance and Implementation of Employee Promotion

Assessment	Criteria / Subcriteria	Global Wright
Employee Work Performance Assessment	Element: Employee Work Performance (Weight 55%)	
	1. Work quality	0,6426
	2. Time	0,2403
	3. Work quantity	0,1171
	Element: Employee Work Behavior (Weight 45%)	
	1. Honesty	0,1551
	2. Credibility	0,0987
	3. Fairness	0,0759
	4. Adherence to rule and law	0,0746
	5. Transparency	0,0606
	6. Courage	0,0564
	7. Collaboration	0,0552
	8. Visionary leadership	0,0389
	9. Collegial	0,0367
	10. Added value to *stakeholder*	0,0359
	11. Accountable	0,0351
	12. Responsive	0,0332
	13. Kinship	0,0324
	14. Competency	0,0259
	15. Progressive	0,0256
	16. Dedication	0,0252
	17. Compliance	0,0252
	18. Reliability	0,0239
	19. Continous study	0,0193
	20. Secrecy	0,0186
	21. Proactive	0,0179
	22. Consistent	0,0178
	23. Reciprocal sense of dependence	0,0117
Assessment	Criteria/Subcriteria	Global Weight
Assessment on Employee Promotion Implementation	1. Competency assessment	0,1937
	2. Employee work performance assessment	0,1744
	3. Positional experience	0,1242
	4. Physical and mental health	0,1047
	5. Disciplinary Punishment	0,0969
	6. Technical / Functional Training	0,0677
	7. Working period	0,0642
	8. Leadership training	0,0526
	9. Formal education	0,0503
	10. Group rank	0,0495
	11. Age	0,0218

Validity and Reliability Analysis

Hierarchy process is the most important step in preparing the AHP model. The lack of clarity or error in answering a question can make the decision makers choose poorly a criterion or subcriteria, therefore, questions should be answered consistently. Validity and reliability are required in order for a model to be tested (Permadi, 1992). According to Permadi (1992: 14), one of the main assumptions of the AHP method that distinguishes it from other decision-making models is the absence of absolute consistency condition. AHP method used in this study involves human perception as its input, the inconsistency may occur because human beings have limitations in expressing their perceptions consistently especially if they have to compare many criteria/subcriteria assessment. Validity and reliability test in this research is done by utilizing AHP method using Consistency Ratio (CR) calculation. The consistency measurement result on assessment criteria and subcriteria are presented in Table 3.

Table 3 – Criteria and Sub Criteria Consistency Measurement Result on Employee Performance Assessment and Employee Promotion Implementation Assesment

Criteria/Subcriteria	Matrix Size	λ max	*Consistency Index* (CI)	*Consistency Ratio* (CR)
Criteria:				
1. Employee performance	3	3,0080	0,0040	0,0069
2. Employee behavior	5	5,0787	0,0197	0,0176
3. Employee promotion implementation assessment	11	11,4321	0,0432	0,0286
Employee behavior subcriteria:				
1. Integrity	5	5,0225	0,0056	0,0050
2. Profesionalism	9	9,1232	0,0154	0,0106
3. Compliance	2	2,0000	0,0000	0,0000
4. Orientation to *Stakeholder*	3	3,0106	0,0053	0,0092
5. Teamwork	4	4,0368	0,0123	0,0136

According to Permadi (1992: 17), the limitation of whether or not the consistency of a matrix is actually non-existent. But based on some experiments and experience, the inconsistency level of 10% and below is an acceptable level of inconsistency. Based on the value of Consistency Ratio (CR) in Table 3, it exhibits that all criteria and subcriteria assessment in this study has a CR value smaller than 0.1. This explains that the pairwise comparison matrix between the criteria or subcriteria in this study is consistent and the criteria/subcriteria can be used as a tool of Baperjakat in the implementation of the employee promotion process in LKPP.

Illustration of Work Performance Assessment and Implementation of Employee Promotion. The criteria/subcriteria global weight of the previously achieved work Performance is multiplied by assessment score (Likert scale 1 through 5) to obtain the Work Performance Value (NPK) on both the Employee Performance Performance and Employee Work Behavior. The calculation format Employee Performance Value (NPKP) is as follows:

$$NPKP = [(CKP\ Weight)\% \times NPK\ (CKP)] + [(PKP\ Weight)\% \times NPK\ (PKP)]$$

Assessment criteria on Employee Performance using score criteria in accordance with Head of State Personnel Agency Regulation No. 1 of 2013. On the other hand, subcriteria score on the assessment of Employee Behavior used Behavioral Observation Scale (BOS) based on observation on the frequency of work behavior using Likert scale 5 points i.e never, rarely, occasionally, generally and often (Noe et.al., 2011: 229). After obtaining Employee Performance Value, the value is interpreted into the assessment interval described as follows:

Table 4 – Criteria Interpretation of Employee Performance Values

Employee Performance Interval Values	Interpretation
4,0001 – 5,0000	Very Good
3,0001 – 4,0000	Good
2,0001 – 3,0000	Adequate
1,0001 – 2,0000	Poor
0,0000 – 1,0000	Very Poor

The illustration of performance Assessment of an employee "A" is presented in Table 5 below.

Table 5 exhibits that Employee Performance Value "A" is 3.7930 and is included in the "Good" rating interval. Similar to the illustration of employee performance Assessment, in preparing illustration of employee promotion implementation assessment, the promotion implementation assessment criteria score is required. These criteria are described in the following Table 6.

The illustration of the Official Candidates promotion implementation assessment is presented in the following Table 7.

Table 5 – Illustration of Employee Performance Assessment

Criteria / Subcriteria		Global Weight	Score	Value
Elements: Employee Performance, Weight: 55%				
1.	Quality	0,6426	4	2,5704
2.	Time	0,2403	4	0,9612
3.	Quantity	0,1171	3	0,3513
Total				3,8829
Work Performance Grade (Total x Weight 55%)				2,1356
Elements: Employee Work Behavior, Weight: 45%				
1.	Honesty	0,1551	5	0,7755
2.	Credibility	0,0987	4	0,3948
3.	Fairness	0,0759	4	0,3036
4.	Adherence to rule and law	0,0746	4	0,2984
5.	Transparency	0,0606	4	0,2424
6.	Courage	0,0564	3	0,1692
7.	Collaboration	0,0552	4	0,2208
8.	Visionary leadership	0,0389	2	0,0778
9.	Collegial	0,0367	4	0,1468
10.	Added value to *stakeholder*	0,0359	3	0,1077
11.	Accountable	0,0351	3	0,1053
12.	Responsive	0,0332	3	0,0996
13.	Kinship	0,0324	3	0,0972
14.	Competency	0,0259	3	0,0777
15.	Progressive	0,0256	2	0,0512
16.	Dedication	0,0252	2	0,0504
17.	Compliance	0,0252	4	0,1008
18.	Reliability	0,0239	3	0,0717
19.	Continous study	0,0193	3	0,0579
20.	Secrecy	0,0186	4	0,0744
21.	Proactive	0,0179	3	0,0537
22.	Consistent	0,0178	4	0,0712
23.	Reciprocal sense of dependence	0,0117	3	0,0351
Jumlah				3,6832
Work Performance Grade (Total x Weight 45%)				1,6574
Employee Work Performance Grade (NPKP)				3,7930

Table 6 – Implementation of Employee Promotion Assessment Grade

Criteria	Grade	Indicator
Employee Performance Assessment	1	Performance value: 50 below
	2	Performance value: 51 - 60
	3	Performance value: 61 - 75
	4	Performance value: 76 - 90
	5	Performance value: 91 above
Competency Assessment	1	Low / Less in accordance with the intended position
	2	Medium Low / Not in accordance with the intended position
	3	Medium High / Sufficient according to the intended position
	4	High / In accordance with the intended position
	5	Very High / Very appropriate with the intended position

**) Partially shown data.*

Tabel 7 – Implementation of Employee Promotion Asssessment Illustration

No	Scoring Criteria	Global Weight	Score	Total
1.	Competency assessment	0,1937	5	0,9685
2.	Employee work performance assessment	0,1744	4	0,6976
3.	Positional experience	0,1242	3	0,3726
4.	Physical and mental health	0,1047	3	0,3141
5.	Disciplinary Punishment	0,0969	4	0,3876
6.	Technical / Functional Training	0,0677	2	0,1354
7.	Working period	0,0642	2	0,1284
8.	Leadership training	0,0526	1	0,0526
9.	Formal education	0,0503	3	0,1509
10.	Group rank	0,0495	1	0,0495
11.	Age	0,0218	4	0,0872
Total Score				3,3444

Based on the illustration presented in Table 6 and Table 7, an assessment could be made of several prospective employees who will occupy the structural position. By comparing each employee's Performance final value resulting in prioritized employee eligible for promotion in structural positions. Through the assessment utilizing AHP in this study, Baperjakat could be more objective in making employee promotion decisions.

CONCLUSION

This study aims to describe and analyze assessment criteria required to be considered in the employee promotion planning by applying AHP method to LKPP. Based on the research result, it can be concluded that an employee promotion planning using assessment model consisted of: (1) Employee performance Assessment consisting of 2 elements. Employee Work Performance weighing 55% with 3 criteria. Employee Work Behavior weighing 45% with 23 subcriteria. Weighing criteria and subcriteria producing the highest global weight is work quality on CKP elements at 0.646. Subcriteria honesty at 0.1551; and (2) assessment of employee promotion which consists of 11 criteria. The highest global weight is competence assessment criterion at 0.1937. AHP usage in this study can generate priority weighting on criteria and subcriteria to be used and applied as a tool of assessment for Baperjakat in planning employee promotion, especially in structural positions. Therefore decision maker subjectivity factor can be reduced.

This study still has limitations that can be developed in further research. First, the implementation of the merit system as mandated by the prevailing laws and regulations needs to be reviewed and improved by LKPP. Through the improvement of employee promotion system, the assessment model with AHP method can be used and applied as a tool of Baperjakat in the decision making of LKPP employee promotion planning. Secondly, the results of this research need to be developed through a decision support system integrated with LKPP Personnel Information System to facilitate the Personnel Section and Baperjakat in assessing and acknowledging the rank of employees entitled to occupy structural positions in LKPP. Third, this study uses LKPP Core Values as a criterion of assessment on Employee Work Behavior elements. In future practices, this method could use/add other criteria as needed.

REFERENCES

1. Armstrong, Michael. 2009. Armstrong's Handbook of Performance Management (4th Edition). London and Philadelphia: Kogan Page.
2. Armstrong, Michael and Taylor, Stephen. 2014. Armstrong's Handbook of Human Resource Management Practice (13th Edition). London and Philadelphia: Kogan Page.
3. Bernardin, John H., dan Russel, Joyce, ES. 1993. Human Resources Management. New York: Mc. Graw-Hill.
4. Hasibuan, Melayu. 2007. Manajemen Sumber Daya Manusia (Dasar dan Kunci Keberhasilan). Jakarta: PT Toko Gunung Agung.
5. Kusrini. 2007. Konsep dan Aplikasi Sistem Pendukung Keputusan. Yogyakarta: Andi.
6. Manullang. 2001. Manajemen Sumber Daya Manusia. Yogyakarta: BPFE
7. Noe, Raymond A., Hollenbeck, John R., Gerhart, Barry, Wright, Patrick M. 2007. Fundamentals of Human Resource Management. 2nd Edition. New York: McGraw-Hill.
8. Noe, Raymond A., Hollenbeck, John R., Gerhart, Barry, Wright, Patrick M. 2011. Fundamentals of Human Resource Management (4th Edition). New York: McGraw-Hill/Irwin.
9. Prasodjo, Eko. dan Rudita, Laode. 2014. "Undang-Undang Aparatur Sipil Negara: Membangun Profesionalisme Aparatur Sipil Negara". Dalam Jurnal Kebijakan dan Manajemen PNS, Volume 8 Nomor 1.
10. Peraturan Pemerintah Nomor 11 Tahun 2017 tentang Manajemen Pegawai Negeri Sipil.
11. Permadi, Bambang. 1992. AHP. Jakarta: Pusat Studi Antar Universitas-Studi Ekonomi Universitas Indonesia.

12. Saaty, TL. 2008. “Decision Making with The Analytical Hierarchy Process”. In International Journal Services Sciences, Volume 1.
13. Siagian, Sondang P. 2005. Fungsi-Fungsi Manajemen. Jakarta: Bumi Aksara.
14. Siagian, Sondang P. 2009. Kiat Meningkatkan Produktivitas Kerja. Jakarta: PT Rineka Cipta.
15. Siagian, Sondang P. 2015. Manajemen Sumber Daya Manusia. Jakarta: Bumi Aksara.
16. Simamora, Henri. 2004. Manajemen Sumber Daya Manusia. Edisi Ketiga Cetakan Pertama. Yogyakarta: STIE YKPN.
17. Sunaryo, Bambang dan Cicellia, Celly. 2014. “Nilai Penting Affirmative Action Policy Dalam Pengembangan Sumber Daya Manusia (SDM) Aparatur Berbasis Merit”. Jurnal Kebijakan dan Manajemen PNS, Volume 8 Nomor 1.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.17

ВОЗНАГРАЖДЕНИЕ ТОП-МЕНЕДЖМЕНТА И СОВЕТА ДИРЕКТОРОВ В РОССИЙСКИХ КОМПАНИЯХ

REMUNERATION OF TOP MANAGEMENT AND BOARD OF DIRECTORS IN RUSSIAN COMPANIES

Бочарова И.Ю., доктор экономических наук, профессор
Bocharova I.Y., Doctor of Economic Sciences, Professor
Орловский государственный аграрный университет, Орел, Россия
Orel State Agrarian University, Orel City, Russia

Рыманов А.Ю.*, доктор экономических наук, профессор
Rymanov A.Y., Doctor of Economic Sciences, Professor
Новосибирский государственный университет экономики и управления, Новосибирск, Россия
Novosibirsk State University of Economics and Management, Novosibirsk, Russia

*E-mail: rymanov@yandex.ru

АННОТАЦИЯ
В статье рассмотрены проблемы вознаграждения менеджмента и совета директоров в российских компаниях в условиях функционирования Российского кодекса корпоративного управления, принятого в 2014 г. Основное внимание уделено рассмотрению вопросов вознаграждения топ-менеджеров и членов советов директоров в крупных компаний.

ABSTRACT
The article examines the problems of remuneration of management and the board of directors in Russian companies under the Russian Corporate Governance Code adopted in 2014. The main attention is paid to consideration of remuneration of top managers and board members in large companies.

КЛЮЧЕВЫЕ СЛОВА
Вознаграждение, корпоративное управление, топ-менеджмент, директор.

KEY WORDS
Remuneration, corporate governance, top-management, director.

Российское корпоративное управление постепенно внедряет международную практику ведения бизнеса. Происходит это благодаря выходу на международные рынки капитала.

Особенностью российской модели корпоративного управления явилось участие собственника в управлении компанией в качестве ее топ-менеджера. В 1990-е гг. в целях сокращения затрат на формирование адекватных стимулов, предотвращения оппортунизма наемных менеджеров, в условиях неразвитости рынка управленческого труда произошло совмещение функций собственника и контроля. Это привело к ограничению спроса на наемный менеджмент.

В 2000-е гг. активизировался переход к наемному менеджменту, которому переданы компетенции в области снабжения и сбыта, производственно-технологических, финансовых вопросов. В современной экономике опрос 822 акционерных предприятий [9] показал, что лишь в 29% обследованных компаний происходит разделение функций, поскольку директор не является акционером компании и крупные акционеры не работают менеджерами компаний.

Привлечению высококвалифицированных менеджеров, не владеющих акциями

корпорации, способствуют повышение требований к уровню менеджмента, к новому знанию, необходимость внедрения инновационных методов в области технологии, стратегического планирования, финансового менеджмента, маркетинга.

Вознаграждения менеджмента компаний. Важным инструментом эффективного корпоративного управления является система вознаграждения менеджмента корпорации, который играет ключевую роль в развитии бизнеса, росте капитализации компании.

Проблема разработки результативного механизма вознаграждений менеджеров осложняется противоречивостью внутрикорпоративных экономических интересов. Собственники в основном не осуществляют контроль над деятельностью корпораций. К тому же он затруднен вследствие ограниченности информации в виде бухгалтерских отчетов, отсутствия четких процедур оценки эффективности деятельности корпорации. Менеджеры зачастую не заинтересованы в росте капитализации корпорации вследствие отсутствия конкретных ориентиров эффективности своей работы и соответствующей мотивации при достижении заданных ориентиров.

Кодекс корпоративного управления [15] рекомендует следующие способы и механизмы практической реализации принципов корпоративного управления в сфере вознаграждения ключевых руководящих работников (таблица 1).

Таблица 1 – Система вознаграждения исполнительных органов в Кодексе корпоративного управления

Принципы корпоративного управления	Рекомендации способов и механизмов практической реализации принципов корпоративного управления
1. Уровень выплачиваемого вознаграждения должен быть достаточным для привлечения, мотивации и удержания лиц, обладающих необходимой компетенцией и квалификацией. Выплата вознаграждения должна осуществляться в соответствии с принятой политикой по вознаграждению.	1.1. Рекомендуется, чтобы уровень вознаграждения создавал достаточную мотивацию для их эффективной работы, позволяя привлекать и удерживать компетентных и квалифицированных специалистов. При этом следует избегать чрезмерного уровня вознаграждения, а также большого разрыва между уровнями вознаграждения ключевых руководящих и рядовых работников.
	1.2. Политика по вознаграждению должна разрабатываться комитетом по вознаграждениям и утверждаться советом директоров. Совет директоров должен обеспечить контроль за внедрением и реализацией политики по вознаграждению, а при необходимости - пересматривать ее.
	1.3. Политика по вознаграждению должна содержать прозрачные механизмы определения размера вознаграждения, а также регламентировать все виды выплат, льгот и привилегий.
	1.4. Рекомендуется определить политику возмещения расходов (компенсаций), конкретизирующую их перечень, и уровень обслуживания ключевые руководящие работники. Такая политика может быть составной частью политики по вознаграждению.
2. Система вознаграждения членов исполнительных органов и иных ключевых руководящих работников должна предусматривать зависимость вознаграждения от результата работы общества и их личного вклада.	2.1. Вознаграждение членов исполнительных органов и иных ключевых руководящих работников должно обеспечивать разумное и обоснованное соотношение фиксированной части вознаграждения и переменной части вознаграждения, зависящей от результатов работы общества и личного (индивидуального) вклада работника в конечный результат.
	2.2. Обществам, акции которых торгуются на бирже, рекомендуется внедрить опционную программу долгосрочной мотивации членов исполнительных органов и иных ключевых руководящих работников (опционы или другие производные финансовые инструменты, базисным активом по которым являются акции).
	2.3. Размер золотых парашютов[1] не должен превышать двукратного размера фиксированной части годового вознаграждения.

Высокопроизводительных топ-менеджеров можно привлечь к работе и удержать только за счет оплаты, отвечающей требованиям рынка труда.

[1]*Золотой парашют - сумма компенсации, выплачиваемая в случае досрочного прекращения полномочий членами исполнительных органов или ключевых руководящих работников по инициативе компании и при отсутствии с их стороны недобросовестных действий.*

В настоящее время существующая система стимулирования менеджмента корпорации включает: традиционный подход; подход, ориентированный на результат, и подход, ориентированный на стоимость бизнеса.

При падении курса акций менеджер, мотивированный по опционной программе, рискует потерять свою премию, если курс будет ниже цены покупки. Менеджер, участвующий в собственности, застрахован на сумму акций.

При исследовании системы вознаграждения менеджмента и членов совета директоров анализируют следующие элементы [5,20]:

- процесс принятия решений о вознаграждении членов совета директоров;
- детальная информация о вознаграждении членов совета директоров (уровень заработной платы);
- формы вознаграждения директоров (например, в денежной форме, в форме акций и т.д.);
- особенности вознаграждения членов совета директоров;
- процесс принятия решений о вознаграждении менеджмента (не членов совета директоров);
- особенности вознаграждения менеджмента (не членов совета директоров), в частности, уровень заработной платы и бонусов;
- форма вознаграждения менеджмента (не членов совета директоров);
- насколько вознаграждение менеджмента привязано к результатам деятельности компании.

Современные программы вознаграждений топ-менеджмента должны учитывать зависимость от результатов деятельности компании. Только в 25% российских обследуемых компаний выявлена такая зависимость [7]. Среди компаний, чьи ценные бумаги включены в котировальные списки бирж - 37%. В 24% компаний, заявивших о планах проведения IPO,существует зависимость вознаграждения менеджмента от результатов деятельности.

Закрепление основных положений, отражающих зависимость вознаграждений от результатов компании, способствует систематизации данного процесса.

В период экономической рецессии выделяют следующие изменения политики вознаграждений менеджеров, вызванные глобальным финансовым кризисом.

Вознаграждения, выплачиваемые руководителям инвестиционных компаний и крупнейших банков, продолжают расти, несмотря на финансовый кризис. На высокий уровень вознаграждений оказывает влияние совмещение должностей генерального директора и председателя совета директоров. Оно характерно для примерно 50 % крупнейших публичных компаний из списка S&P 500. Гендиректора компаний, в которых председатель совета – независимый кандидат, получают примерно на 20% меньше коллег в компаниях, в которых председатель является выдвиженцем мажоритарного акционера или исполнительным директором. В год они получают в среднем на 2,9 млн. долл. меньше, чем главы компаний из списка S&P 500, в которых должность председателя совета директоров занимает сам гендиректор [21]. Вознаграждение руководителей крупнейших российских компаний растет, несмотря на экономический кризис. Так, суммарное вознаграждение топ-менеджмента 15 российских компаний, имеющих наибольший вес в индексе ММВБ в 2015 г. составило 63,8 млрд.руб. и увеличилось по отношению к 2014 г. (58,1 млрд.руб.) на 10%, к 2013 г. (56,5 млрд.руб.) на 13%. При этом чистая прибыль компаний еще не вернулась на докризисный уровень [25].

Наблюдается обострение разрыва (дифференциации) в оплате труда рядовых рабочих и менеджеров. Например, рабочий в Великобритании получает около 24 тыс. фунтов стерлингов в год, что составляет менее 0,01 среднего заработка генерального директора [12].

Среднее вознаграждение директоров британских компаний из списка FTSE, по данным исследовательской фирмы High Pay Centre, в 2015 г. составило 5,5 млн. фунтов. Гендиректор компании из списка FTSE-100 получал в среднем в 140 раз

больше рядового менеджера [11].

В условиях экономического спада вознаграждение топ-менеджеров снижается пропорционально прибыли компании. Классически размер вознаграждения должен быть в корреляции с качеством менеджмента, которое оказывает влияние на прибыль компании. Однако существует и обратно пропорциональная зависимость между уровнем вознаграждений и качеством менеджмента. Так, ни одна из 10 компаний из списка S&P 500, возглавляемых самыми высокооплачиваемыми гендиректорами, по итогам 2015 года не вошла в число лучших по доходности. В шести отраслях, включая электроэнергетику, финансовые услуги, гендиректора имеют наибольшие заработки, а их компании – самые плохие результаты. В семи отраслях, включая фармацевтику и розничную торговлю, наиболее эффективными компаниями управляют самые низкооплачиваемые директора [23].

Данные отчетности российских кредитных организаций подтверждают данную тенденцию. Эксперты отмечают, что уменьшения премиальных выплат топ-менеджеров носят показной характер, формы компенсаций становятся изощреннее.

Наблюдается уменьшение численности топ-менеджеров, особенно в финансовом секторе. Так, число инвестиционных банков в США сократилось с 5 до 2, уменьшилось на 200 тыс. количество сотрудников в финансовой отрасли. Спрос остается стабильным на высококвалифицированных работников, способных к риску, к принятию нестандартных решений, направленных на благосостояние корпорации.

Высокие вознаграждения менеджмента вызвали недовольство акционеров, правительства, вынужденного направлять бюджетные деньги на национализацию банков. Это привело к обострению противоречий между экономическими интересами стейкхолдеров.

Об обострении агентской проблемы свидетельствует умышленное неэффективное поведение менеджмента компаний. Например, в Национальном резервном банке (НРБ) оказались уличены топ-менеджеры в излишней трате прибыли банка на бонусы. В результате обмана менеджментом совета директоров, членам правления выплачивались тайные бонусы и премии в размере 108 млн. руб. Эксперты отмечают, что случаи «тайных бонусов и премий» в организациях не редки, просто не все собственники компаний об этом знают.

В результате рецессии выплаты менеджерам станут более персональными, ориентированными на долгосрочную перспективу, а их денежная часть сократится. Прослеживается корректировка основополагающего принципа мотивации топ-менеджеров, свидетельствующего, что предоставление менеджерам в качестве вознаграждения опционов на покупку крупных пакетов акций способствует достижению компанией лучших результатов. Так, исследователи индексного провайдера MSCI проанализировали выплаты около 800 гендиректоров свыше 400 крупных американских компаний с 2005 по 2015 гг. Так, 100 долл., вложенные в акции 20% компаний с самыми высокими зарплатами директоров за 10 лет превратились в 265 долл. Вложенные 100 долл. в компании, в которых гендиректорам платят меньше всего, за этот же срок выросла до 367 долл. [22]

Одним из отличий современных бонусных выплат от сложившейся ранее практики стал переход от наличных средств к акциям компании. Изменились и сроки выплат, растянутые на длительный срок. Так, в Bank of America сроки увеличились до трех лет, а наиболее высокооплачиваемые менеджеры получили наличными до 5% причитающейся суммы. [17]

По данным исследования мировых компаний консалтинговой фирмой Mercer,около 80% опрошенных организаций внесли изменения в систему ежегодных премий и краткосрочных стимулов. Многие страховые компании приняли решения об отмене «золотых парашютов» и урезании бонусов. Около 40% компаний существенно уменьшили дополнительные выплаты топ-менеджерам. Наиболее популярной практикой явилась привязка дополнительных выплат к прибыльности компаний. Тем не менее, около 65% европейских и американских компаний урезав бонусы, увеличили основные зарплаты своих топ-менеджеров.

В условиях финансового кризиса в России контроль над уровнем вознаграждений топ-менеджеров осуществлялся преимущественно в банковской сфере. Ограничили вознаграждение руководству банки, получившие средства из федерального бюджета и от Центрального Банка - около 200 банков. Контролю подлежат вознаграждения топ-менеджеров банков, получающих[2]:

- субординированные кредиты от Банка России, Внешэкономбанка;
- беззалоговые кредиты от Центрального Банка;
- кредиты на санацию проблемных банков, выделенные из средств Центрального Банка.

В российских частных компаниях произошло сокращение выплат. В целом в России запреты на выплаты остались на уровне предписаний.

В условиях глобального финансового кризиса целесообразно введение государственных механизмов, ограничивающих размер вознаграждений топ-менеджмента компаний, получивших государственную поддержку. Самим компаниям в условиях кризиса необходимо не направлять средства на вознаграждение топ-менеджмента, а направить планировавшиеся на вознаграждения средства на инновационные ресурсосберегающие технологии и программы.

Таким образом, современный этап развития корпорации связан с переходом к наемному менеджменту. Внутренние механизмы корпоративного управления, включающие жесткую политику найма и увольнения менеджеров, препятствуют проявлению агентских проблем. Вознаграждение менеджмента должно ориентироваться на экономические возможности корпорации. Оно должно соответствовать квалификации менеджмента и учитывать реальный вклад в результаты деятельности компании. Размер вознаграждения определяется в зависимости от конечного результата деятельности общества, изменения цены акций на рынке и роли топ-менеджеров в этих процессах. Размер и порядок вознаграждения указывается в договоре с ними.

В условиях экономического подъема бюджет для повышения оплаты труда должен быть больше, чем во время рецессии. Целесообразно в успешные годы предоставлять менеджменту единовременные вознаграждения, а не производить повышение окладов. Иногда является экономически оправданным как раз во время экономического спада предоставлять финансовые стимулы для высокопроизводительной работы. Инновационный характер развития корпорации, включающий передовые технологии ведения бизнеса, возможен при адекватной, справедливой системе вознаграждения менеджмента компании.

Политика выплаты вознаграждений членам совета директоров. Вознаграждение членов советов директоров является важным мотивационным фактором обеспечения эффективной деятельности компании. Оно должно быть, во-первых, разумным, чтобы исключить влияние на независимость директоров. Во-вторых, конкурентоспособным, чтобы привлечь к работе достаточно квалифицированных директоров. Однако завышенные выплаты подрывают доверие акционеров и их желание инвестировать в компании. С этой точки зрения использование европейских норм, которые закрепляют право акционеров на определение принципов и размеров вознаграждений, выплачиваемых членам правления, открытость в этом вопросе, обязательность ведения бухгалтерской отчетности по опционам на ценные бумаги в соответствии с новыми международными стандартами, является чрезвычайно полезным.

В западных компаниях вознаграждение членов совета директоров включает:

- вознаграждение в денежной форме;
- в виде акций компании или опционов на приобретение акций;
- прочие блага.

Вознаграждение в денежной форме состоит из годового вознаграждения за работу в совете директоров, разового вознаграждения за участие в заседаниях совета,

[2] *Алешкина Т. Банк России режет бонусы // «Коммерсантъ» № 32/В(4087).*

вознаграждения за работу в комитетах при совете директоров и разового вознаграждения за участие в заседаниях комитетов [3, 15].

Вознаграждение, связанное с акциями компании имеет формы, различающиеся по размеру выгоды, извлекаемой из получения акций по полной стоимости (Full Value Shares)и опционов на приобретение акций (Stock Option).

Существуют различные виды передачи акций по полной стоимости:

- акции без ограничений (Unrestricted Stock);
- акции с ограничениями (Restricted Stock);
- отсроченные акции (Deferred Stock).

Акции без ограничений реализуются членам совета директоров в любой момент времени. Акции с ограничениями ограничены по срокам реализации. Отсроченные акции передаются члену совета директоров после его выхода из состава. В случае продажи данных акций директор получает их полную рыночную стоимость на момент реализации. При получении опциона на приобретение акций, его выгода будет равна разнице между текущей ценой акций и ценой акций на момент исполнения опциона.

Прочие блага включают пенсионные планы, дополнительное страхование, служебный транспорт, оплату затрат на обучение и др.

Существуют различные аргументы, как в защиту, так и против применения такой формы вознаграждения, как предоставление опционов на приобретение акций.

Опционы на акции являются формой вознаграждения, призванной увязать интересы менеджеров, сотрудников компании и членов совета директоров с достижением высоких результатов деятельности и повышением рыночной стоимости акций. С одной стороны, они обеспечивают стимулы для менеджеров и директоров, оказывают существенное влияние на компанию. С другой стороны, побуждают членов совета директоров уделять основное внимание краткосрочной динамике цен на акции компании. Поэтому компания должна обеспечить прозрачность информации о размывании капитала, о методах учета, используемых для оценки затрат на предоставление акций и опционов.

Принято считать, что директорам, не участвующим в повседневном управлении компанией, не должны предоставляться в качестве вознаграждения фондовые опционы. Но это не распространяется на их право владения акциями собственной компании. Обладание акциями должно послужить стимулом для более эффективного контроля советом директоров текущего управления компании. В данном случае исчезает питательная среда для соблазнов, порождаемых фондовыми опционами. В российских акционерных обществах использование опционов как формы вознаграждения находится на начальной стадии.

Кодекс корпоративного управления[3] рекомендует следующие способы и механизмы практической реализации принципов корпоративного управления в сфере вознаграждения членов совета директоров (таблица 2).

В американских корпорациях директора являются доверенными лицами акционеров. Вознаграждение рассматривается как плата за действия в интересах корпорации и ее акционеров. В исследовании The Corporate Library Director Pay Survey [25], охватывающем около 2 тыс. крупнейших американских корпораций, отмечается, что вознаграждение директоров включает базовый компонент за членство в совете директоров в денежной форме и в форме акций, а также вознаграждение за участие в заседаниях совета и другие формы вознаграждения. Неисполнительным директорам вознаграждение, привязанное к краткосрочным показателям работы компании - EBITDA или чистой прибыли, применяется редко. Широко распространено вознаграждение за участие в заседаниях совета директоров.

В российской практике вознаграждение членов совета директоров выплачивается за исполнение соответствующих обязанностей. Кроме того, оно осуществляется в целях компенсации понесенных в связи с исполнением обязанностей расходов. Это

---

[3]*Письмо Банка России от 10.04.2014 г. № 06-52/2463 «О Кодексе корпоративного управления» // Вестник Банка России. − № 40. – 18.04.2014 г.*

своего рода вознаграждение за оказание услуг или агентское вознаграждение [9].

Таблица 2 – Система вознаграждения членов совета директоров в Кодексе корпоративного управления

Принципы корпоративного управления	Рекомендации способов и механизмов практической реализации принципов корпоративного управления
Система вознаграждения членов совета директоров должна обеспечивать сближение финансовых интересов директоров с долгосрочными финансовыми интересами акционеров.	1. Фиксированное годовое вознаграждение является предпочтительной формой денежного вознаграждения членов совета директоров. Выплата вознаграждения за участие в отдельных заседаниях нежелательна. Не рекомендуется применение форм краткосрочной мотивации и дополнительного материального стимулирования.
	2. Долгосрочное владение акциями общества в наибольшей степени способствует сближению финансовых интересов членов совета директоров с долгосрочными интересами акционеров. Не рекомендуется привязка права реализации акций достижению определенных целевых показателей, а также участие членов совета директоров в опционных программах.
	3. Не рекомендуется предусматривать дополнительные выплаты или компенсации в случае досрочного прекращения полномочий членов совета директоров в связи с переходом контроля над обществом.

Источником выплаты вознаграждения является прибыль компании. Для осуществления выплат необходимо решение общего собрания акционеров. Оно определяет размер выплат (вознаграждения, компенсации). Для привлечения высококвалифицированных управленцев общее собрание утверждает размер вознаграждения. С членами совета директоров могут заключаться договоры. Заключение договора не является обязательным, не всегда используется на практике, особенно если членами совета директоров являются сотрудники компании.

Необходимо разграничивать вознаграждение исполнительных и неисполнительных директоров. Исполнительные директора могут не получать дополнительного вознаграждения за участие в работе совета директоров. Выплачиваемое им вознаграждение за работу в качестве должностных лиц, является достаточным и охватывает их обязанности в качестве членов совета директоров. Неисполнительным директорам необходимо выплачивать вознаграждение. Их оплата включает: годовую заработную плату в форме акций и денежных средств; плату в зависимости от числа заседаний совета директоров; дополнительное вознаграждение за работу в комитетах совета директоров; дополнительное вознаграждение за работу в качестве председателя совета директоров или комитетов. За период 2006-2014 гг. оплата неисполнительным директорам компаний, входящих в индекс S&P 500, увеличилась на 50%. По состоянию на конец 2015 г. медианная оплата членов совета директоров компаний S&P 500 составила 255 тыс. долл. в год. Величина вознаграждения независимых директоров не привлекает особого внимания ни акционеров, ни регуляторов и в сумме составила 1,4 млрд. долл. [8]

Совет директоров должен периодически пересматривать размер вознаграждения, выплачиваемого его членам. Компания должна раскрывать информацию о выплате вознаграждений и размере вознаграждения каждого директора в годовом отчете.

Таким образом, система вознаграждения для исполнительных и внешних директоров может различаться. Как правило, должностные обязанности топ-менеджеров, избранных в совет директоров, включают их участие и подготовку к заседаниям совета директоров. Поэтому эта работа учитывается в их мотивационном плане и системе компенсации и дополнительного вознаграждения не предусматривает.

Вознаграждение членов Совета директоров крупнейших российских компаний [2] представлено в таблице 3. Как следует из таблицы, в крупнейших российских компаниях вознаграждение членов Совета директоров составляет в среднем 10 млн. руб. в год, в некоторых – достигает 57,4 млн. руб.

Таблица 3 – Вознаграждение членов Совета директоров крупнейших российских компаний в 2016 г., млн. руб.

Минимальное значение	Максимальное значение	Среднее значение
0,1	57,4	9,9

Источник: Национальная ассоциация корпоративных директоров.

В 14 крупных российских публичных компаниях, по данным Standard&Poor's, средняя фиксированная сумма годового вознаграждения одного директора составляет 70 тыс. долл. Величина вознаграждения председателя совета директоров в полтора раза выше. В ряде компаний - выше в несколько раз[4] [18]. Так, оклад председателя совета директоров компании «Вимм-Билль-Данн» в 6 раз выше оклада директора. При этом суммарное вознаграждение 11 членам совета директоров за 2006 г. составило 26,17 млн. руб. За посещение заседания совета директоров выплачивается отдельное вознаграждение в среднем 1500 долл. В ряде случаев вознаграждение директоров складывается из двух компонентов - фиксированного и переменного, привязанного к результатам работы. Наиболее распространенными показателями результатов работы компании в России являются EBITDA и чистая прибыль, направляемая на выплату дивидендов. Премиальные выплаты директорам рассчитываются в процентах от величины этих показателей. Средняя величина по 7 компаниям, выплачивающим такие премиальные, составляет 0,15% от EBITDA и 0,27% от чистой прибыли, направляемой на выплату дивидендов.

В исследовании ЦЭФИР непубличных компаний отмечается, что 30% компаний заключают трудовой или гражданский договор с членами совета директоров. Систему вознаграждений членов совета директоров имеют 23% компаний. Годовое вознаграждение членов совета директоров непубличных компаний существенно меньше, чем публичных. Но некоторые непубличные компании выплачивают своим директорам существенные вознаграждения. Так, ОАО «МКХ «ЕвроХим» в 2006 г. выплатило шестерым членам совета директоров суммарное вознаграждение за участие в заседаниях совета директоров и в заседаниях комитетов совета 72,97 млн. руб., компенсационных выплат - 11,36 млн. руб.

В российских компаниях в принятой системе вознаграждения отражена зависимость от посещения заседаний (24% случаев) и от выполнения дополнительных обязанностей в качестве председателя совета или члена комитета совета директоров (18% случаев). Зачастую вознаграждение зависит от финансовых показателей компании. Система вознаграждения в 23% случаев отражает зависимость от объема продаж, в 43% - от чистой прибыли. В 23% случаев вознаграждение не зависит от показателей. Так, члены совета директоров АвтоВАЗа в кризисном 2008 г. получили 50,36 млн. руб. Вознаграждение совета директоров «Норильского никеля» за 2009 г. выросло в 3,2 раза до 66,6 млн. руб. в среднем 5 млн. руб. [16]

Заключение. Ряд рекомендаций в области мотивационной политики членам совета директоров содержит Кодекс корпоративного управления [13]: система вознаграждения исполнительных органов и иных ключевых руководящих работников общества должна предусматривать зависимость вознаграждения от результата работы общества и их личного вклада в достижение этого результата; критерии определения размера вознаграждения должны быть понятны, разрабатываться комитетом по вознаграждениям и утверждаться советом директоров; система вознаграждения членов совета директоров должна обеспечивать сближение интересов директоров с долгосрочными финансовыми интересами акционеров.

При разработке системы вознаграждения высшего менеджмента компании

[4]*Помимо Федерального закона «Об акционерных обществах» правовое регулирование вознаграждения членов советов директоров в России отражают: Трудовой кодекс РФ, Федеральный закон № 119-ФЗ от 31 июля 1995 г. «Об основах государственной службы в РФ», Федеральный закон «О рынке ценных бумаг», Положение о раскрытии информации эмитентами эмиссионных ценных бумаг», (утв. Банком России 30.12.2014 № 454-П) (ред. от 01.04.2016)-Рекомендательные нормы по вопросам вознаграждения членов советов директоров в России содержит Кодекс корпоративного управления.*

необходимо руководствоваться: созданием эффективных механизмов мотивации топ-менеджеров, учитывающих достижение стратегических целей компании; соблюдением интересов собственников; минимизацией агентских издержек.

Вознаграждение менеджеров в условиях эффективного корпоративного управления отражает следующие его аспекты: зависимость от результатов деятельности компании; зависимость от достигнутых менеджером результатов в краткосрочном и долгосрочном периоде; достаточность для привлечения высококвалифицированных специалистов; сравнимость с доходом акционеров.

БИБЛИОГРАФИЯ

1. The Corporate Library (2006): New Director Pay Survey.
2. Электронный ресурс: http://www.finanz.ru/aktsii/Moscow_Exchange
3. Алексеев М.А. Оценка человеческого капитала в интегрированной отчетности с позиций теории трансакционных издержек. Издательство: НИЦ "Апостроф". 2015.
4. Алешкина Т. Банк России режет бонусы // «Коммерсантъ» № 32/В(4087).
5. Бочарова И.Ю. Корпоративный контроль в условиях перераспределения акционерного капитала//Финансы и кредит. -2005. -9(177). -С. 48-53.
6. Исследование информационной прозрачности российских компаний в 2006 г.: Скромные успехи на фоне всеобщего стремления к IPO.Служба рейтингов корпоративного управления Standard&Poor's,2006. - С. 33.
7. Исследование практики корпоративного управления в России. М.: РИД, 2006. - 97 с.
8. Люблин Д. Неисполнительные директора хорошо зарабатывают. // Ведомости. – 2016. – 23 марта.
9. Макарова О.А.Корпоративное право / Учебник. - М.: Волтерс Клувер, 2005. - С. 183.
10. Национальный доклад по корпоративному управлению / Национальный совет по корпоративному управлению. М.: НСКУ, 2008.
11. Окли Д. Топ-менеджеров хотят ограничить // Ведомости. – 2016. – 16 сент.
12. Павлов В., Котов А. В Британии кредитный кризис ударил по кошелькам управленцев // РБК daily. - 12.09.2008
13. Письмо Банка России от 10.04.2014 г. № 06-52/2463 «О Кодексе корпоративного управления» // Вестник Банка России. − № 40. – 18.04.2014 г.
14. Положение о раскрытии информации эмитентами эмиссионных ценных бумаг», (утв. Банком России 30.12.2014 № 454-П) (ред. от 01.04.2016)
15. Практика избрания и вознаграждения членов совета директоров в российских компаниях. - М.: АНД, 2004.
16. Сергиенко Е. Кризисные выплаты: 14 топ-менеджеров АвтоВАЗа заработали в 2009 г. более 100 млн. руб. // РБК daily. - 16.02.2010.
17. Старостина Н. Александр Лебедев проверил бонусы, которые менеджмент НРБ выписывал сам себе // РБК daily. - 22.03.2010.
18. Телюкина М.В.Комментарий к Федеральному закону «Об акционерных обществах» (постатейный). - М.: Волтерс Клувер, 2005. - Ст. 64.
19. Терентьева А., Бараулина Е. Высшая экономия // Ведомости. - № 28. - 17.02.2010.
20. Уильямсон О.И. Экономические институты капитализма: Фирмы, рынки, «отношенческая» контрактация. СПб.: Лениздат; CEVPress, 1996. - С. 497.
21. Фрэнсис Т. В компаниях с независимыми советами директоров топ-менеджеры зарабатывают на 20% меньше. // Ведомости. – 2016. – 14 марта.
22. Фрэнсис Т. Кто больше зарабатывает, тот хуже руководит. // Ведомости. – 2016.
23. Фрэнсис Т., Директорам платят не за результат. // Ведомости. – 2016.
24. Хопт К. Европейская система корпоративного управления после дела Энрон // Корпоративный юрист. - 2005. - № 1-2.
25. Шатило В. Кризисная щедрость: как растут доходы руководителей российских компаний. // РБК. – 2016. – 23 мая.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.18

THE INFLUENCE OF ISO 9000 AND STRATEGIC ROLE OF MSDM TOWARDS PERFORMANCE OF AN ORGANIZATION: SURVEYS AT ISO 9000 STANDARDIZED PUBLIC HEALTH CENTERS IN CENTRAL SULAWESI, INDONESIA

Syamsuddin
Faculty of Economics, University of Tadulako, Indonesia
E-mail: syam_singga@yahoo.co.id

ABSTRACT
Despite of several advantages it has, implementation of ISO 9000 has several shortcomings, namely additional costs to get ISO certification, increasing workload, little or no attention towards personal development, lack of attention towards supporting functions within an organization, less room for employees to think creatively as employees are forced to work according to existing procedures and rules. The strategic role of MSDM can have positive effect towards performance of organization of an organization. In accordance to the research gap, analysis towards the variables or domains of the strategic role of MSDM that supports performance of organization of an organization is necessary.

KEY WORDS
ISO 9000, MSDM strategic role, performance, public health center.

Instead of seeking profit (profit-oriented), the main objective of public sector organizations, more particularly government organizations responsible for public health service is to meet the needs of the community. The Institute of Medicine (IOM) states that health care services today are too often harmful and fail to provide benefits to society (Institute of Medicine, 2001). Poor service quality is usually associated with complex production process design, instead of lack of willingness, skill, or intention of the employees (Berwick, 1989). Studies have discussed the benefit of ISO 9000 (Carson, 2004). It is reported that very few health care organizations use ISO 9000 as their standard (Sluijs and Wagner, 2000). Implementation of ISO 9000 in hospitals or at other health facilities is currently limited to the desire to obtain certification for its department alone (Van den Heuveletal., 1998).

Researchers have conducted many investigations about the main underlying reasons for companies to get ISO certification, difficulties they encountered to obtain ISO certification and the benefits they get having obtained the certification. Although ISO certification brings several benefits for the companies, , it also has also some disadvantages such as additional costs to get ISO certification, increasing workload, little or no attention towards personal development or attention towards supporting functions within an organization (Singels, et.al., 2001). Furthermore, ISO certification provides less room for employees to think creatively as employees are forced to work according to existing procedures and rules. Critics tend to say that ISO certification involves a lot of extra costs, and does not seem to benefit. Jones, et.al., (1997) stated that obtaining an ISO certificate was a "hollow achievement".

Various empirical studies conducted by the researchers disclosed that the strategic role of MSDM can positively affect the performance of the organization (Becker & Huselid, 1998; Huselid, 1995; Terpstra & Rozell, 1993). Nevertheless, in accordance to the research gap in this study, it is necessary to conduct analysis towards the variables or domains of the strategic role of MSDM that can support performance of organization of an organization. The relationship between the strategic role of MSDM towards performance of organization of organization will be tested in this study. Thus, the background and the research gap studyare one of the reasons why this research is important t.

The finding of (Maruf, Ali and Lam, 2007) study states that the implementation of ISO 9000 is a process shifting culture of organization of an organization in order to achieve desired performance. The findings of the (Katerina and Tsiotras, 2001) research mention ISO

9000 can enhance quality culture and quality commitment as well as give significant operational benefits to ISO 9000 certified companies. However, the contribution of ISO 9000 is found to be higher for small and medium-sized companies which have lower performance of organization before ISO 9000 certification. The theory shows that certification using ISO 9000 as the standards can reduce information asymmetry in the supply chain and thus result in a competitive advantage for certified companies. The results showed that certified facilities or facilities grew faster after certification. (Ann and Andrew, 2006).

It is pivotal to identify the strategic role of MSDM that can be used as a standard measure to see how much contribution the role has to help companies achieving their business targets more quickly, and supporting long-term survival of the companies in a predictable environment (Cho, 2004). Furthermore, many academics and professionals disagree "what and how to measure the strategic role of MSDM" effectively (Cho & Mayer, 2003). Ulrich (1997) proposes several domains of MSDM strategic role that can positively affect performance of organization. To address the domain gaps in measuring the strategic role of MSDM that contributes to performance of organization, this research will develop model and measurement of generic MSDM domains as best practices for academics. In addition, there has been no specific published research on the strategic role of MSDM that can support culture of organization and ultimately leads to performance of organization. In conclusion, this research addresses the problem.

Based on the research gap above, the statements of the problems are:

Does implementation of ISO 9000 affect performance of the ISO-standardized public health centers in Central Sulawesi?

Does MSDM strategic role affect performance of ISO-standardized public health centers in Central Sulawesi?

LITERATURE REVIEW

ISO 9000. Syamsuddin (2006) mentioned implementation of ISO 9000 (product, implementation, and role of management) had both simultaneous and partial influence towards performance of large scale wood industry in Palu. This meant that the performance of large-scale timber industry in Palu was determined based on several aspects, their product, implementation, and role of management.

Implementation of ISO 9000 into the product, implementation and management of the wood processing industry in Donggala, Central Sulawesi was able to explain partial influence of ISO 9000 towards the industry. ISO 9000 (product, implementation and management) had simultaneous effect towards the performance of the wood processing industry in Donggala, Central Sulawesi. (Ismail and Syamsuddin, 2007).

Dimensions of quality namely reliability, responsiveness, assurance, empathy and tangible had simultaneous influence towards the satisfaction the patients of the public health centers in Central Sulawesi. Seen from the variables of service quality ,reliability, responsiveness, assurance, empathy and tangible, there is difference between the public health center implementing TQM and those who did not (Mattulada A and Syamsuddin, 2008).

Implementation of ISO 9000 quality system from product aspect, implementation aspect and management role aspect partially able to explain its effect on public hospital performance in Palu city of Central Sulawesi. The impact of quality system implementation with ISO 9000 approach (product aspect, implementation aspect, and management role aspect) influence simultaneously to the performance of public hospital in Palu city of Central Sulawesi. (Sulaeman M and Syamsuddin, 2008).

Implementation of ISO 9000 on product, implementation and management was able to explain partial influence of ISO 9000 towards the performance of the TQM public health centers in Palu. The implementation of ISO 9000 on the product, implementation, and management had simultaneous influence towards the TQM performance of the public health centers in Palu (Sulaeman M and Mukhtar T, 2009).

Human resource development system (career planning and education / training) had significant effect towards intellectual capital with probability lower than α = 0.05. This meant that career planning and education / training had positive effect towards intellectual capital of the employees of the public health centers in Palu. Human resource development system (career planning and education / training) affected the performance of the public health centers in Palu employees but the influence was not significant. (Syamsul Bahri DP and Syamsuddin, 2009).

The literature review showed that there were a lot of studies discussing ISO 9000 with a focus on describing motivation or obstacles in adopting ISO 9000, impact of quality management, internal benefitsand effects of ISO 9000 towards performance of organization (Lee and Palmer, 1999; Boiral, 2003). Three factors caused some obstacles towards the findings of the studies. First, most of the studies were conducted in manufacturing sector, with relatively few studies conducted in other sectors or across industries. Second, most researchers assumed that ISO 9000 was a "mechanistic, consensual and monolithic" system (Boiral, 2003: 720). Third, while differences between manufacturing and organizational services were recognized, contingent issues related to universal application of innovation management such as ISO 9000 were significantly researched and applicable across sectors.

A number of researchers investigated the experience of service organizations with ISO 9000. Dicketal. (2002) study involved large service organizations in the United Kingdom and showed that organizations registered in ISO 9000 were of a higher quality than unregistered companies. McAnn and Canning (2001) described professional services (quantity surveys) of companies from Northern Ireland that signed up for marketing and the purpose of internal process improvement. A number of studies in the computer software sector had shown that organizations had had difficulties with ISO 9000 (Stelzer et al, 1997; McArn and Fulton, 2002). While most of this research had acknowledged that the requirements of the service industry were different from those in the manufacturing sector, they provided little evidence that the issues identified above had been addressed.

Using a variety of approaches, studies were attempting to demonstrate the intrinsic value of ISO 9000 and implicitly suggested that unregistered organizations should imitate registered organizations. Benefits included improved routine efficiency, internal quality, total quality (Carlsson and Carlsson, 1996), employee skills, customer service, employee morale and processes (Beattie and Sohal, 1999). Registered organizations performed better than unregistered organizations on several dimensions of quality management (Terziovski et al., 2003), particularly in terms of process improvement and quality measurement (Carr et al., 1997). In short, this model assumed that organizations registered with ISO 9000 may act as role models for unregistered organizations.

Rayner and Porter (1991), Street and Fernie (1992), and Taylor (1995a, 1995b)) demonstrated that organizations were applying for various reasons, by being the most prominent external customer motivational pressure, internally oriented process and product enhancements, and using opportunistic as a marketing tool. Lee and Palmer (1999) and Hughes, et. al (2000) suggested that the main motivations now included factors such as client / customer pressure, ability to compete successfully with competitors, improve product / service quality, and obtain approved supplier status. The benefits of related marketing were realized by several organizations (Rayner and Porter, 1991; Street and Fernie, 1992). However, some organizations were also aware of internal benefits such as business process improvement and product quality, but this seemed to happen by chance (Boiral, 2003). Organizations registered in ISO 9000 had greater results than their business operations (Ebrahimpour et al., 1997; Terziovski et al., 2003). The comparison of the financial performance of registered organizations with unlisted organizations of ISO 9000 was that there was little difference between the two (Terziovski et al, 1997; Five et al., 2000; Rahman, 2001).

Interpretation of ISO 9000:2000:

- Quality System Clauses Management Responsibility (Pramudya Sunu, 1999: 75);
- Quality System (Rudi Suardi, 2001: 82);
- Review of Contract (Sr. Nugroho, 1997: 157);

- Design Control (Pramudya Sunu, 1999: 40);
- Control of Documents and Data (Bambang and Sulistijarningsih, 2000: 67);
- Purchase (Zulian Yamit, 2001: 159);
- Product Customer Supply Control;
- Identification and Ability to Search Products (Gilang P, 1996: 100);
- Process Control (Bambang and Sulistijarningsih, 2000: 73);
- Inspection and Testing (Zulian Yamit, 2001: 162);
- Control of Inspection, Measuring and Testing Tools;
- Status of Inspection and Testing (Zulian Yamit, 2001: 164);
- Unsuitable Product Control (Rudi Suardi, 2001: 119);
- Correction and Prevention (Pramudya Sunu, 1999: 97);
- Handling, Storage, Packaging, and Submission (S. Nugroho, 1997: 123);
- Quality Record Control (Zulian Yamit, 2001: 167);
- Internal Quality Audit (Zulian Yamit, 2001: 168);
- Training (Bambang and Sulistijarningsih, 2000: 47);
- Service (Zulian Yamit, 2001: 169);
- Statistical Techniques (Bambang and Sulistijarningsih, 2000: 67).

The four roles that arose from this quadrant and the four ways human resource professionals may contribute, based on two fixed axes, were shown in Figure 1.

Figure 1 – The Ulrich Model
Source: Ulrich, D. (1997). "Human Resource Champions: The Next Agenda for Adding Value and Delivery Results". Harvard Business School Press

The Role of Strategic Partners. According to Ulrich (1997), the key to enable human resource to play role as a strategic partner is to participate in the process of defining business strategy, instead of just responding to the strategy presented by "senior management". Eisenstat (1996) pointed out the paradox of pressure in roles such as discussing the executive's desire for professional human resources to serve as a strategic partner, while also expecting them to perform traditional administrative and control functions downgraded to human resources. The role of an inherently strategic partner implies that human resources work together with the organization's managers in developing, improving and implementing strategies. In today's organizations, to ensure the viability and ability to contribute to them, human rsource managers must consider themselves as strategic partners. The role of human resource professionals analyzes and evaluates the organization's financial position (Mathis, & Jackson, 2007).

The Role of Change Agent. This role makes it easier to introduce and adapt from faster changes. This can be achieved through training of new technology operations staff (Lawler & Boudreau, 2009). If the organization needs more staff i.e expert staff, human resources should be able to recruit the staff. It also handles what customers expect from the organization. It is used to evaluate business satisfaction for customers (Holbeche, 2008). Kesler (2000) writes that the role of human resource in change varies between organizations, but if society cannot define the processes and priorities of change efforts, it is not an effective player in the organization. Defined more closely, the role of change agents helps to refer to organizations building capacity for change (Conner & Ulrich, 1996). Csoka (1995) further demonstrates that human resource professionals can add significant value through managing organizational change processes. Ehrlich (1997) adds that the human resources department should anticipate change and have knowledge in its implementation. Baird and Meshoulam (1998) state that the effectiveness of human resource management depends on the stage of organizational development.

The Role of Employee Champion. The role of superior workers has not been significant in human resource management (Pride & Hughes, 2009). Organizations in the past used to have a good strategy for employees. It provides security for them and hopes for promotion in the workplace. But this is no longer an effective way to communicate between staff and management (Daft, 2008). Human resources ensure that employees have skills that enable them to meet organizational goals. It is also responsible for motivating employees so as to provide a good working environment. This ensures they get a better salary. Good service depends on the ability of human resources to coordinate employees in an orderly manner.

The Role of Administrative Expert. Another role is the role of administration. A professional human resource is an expert in executive roles. They ensure that the operation runs as it is set. They must work to reduce costs and improve benefits and ensure the achievement of organizational efficiency and effectiveness. This executive should always analyze how the workflow takes place within an organization. They are responsible for rethinking the mode of operation in business (Dubrin, 2008). Allowing part of a company to share the services of human resource professional executives should try to get the job done faster and cheaper.

The four roles identified above are responsible for organizational well-being (Bohlander & Snell, 2009). They work together and without any of them it is difficult to achieve success. But this model faces several challenges. Technological improvements are a major challenge. Businesses or organizations try to catch up with technological change. Globalization is another factor. Organizations must improve their products to handle global settlements.

Performance Concepts. Performance terminology is quite popular among the public and is generally understood and clearly defined. Performance means something that has been done (done thing) and is a work that can be achieved by a person or group of people in the organization in accordance with the authority and responsibility of each in order to achieve organizational goals (Suyadi, 1999). Another opinion about the performance proposed by Osborne (1990), performance is defined as the level of achievement of an organizational mission. According to this understanding, performance is defined as the extent to which the organization is able to achieve its mission.

Inadequate performance of performance of organization is only done by using the indicators attached to the organization such as efficiency, effectiveness, but must also be seen from the indicators inherent in service users such as satisfaction, accountability and responsiveness. For that purpose, the authors use performance appraisal by referring opinion Dwiyanto (2008) that is:

- Productivity;
- Quality of service;
- Responsiveness;
- Responsibility;
- Accountability.

Based on review of the literatures and the findings of other previous studies, the research hypotheses are 1). The implementation of ISO 9000 has an effect towards the

performance of the ISO standardized public health centers in Central Sulawesi; and 2). the strategic role of MSDM influences the performance of the ISO-standardized public health centers in Central Sulawesi.

METHODS OF RESEARCH

The study was descriptive-causality research. This type of research will test the hypothesis in empirical research model. The data were cross sectional data. The setting was four regencies/ cities in Central SulawesiPalu, Donggala, Banggai, and Poso. Since the number of target population is relatively small then this research would use census method. The total respondents were 183 respondents. The data analysis method was path analysis (The Structural Path Analysis) from the AMOS 22 statistical software package.

RESULTS OF STUDY

Figure 2 described the result of the data analysis.

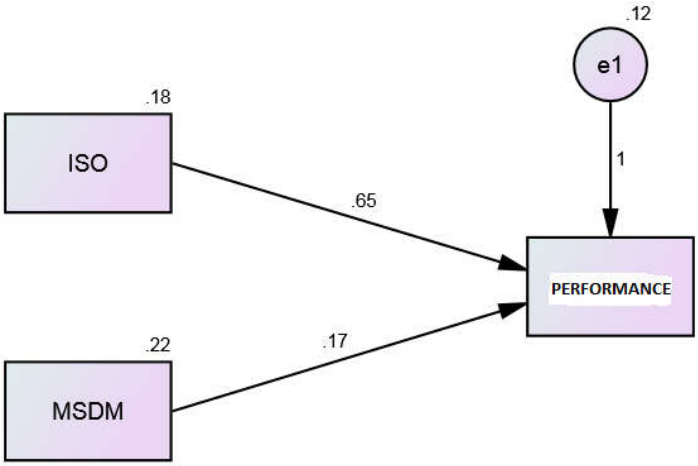


Figure 2 – Path Analysis Results

Table 1 described Figure 2 in a more elaborated manner.

Table 1 – Contribution of X1 = ISO 9000, X2 = MSDM Strategic Role towards Y = Performance of ISO standardized public health centers in Central Sulawesi and P = Probability of the Significance

-			Estimation	S.E.	C.R.	P
Y	<---	X1	.655	.059	11.026	***
Y	<---	X2	.168	.055	3.072	.002

Based on Table 1, ISO 9000 had 0.65 or 65% influence towards the performance of the public health centers with probability of 0.000 at level of significance α = 5%. The strategic role of human resource management had 0.17 or 17% influence towards the performance of the public health centers with the probability of 0.002 and the level of significance α = 5%. The ISO 9000 and the strategic role of human resource management simultaneously had 0.419 or 41.9% influence towards the performance of the ISO standardized public health centers in Central Sulawesi. The rest was influenced by other factors not examined in this study.

DISCUSSION OF RESULTS

ISO 9000 has a significant effect on the performance of the ISO standardized public health centers in Central Sulawesi with α = 5%. It is proven by probability value or P-Value

0.000 <α (0,05). It can be interpreted that the ISO 9000 consisting of; management responsibilities, quality system, contract review, design control, document and data control, purchasing, product supply control, product identification and traceability, process control, inspection and testing, inspection control, measuring and testing, inspection and testing , Inappropriate product control, corrective and preventive measures, handling, storage, packaging and delivery, quality recording control, internal quality audit, training, and service contributes 65% towards the performance of the ISO standardized public health centers in Central Sulawesi.

The strategic role of human resource management has a significant effect on the performance of the ISO standardized public health centers in Central Sulawesi with α = 5%. The evidence was, probability value or P-Value 0.002 <α (0.05). Thusm it can be interpreted that the strategic role of human resource management consisting of; The role of strategic partners, the role of change agents, the role of superior workers, and the role of administrative experts contributed 17% towards the performance of the ISO standardized public health centers in Central Sulawesi.

The ISO 9000 and the strategic role of human resource management simultaneously had 41.9 contributions towards the performance of the ISO standardized public health centers in Central Sulawesi. This provides an understanding that the 41.9% of the performance of the public health centers in Central Sulawesi is affected by both variables.

CONCLUSION

The ISO 9000 and the strategic role of human resource management have simultaneous and partial contribution towards the performance of the ISO standardized public health centers in Central Sulawesi.

Moreover, it can be suggested that the ISO certification that has been obtained should to be maintained in order to gain trust of stakeholders who may sometimes grant aid to institution. As an addition, the four strategic roles of human resource management should complement and support each other in achieving excellent performance.

REFERENCES

1. Baird, L & Meshoulam, I. 1998. Managing Two Fits of Strategic Human Resource Management. The Academy of Management Review. Mississippi State. 13 (1), 116-129.
2. Beattie, K.R. And Sohal, A. 1999. "Implementing ISO 9000: a study of the benefits among Australian organizations", Total Quality Management, Vol. 10 No. 1, pp. 95-106.
3. Becker, B.E. & Huselid, M.A. 1998. High performance work systems and firm performance: a synthesis of research and managerial implications. Research in Personnel and Human Resources Management, 16, 53-101.
4. Berwick, D.M. 1989. "Continuous improvement as an ideal in health care", New England Journal of Medicine, Vol. 320, pp. 53-6.
5. Bohlander, G. & Snell, S., 2009. Managing Human Resources. 15th ed. New York: Cengage Learning.
6. Boiral, O. 2003. "ISO 9000: outside the iron cage", Organization Science, Vol. 14 No. 6, pp.72-137.
7. Carlsson, M. and Carlsson, D. 1996. "Experiences of implementing ISO 9000 in Swedish industry", International Journal of Quality and Reliability Management, Vol. 13 No. 7, pp. 36-47.
8. Carr, S., Mak, Y.T. And Needham, J.E. 1997. "Differences in strategy, quality management practices and performance reporting systems between ISO accredited and non-ISO accredited companies", Management Accounting Research, Vol. 8 No. 4, pp. 383-403.
9. Carson, B.E. 2004. ISO 9001: 2000: A New Paradigm for Health Care, ASQ Quality Press, Milwaukee, WI.

10. Cho, S., & Mayer, K.J. 2003. Measuring the Impact of HRM Practices on Performance of organization. Proceedings of ICHRIE, Palm Springs, CA.
11. Cho, Y. Seonghee. 2004. Examining the Impact of Human Resources Management: A Performance-Based Analytical Model, Unpublished Dissertation, Graduate College, University of Nevada, FL.
12. Conner, J & Ulrich, D. 1996. Human Resource Roles: Creating Value, Not Rhetoric. HR. Human Resource Planning: Tempe. 19 (3), pg 38.
13. Csoka, Louis S. 1995. Rethinking Human Resources: A Research Report.New York. The Conference Board.
14. Daft, L., 2008. New era of management. 2nd ed. New York: Cengage Learning EMEA.
15. Dicket, G., Gallimore, K. and Brown, J. 2002). Does ISO 9000 accreditation make a profound difference to the service quality is perceived and measured? ", Managing Service Quality, Vol. 12 No. 1, pp. 30-42.
16. Dubrin, J., 2008. Essentials of Management. 8th ed. New York: Cengage Learning.
17. Dwiyanto, A. 2008, Public Organization Performance Assessment: State Administration Science Department, Yogyakarta. Fisipol UGM.
18. Ebrahimpour, M., Withers, B. and Hikmet, N. 1997. "Experiences of US- and foreign-owed firms: a perspective on ISO 9000 implementation", International Journal of Production Research, Vol. 35 No. 2, pp. 569-76.
19. Ehrlich, C. J. 1997. Human resource management: a changing script for a changing world. (Special Issue on the Future of Human Resource Management) Human Resource Management.36 (1), 85-90.
20. Eisenstat, Russell A. 1996. Four models for functional management. Organizational Dynamics.25 (2), 6-14.
21. Gilang Priyadi S, 1996. Implement SNI Series 9000 ISO 9000 (Series) Product Manufacturing, Earth Script, Jakarta.
22. Holbeche, L. 2008. Aligning Human Resources and Business Strategy. 2nd ed. New Jersey: Butterworth-Heinemann.
23. Hughes, T., Williams, T. and Ryall, P. 2000. "It is not what you achieve it is the way you achieve", Total Quality Management, Vol. 11 No. 3, pp. 329-40.
24. Huselid, M.A., 1995. The Impact of Human Resource Management Practices on Turnover, Productivity and Corporate Financial Performance, Academy of Management Journal, 38 (3), 635-672.
25. Institute of Medicine. 2001. Crossing the Quality Chasm: A New Health System for the 21st Century, National Academy Press, Washington DC.
26. Ismail R, and Syamsuddin, 2007. Impact of ISO 9000 Quality System Implementation on Processed Wood Industry Performance in Donggala Regency Central Sulawesi (Study on Exported Wood Processing Industry in Donggala Regency, Central Sulawesi), Fundamental Research of DP2M Dikti, Tadulako University, Palu.
27. Jones, R., Arndt, G. and Kustin, R. 1997. "ISO 9000 among Australian companies: the International Journal of Quality and Reliability Management, Vol. 14 No. 6/7, pp. 650-60.
28. Katerina D. Gotzamani and George D. Tsiotras, 2001. An empirical study of the ISO 9000 standards' contribution towards total quality management. International Journal of Operations & Production Management, Vol. 21 No. 10, 2001, pp. 1326-1342. MCB University Press.
29. Kesler, Gregory. 2000. Four steps to building an HR agenda for growth: HR strategy revisited. HR. Human Resource Planning. Tempe 2000. 23 (3), 24-37.
30. Lawler, E., Boudreau, A., 2009. Achieving Excellence in Human Resource Management. London: Stanford University Press.
31. Lee, K.S. And Palmer, E. 1999. "An empirical examination of ISO 9000-listed companies in New Zealand", Total Quality Management, Vol. 10 No. 6, pp. 887-99.
32. Lima, M.A.M., Resende, M. and Hasenclever, L. 2000. "Quality certification and performance of Brazilian firms: an empirical study", International Journal of Production Economics, Vol. 66 No. 2, pp. 143-7. ISO 9000 series of standards 141

33. Maruf Hasan, Ali, Lam. 2007. ISO 9000 and TQM for Business Excellence. The University of New South Wales, Sydney 2052, Australia
34. Mathis, R.L., & Jackson, R.H., 2007. Strategies of human resources management. 6th ed. New York: Cengage Learning.
35. Mattulada A, and Syamsuddin, 2008. Impact of Public health center Service Quality on Satisfaction of Poor Family and Non Poor Family Service Users in Central Sulawesi (Studies at TQM and Non TQM Community Health Centers in Central Sulawesi), Fundamental Research of DP2M Dikti, Tadulako University, Palu.
36. McAdam, R. and Canning, N. 2001. "ISO in the service sector: perceptions of small professional firms", Managing Service Quality, Vol. 11 No. 2, pp. 80-92.
37. McAdam, R. and Fulton, F. 2002. "The impact of the ISO 9000: 2000 quality standards in small software firms", Managing Service Quality, Vol. 12 No. 5, pp. 336-45.
38. Osborne, David. 1990. Organizational Theory an Intergrated Approach. United States: Perseus Book Publisshing.
39. Pramudya Sunu, 1999. Role of HR in Implementing ISO 9000 Human Resource Role with TQM Approach, Gramedia Widiasarana Indonesia, Jakarta.
40. Pride, W., Hughes, R, 2009. Business. 10th ed. New York: Cengage Learning.
41. Rahman, S. 2001. "A comparative study of TQM practice and performance of organization with and without ISO 9000 certification", International Journal of Quality & Reliability Management, Vol. 18 No. 1, pp. 35-49.
42. Rayner, P. and Porter, L. 1991. "BS5750 / ISO9000 - the experience of small and medium-sized firms", International Journal of Quality & Reliability Management, Vol. 8 No. 6, pp. 16-28.
43. Rudi Suardi, 2001. Quality Management System ISO 9000: 2000 Its Implementation To Achieve TQM, PPM Management Institute, Jakarta.
44. S. Nugroho, 1997. ISO 9000 Series and SNI Series 19-9000-1992 Version 1987 and 1994, Abdi Tandur, Jakarta.
45. Singles, J., Ruel, G. and Water, H. 2001. "ISO 9000 series: certification and performance", International Journal of Quality and Reliability Management, Vol. 18, No. 1. Pp. 62-75.
46. Sluijs, E.M. And Wagner, C. 2000.Quality Systems in Health-Care Organizations. Present Situation in 2000, Nivel, Utrecht.
47. Stelzer, D., Mellis, W. and Herwurm, G. 1997. "A critical look at ISO 9000 for software quality management", Software Quality Journal, Vol. 6 No. 2, pp. 65-79.
48. Street, P. and Fernie, J. 1992. "BS 5750: the industry view", International Journal of Quality & Reliability Management, Vol. 9 No. 7, pp. 37-41.
49. Sulaeman M and Mukhtar T, 2009. Implementation of ISO 9000 Quality System to Public health center Performance in Palu City (Survey at Public health center TQM in Palu City), Fundamental Research of DP2M Dikti, Tadulako University, Palu.
50. Sulaeman M and Syamsuddin, 2008. Impact of ISO-9000 Quality System Implementation on Public Hospital Performance in Palu Central Sulawesi (Survey on Public and Private Public Hospital in Palu City), Fundamental Research of DP2M Dikti, Tadulako University, Palu.
51. Suyadi Prawirosentono, 1999, Employee Performance Policy; Tips for Building a Competitive Organization Toward World Free Trade, BPFE Yogyakarta.
52. Syamsuddin, 2006. Effect Analysis of Quality System Implementation of ISO 9000 on Operational Performance of Large-scale Wood Industry in Palu City, Research of Young Lecturer of DP2M Dikti, Tadulako University, Palu.
53. Syamsul Bahri DP and Syamsuddin, 2009. Human resource development system in increasing intellectual capital and its effect on employee performance and performance of health center in Palu city, Fundamental Research of DP2M Dikti, Tadulako University, Palu.
54. Taylor, W. 1995a.Senior executive and ISO 9000: Attitudes, Behavior and Commitment", International Journal of Quality & Reliability Management, Vol. 12 No. 4, pp. 40-57.

55. Taylor, W. 1995b "Organizational differences in ISO 9000 implementation practices", International Journal of Quality & Reliability Management, Vol. 12 No. 5, pp. 10-27.
56. Terpstra, D.E. & Rozzell, E.J. 1993. The relationship of staffing practices to organizational level measures of performance. Personnel Psychology, 46: 27-48.
57. Terziovski, M., Power, D. and Sohal, A. 2003. "The Longitudinal Effects of the ISO 9000 certification process on business performance", European Journal of Operations Research, Vol. No. 146 3, pp. 580-595.
58. Terziovski, M., Samson, D. and Dow, D. 1997. "The Business Value of Quality Management Systems Certification: Evidence from Australia and New Zealand", Journal of Operations Management, Vol. 15 No. 1, pp. 1-18.
59. Ulrich, D. 1997. Measuring Human Resource: An Overview of Practice and a Prescription for Results. HRM, 36 (3), 303-320.
60. Van den Heuvel, J., Hendriks, M.J. And van Waes, P.F.G.M. 1998. "An ISO-quality system in the radiology department: a benefit analysis", Academic Radiology, Vol. 5, suppl. 2, pp. S441-5.
61. Yeung, A. C. L., Lee, T. S. and L. Y. Chan. 2003. Senior management perspectives and ISO 9000 effectiveness: an empirical research. International Journal of Production Research. 41: 545-569.
62. Zulian Yamit, 2001. Quality Management of Products and Services, First Edition, Econisia, Yogyakarta.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.19

IMPACT OF MINANGKABAU'S OUT MIGRATION: MERANTAU TO HOUSEHOLD LABOR ALLOCATION IN WEST SUMATRA, INDONESIA

Afrizal Roni[1]*, **Rizkiyah Noor**[2], **Ismawati Iis**[1]
[1]State Agricultural Polytechnic of Payakumbuh,Indonesia
[2]University of Antakusuma, Central Kalimantan, Indonesia
*E-mail: iesmawati08@gmail.com

ABSTRACT
Merantau is a unique form of outmigration in Minangkabau communities. The Minangkabau's strong tendency to migration as a rite de passages especially for young men. They migrate from rural areas to looking for experience, prosperity and education. Its also places a heavier burden on household left behind to make up for lost local labor. The impact of outmigration on agriculture, especially on household left behind has long been debated. Thus identifiying the impact of migration on household in rural origin is an open empirical questio. The main purpose of this paper is to analyse impact of *merantau* to household left-behind labor allocation in on-farm, off-farm and non-farm activity. The paper uses treatment regression techniques to asses impact merantau on household labor allocation. The result provide that m*erantau* contributes to increase hired labor on paddy farming. Paddy farming operations used 89% hired labor. Merantau reduce labor force participation for household members left behind and increase non-farm activity. Base on the findings, this study contributions to the literature by providing a wider understanding of labor supply decisions in rural household that have migrant and receive financial transfers.

KEY WORDS
Out migration, merantau, minangkabau, paddy farming, labor allocation.

Indonesia is the world's archipelagic country with five major islands among more than 30.000 of islands. Its inhabited by more than three hundred ethnic societies. This condition has been conducive to outmigration between and beyond the islands. The Minangkabau society, one of the largest matrilineal society, have been noted for a high level of outmigration called *merantau*. Its means voluntary migration from homeland to other places with the aim of earning a living or seeking further knowledge or experience (Naim, 1979). Recently Minangkabau society are found throughout almost in the regions of Indonesia.

The type of *merantau* is mainly from rural to urban areas. As a typically rural areas, agriculture sector has long been considered to play important role in West Sumatra's economic development. In this province, where paddy farming is dominant, most people especially in rural areas make a living and depends from it. Programmes for increased paddy production is focused on intensification, diversification, expantion and implementation of new technology. Among the obstacles paddy farming faced were land degradation, technological and infrastructure shortcomings, poor financial support and loss empoyment because of outmigration. In paddy production, access to labor very substantially

Perantau, Minangkabau migrants, do not always move with their entire family such as spouse, children and parents. In addition places a heavier burden on household left behind to make up for lost employment. The impact of outmigration on agriculture, especially on household left behind has long been debated. Thus identifiying the impact of migration on household in rural origin is an open empirical question. On the one hand, outmigration through financial transfers, positively to increasing household income (William, 2007; McCarthy,2006; Adam, 1996; Cadwell, 1968), make available capital stock in agricultural production (Black, 1993) and reducing poverty (Acharya and Gonzales, 2012). On the other hand, the physical absence of the migrant may have multiple adverse effects on family member's education, health, labor supply and social status (Démurger, 2015), reducing farm production (Rozelle et.al, 1999; Maharjan, 2013; Taylor and deBrauw, 2003) and labor

market partisipation as well as the number of hours worked (Rodriquez and Tiongson, 2001) but also raise off-farm work (Brad, 2007).

Rural household labor resources include non only working on farm but also off-farm and non-farm work. Farm household allocated labor resources between farming, off-farm and non-farm employment to maximize their labor return (Polzin and MacDonald, 1971). Meanwhile Yiqiong (2015) said that household diverdified their labor force to increase income, welfare and avoid risks. The main objectives of this study is to identifying household labor allocation who had migrant members and impact of *merantau* to household labor allocation.

METHODS OF RESEARCH

This study was conducted in three villages of three districs: Sulit Air Village of the Solok district, Sungai Tarab village of the Tanah Datar district and Koto Tuo village of the Padang Pariaman district, West Sumatra Province, Indonesia. There are many reason why those villages and districs are selected the study area. First, in those areas as known highly level of *merantau*. The second reason is that in Minangkabau communities, household's income is mostly from agriculture sector especially paddy farming.

The unit samples are household whose produce paddy. They were selected randomly in each village, so the total respondens are 141 household. The study analyses data obtained interviews of work hours household's paddy farming for one year, using structural questionnaire. The data were analyzed using multiple regression with Statistical Analysis System (SAS) version 9.03 to estimate impact of *merantau* to household labor allocation in paddy farming.

Household labor allocation model in this study based on Barnum and Squire (1979) model. This model allows to assess the impact of migration on labor supply and household can hired labor. The central past of this study was consentrated on the household labor allocation problem. Household behavior describes a semi-commercial family farm with a competitive labor market. Household labor allocation model as follows:

a. Household Labor Allocation On-Farm Work:

$$HHL_m = \beta_0+\beta_{1.1}LS+\beta_{1.2}W+\beta_{1.3}NM+\beta_{1.4}PR+\beta_{1.5}UF+\mu_1$$
$$HHL_w = \beta_0+\beta_{2.1}HL_w+\beta_{2.2}LS+\beta_{2.3}PP+\beta_{2.4}HHL_m+\beta_{2.5}PR+\mu_2$$
$$HL_m = \beta_0+\beta_{3.1}HHL_m+\beta_{3.2}LS+\beta_{3.3}W+\beta_{3.4}PP+\beta_{3.5}HIS+\beta_{3.6}HHA+\beta_{3.7}NM+\beta_{3.8}FT+\mu_3$$
$$HL_w = \beta_0+\beta_{4.1}HHL_w+\beta_{4.2}LS+\beta_{4.3}W+\beta_{4.4}PP+\beta_{4.5}NM+\beta_{4.6}FT+\beta_{4.6}HL_m+\mu_4$$

b. Off-Farm Household Labor Allocation:

$$OFL = \beta_0+\beta_{5.1}HHL_m+\beta_{5.2}ONL+\beta_{5.3}HHA+\beta_{5.4}YS+\beta_{5.5}HTI+\beta_{5.6}NM+\mu_5$$

c. Non-Farm Household Labor Allocation:

$$NFL = \beta_0+\beta_{6.1}HHL_m+\beta_{6.2}HE+\beta_{6.3}HHA+\beta_{6.4}NM+\beta_{6.5}FT+\beta_{6.6}SI+\beta_{6.7}VL+\mu_6$$

The names of variables in those models are listed details in Table 1.

Table 1 – List of Variables Name

HHL_m = Men's Household labor hours	PP = Paddy production
HHL_w = Women's Household Labor hours	HE = household expenditure
HL_m = Men's Hired labor hours	HHA= Household Head Age
HL_w = Women's Hired labor hours	FT = Financial transfers
LS = Land size	OFL = off-farm Household Labor Allocation
W = Agriculture wage	NFL= non-farmHousehold labor allocation
NM = Number of p*erantau*	HIS = household income surplus
PR = Paddy Price	VL = value of livestocks
UF = Urea fertilizer	YS = yard size
HTI =Household Income	

RESULTS AND DISCUSSION

Determinant of *merantau* described by number of *perantau* and financial transfers (refers to remittances). Minangkabau's *perantau* is generally highly concern for welfare of their family and rural origin. They send financial transfers through friends, the post office, bank or visiting homeland.

Impact Merantau On-Farm Labor Allocation. Table.2 presents parameter estimated. On-farm labor allocation consist for household labor and hired labor. The number of *perantau* has negatif impact on men's household labor and positif impact on women's hired labor as expected. Raising in household labor supply due to migration reducing men's household hours worked on paddy farming, on the contrary increasing number of women's hired labor.

The negatif sign of HHL_m variable, suggested related to ageing phenomenon in agriculture areas. According to Fan et.al (2014) findings alteration demographic composition of the agricultural work force in US. The average worker today is older and more likely to be female. They hipothesized that such worker might be less likely to migrate. Kreager (2006) said that in Rao-Ra, one of the higher level migration in Tanah Datar district, activity merantau was change social structure and ageing phenomenon. This indicated from positif sign in household head age (HHA) on men's hired labor. The value of HHA coefficient is 3.58 means raising on 1% HHA will be increase men's hired labor 3.58 hours worked.

Futhermore outmigration of family members including young men was independently associated with raising leisure time allocation for parents or non-farm activity any else. Financial transfers perceived support household well-being and reducing on-farm labor allocation. William (2007) called this phenomenon as "moral hazard" such as impact of flows financial transfers from migrant or *perantau* to family left behind.

Based on the data (show in Figure 1) can descibing why men's household labor decreasing ? We suggest it associated with sort of paddy operations. Involvement of men's household labor in all of paddy operation is less. Generally they workfield on a part of land preparation (such as slashing or dibbling bar) and fertilization. Plowing land used tractor machine and harvesting was worked by men's hired labor. On the other hand both women's household and hired doing transplanting, weeding, fertilization and also harvesting. This study reveal that migration make "agricultural feminism" as supported by Sifelani (2009), Katz (2003) and Schmook (2008). With the result, hired labor were contribution on paddy operations about 89% and household labor 11%.

Table 2 – Estimation Result of Equation parameter: Labor Allocation on Paddy Farming

Explanatory variables	Parameter Value			
	Men's Household Labor	Women's Household Labor	Men's Hired Labor	Women's Hired Labor
Intercept	-1.20 ns)	1.80**	0.27 ns)	-0.63 ns)
Men'sHousehold labor (HHL_m)		1.41 ns)	-0.44 ns)	
Women's Household Labor (HHL_w)				-2.16**
Men's Hired labor (HL_m)				-0.14 ns)
Land size(LS)	0.41 ns)	-0.90 ns)	2.91***	4.02***
Agriculture wage (W)	-0.25 ns)		-2.19**	0.84 ns)
Number of *perantau* (NM)	-1.53*		0.14 ns)	2.37**
Paddy Price (PR)	2.47**	-0.88 ns)		
Urea fertilizer (UF)	1.95**			
Paddy production (PP)		2.34**	8.33***	4.77***
Household Income Surplus (HIS)			-2.00**	
Household Head Age(HHA)			3.58***	
Financial transfers (FT)			-0.75 ns)	-0.49 ns)
F-Statistic	3.52**	2.12*	41.97***	32.28***
R^2	0.1153	0.072	0.7178	0.6294

*Note: ***) significant at 1%; **) significant at 5%; *)significant at 10%; ns) not significant.*

Financial transfers shows no significant on labor allocation in paddy farming. It may indicated that financial transfer from *perantau* do not invested in paddy farming. Maharjan et.al (2013) mentioned that migration undermines the agricultural sector which remittances are seldom invested in land or other capital inputs needed to improve the agricultural sector.

To end the analysis variables that influence on men's hired labor with sign expected are land size (LS), paddy production (PP) and household head age (HHA). Demand of hired labor in paddy farming affected by land size and household head age. This result same as with in corn production in Nusa Tenggara Timur (Leki et.al., 2016). Paddy production will be increase when hired labor added. In other things women's hired labor can substituted women's household labor, its indicated by negatif sign in estimation result.

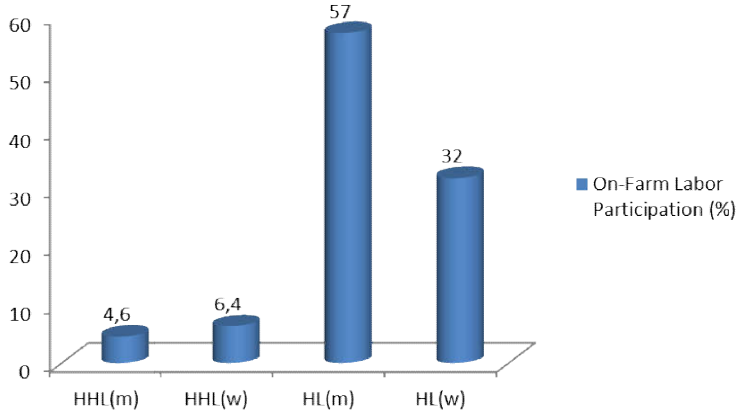


Figure 1 – On-Farm Labor Allocation in Paddy Farming

Impact Merantau On Off-Farm and Non-Farm Labor Allocation. In order to maximize labor resources, rural household prefer to labor force diversity employment. They allocate labor resources to different sectors for employment such as on-farm, off farm, non-farm activity and including migration. Motivated by the common is to increase family income and welfare, the other reason is to avoid risks.

Table 3 – Estimation Result of Equation parameter: Labor Allocation on Off-Farm and Non-Farm Activity

Explanatory variables	Parameter Value	
	Off-Farm Labor	Non-Farm Labor
Intercept	3.71***	3.38***
Men'sHousehold labor (HHL_m)	-1,29 ns)	-1.13 ns)
Number of *perantau*(NM)	-0.46 ns)	2.32**
Household Income (HTI)	5.59***	
Household expenditure(HE)		5.60***
Household Head Age(HHA)	-3.82***	-4.48***
Financial transfers(FT)		-4.46***
Non-farm Household labor allocation(NFL)	-4.18***	
Household Income Surplus (HIS)		3.73***
Value of livestocks(VL)		-4.96***
Yard size(YS)	0.94 ns)	
F-Statistic	9.44***	12.88***
R^2	0.2971	0.4040

*Note: ***) significant at 1%; **) significant at 5%; *)significant at 10%; ns) not significant.*

Table 3 provides a estimation of all variables used in the empirical analysis in off-farm and non-farm labor. Variable number of *perantau* (NM) does not significant influence off farm labor allocation. Result suggest that household income positively encouraged to increse off farm hours worked. Allocation in off farm labor affected by non-farm hours worked with negatif sign. An increasing in hours worked off-farm labor 1% may reducing non-farm activity about 4.18 hours worked. Result representing that off-farm and non-farm labor have substitute association in both. In addition value of livestocks (VL) has negatif sign and significant. Value of lifestock as determinant for off-farm activities.

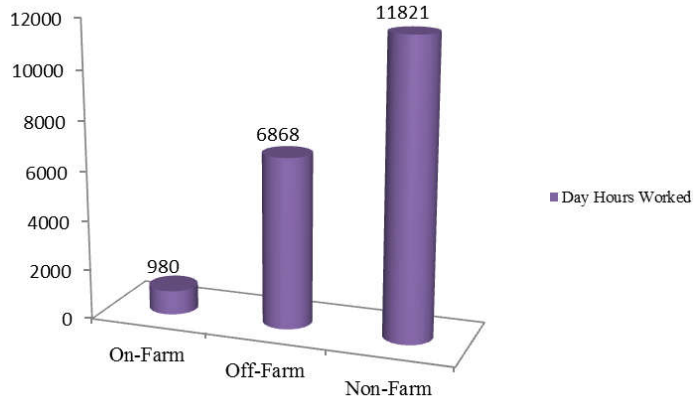


Figure 2 – Household Labor Allocation in Multiple Activity

While all dependent variables in this model simultaneously influence non-farm labor allocation. Variable number of perantau (NM) has positif sign and statistically significant. The consequence of lack of family member who *merantau* will increasing usage non-farm activity. Contrary to expectation, impact of financial transfers to non-farm activity has negatif sign. Meanwhile it has positif sign for income surplus. Presumably the financial transfers do not affected with direct connection to non-farm activity, but pass through income surplus.

Household expenditure (HE) has positive sign and significant. It describe that to enhancement disposable income for necessity household expenditure, they use more labor resources for non-farm activities. Finally, the labor behavior on household left behind in village which has higher level of merantau generally devote labor resources to more non-fam activities (see Figure 2).

CONCLUSION AND SUGGESTIONS

The lack of family labor caused by outmigration (*merantau*) in West Sumatra have the impact on more hired labor and less household labor in paddy farming. Financial transfers as a determinant of remmitance from *perantau* is not significant influence on demand of hired labor or off-farm activities. The results indicated that when financial transfers relatively high, peasant do not invest in crop farming and livestocks. We assume that household prefer to use it on non-farm activities such as family entrepreneurs called *manggaleh*, consumption goods and for more leisure. The result also suggest that merantau have to role in increasing feminisation on agriculture due to deprivation of men's labor.

The findings of this study contributions for relevant policy implications. *Merantau* has been cultural and natural process for Minangkabau communities. The stagnating in agricultural sector must be government concern that seeks policy attention, caused it still the major source of lifelihood for rural household. Involvement of migrant community organization such as SAS (Sulit Air Sepakat), IKTD (Ikatan Keluarga Tanah Datar) and PKDP (Persatuan Keluarga Daerah Piaman) to contribute on rural development.

REFERENCES

1. Acharya, P. Chakra and R. Leon-Gonzales. 2012. The impact of remittance on poverty and inequality: A micro-simulation study fo Nepal. GRIPS Policy Research Center. Discussion Paper: 11-26
2. Adam, R.Jr. 1996. Remittances, income disribution and rural asset accumulation. International Food Policy Institute, Washington.
3. Barnum,Howard, N. dan Lyn Squire. 1979. An Econometric Application of The Theory of The Farm-Household. Journal of Development Economics Vol.6.pp 79-102

4. Black, Richard. 1993. Migration, return and agricultural development in the Serra do Alvao, Northern Portugal. Economic Development and Cultural Change. Vol. 41 (3). Pp.63-85.
5. Caldwell, J.C. 1968. Determinants of rural-urban migration in Ghana. Population Studies: A Journal of Demography. Vol.23 No.3, pp. 361-377.
6. Dèmurger, Sylvie. 2015. Migration and families left behind: families sthat stay behind when a member migrates do not clearly benefit. IZA World Labor 144.
7. Effendi Nursyirwan. 1999. Minangkabau markets: a picture of an indigenoue economic system. Working paper N.312. Sosiology of Development Resech Center. Southeast Asia Programm
8. Fan, Maoyang., S. Gabbard., A.A. Pena and J.M.Perloff. 2014. Why do fewer agricultural workers migrate now? Institute for Research on Labor and Employment (IRLE) Working Paper 117-14.
9. Kazt, E. 2003. The Changing Role of Mowen in The Rural Economics of Latin America. In CUREMIS II
10. Kreager Philip. 2006. Migration, social structure and old-age support networks: comparison of three Indonesian communities. Ageing Soc. Vol 26(1), pp.37-60.
11. Leki, Silverius., N.Hanani., R. Dwiastuti and B. Setiawan. 2016. Household economic decisions of corn farmers at West Timor, Indonesia. Russian Journal of Agricultural and Socio-Economic Sciences Vol.4(1),pp.74-83
12. Maharjan, Amina., S. Bauer and B. Knerr. 2013. Migration for labour and its impact on farm production in Nepal. Working Paper IV Centre for the Study of Labour and Mobility.
13. Mccarthy, N., Gero, C., Benjamin, D., Irini, M. 2006. Assessing the impact of massive out-migration on agriculture. European Journal of Development Research. Vol.21. pp. 448-470.
14. Naim, Mochtar. 1979. Merantau: Pola Migrasi Suku Minangkabau. Gadjah Mada University Press
15. Rozelle, S., J.E. Taylor dan A. deBrauw. 1999. Migration, Remittances and Productivity in China. American Economic Review Vol.89 No.2.pp287-291
16. Schmook, B dan Radel, C. 2008. Male Transnational Migration and Its Lingkages to Land-Use Change in a Southern Campeche Ejido. Journal of Latin American Geography Vol.7. No.2
17. Silfelani, T. 2009. Impact of Migration on Food Security in Chiredzi, Zimbabwe.
18. Taylor, J.E., Rozelle,S., de Brauw,A., 2003. Migration and incomes in source communities: a new economics of migration perpective from China. Economic Development and Cultural Change 52 (1), 75-101.
19. William, S. 2007. Migration in Africa: A Review of the Economic Literature on International Migration in ten Countries. Development Prospects Group The World Bank.
20. Yiqiong Chen. 2015. Analysis on resource allocation of peasant household labor force. International Business and Management Vol.11(2),pp.60-63.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.20

SOCIO-ECONOMIC STUDY OF SUPLIT STONE BREAKER WOMEN IN SUPPORTING FAMILY LIFE: A CASE STUDY OF INFORMAL SECTOR STONE BREAKER WORKER IN THE NORTH MORAMO, INDONESIA

Kambolong Makmur*, **Sahrun**
Faculty of Administrative Science, University of Halu Oleo, Indonesia
*E-mail: h.makmurkambolong@gmail.com

ABSTRACT
A socio-economic study of Suplit Stone breaker women In Supporting Family life is a study of the Informal Sector Workers carried out in the form of a survey. This study aims to assess the socio-economic level of the workers, educational level, results achieved, income levels, health effects, and household's social condition. This research will specifically study and analyze income received, identify and examine the issues that arise in performing stone breaker as an occupation: deficiencies, expectations, and negative impacts. Ten urban villages/villages in Moramo North District was taken as research population. Area samples taken were five (5) urban/rural where workers are concentrated in Lalowaru Village, Puasana Village, Mata Mawatu Village, Sanggula Village, and Lamokula Village. Samples community were 5 percent of all household. Therefore total samples taken were 93 people scattered in villages. Research informants are Head of North Morano district, Stone Processing owner, and stone carrier driver. Data collection was conducted by observation, interview using a list of questions, as well as documentation of objective conditions. Data were analyzed using descriptive analysis techniques, which describe the objective conditions of the field in accordance with the purpose of research. Research result shows workers are housewives who help their husbands and families to supplement the household income to support family life. In general, socio-economic conditions of women suplit stone breaker is relatively low, their education level is generally elementary or none. The results achieved are still limited by an average of IDR 30,000, per day/worker is calculated based on the total stone yield. These women perform their work using simple tools such as hammer and gloves. The negative impact on eye health and breathing difficulty caused by inhaling stone dust every day. The problems faced by the workers is the lack of working capital to be trying to own the business processes, the impact on the health of the eye and breathing for workers. Income received by workers can be used to meet the basic needs level, therefore, obtained income can be used to support family life.

KEY WORDS
Socio-economic status, informal sector, stone breaker, women.

Labor issues are in conjunction with urbanization, migration, and work structure. It is a popular topic discussed by scientists since the 1970s. Afterwards, there are several studies emerging which highlight labor issues, particularly in the Third World.

"Classic" Arthur Lewis, proposes a number of models and theories on economic development, on the assumption that labor in the countryside is the main capital of urban areas construction industry. This theory cannot be justified from third-world experiences. American sociologist Hozelitz explained that it is "urbanization without industrialization". McGee, referred to such phenomenon as the "urbanization pseudo", because of urban development is not accompanied by economic growth rates fast enough to provide jobs for the growing city population. This is due to the application of capital-intensive technology in the industrial sector in city region and "urban bias" (tendency to give priority to the city), as well as the development policies in the third world, tends to ignore the rural areas (Manning and Effendi, 1991).

A number of urban development does not emphasize physical urban economic aspects, therefore problems faced by the urban poor working in the informal sector is less

managed. The new paradigm in urban development is to speed up managing urbanization problem and "institutional radicalization". Returning to the roots of institutional grow within the community itself, which concerns the economic institutions, and aids urban poor working in informal sector (Mabogunje, 1991),

World Bank suggested on urban problems coping strategies, that the productivity of the poor urban population should be improved by increasing the demand for labor and improving their access to basic infrastructure and social services (Poli, 1993).

Economy expert generally believes that rapid economic growth will be accompanied by changes economy structure. Industry and services sector roles are growing and the relative role of the agricultural sector decreased. This structural change will be reflected also in the deployment of the labor sector. Those working in agricultural sectors declined not only in relative but also in absolute. Industrial and services sectors absorb labor market in relative and absolute manner.

Indonesia's economic growth for almost a decade and a half exhibits point of interest. While the economy grew rapidly, employment phenomenon has not experienced significant structural change (improvement). Judging from the composition of the gross domestic product, agricultural sector role declines. Followed by the relative proportional decline of the population employed in the agricultural sector. On the other hand, the macro indicators exhibited improved employment (Squire, 1986).

Residents of urban areas are increasing rapidly due to two reasons: first, because the birth rate is higher than the death rate. Secondly, due to urbanization. City population growth is not matched by employment, would lead to unemployment and underemployment. It is the main cause of the informal sector. As stated by Wirutomo (1994). Informal sector (which means all-primitive) in a global economy field are still considered relevant. This sector is required to fulfill third world population needs.

With regard to the explanations of the theory as research result and assessment experts, this research is related to the informal/traditional sector. Study subjects were women stone crushers who breaks suplit mountain stones into several sizes. According to initial survey result on several locations in the community and Local Government (District Head and village chief, September 20, 2017), this particular research has not been conducted in the selected research area.

The informal sector or the traditional sector in South Konawe, particularly in North Moramo district, there is more informal/traditional sector compared to other areas. Especially informal/ traditional sector in cast concrete manufacture and similar product. Those working in suplit stone breaking informal sector are generally housewives or women in school-age or another member of the social class.

Based on the conceptual background, the research problem is formulated as the following description:

1. How are the socio-economic conditions of women workers suplit stone-crushing North Moramo South Konawe?
2. How big an acceptable income level as a suplit stone breaker suplit?
3. What are the problems faced by women workers to perform as suplit rock breaker?

REVIEW OF LITERATURE

"Classic" Arthur Lewis offers a number of models and theories on economic development on the assumption that labor in the countryside is the main capital of urban areas construction industry. Indonesia's economic growth for almost a decade and a half shows an interesting phenomenon. This is due to a various phenomenon occurring. While the economy is growing rapidly, labor had no significant structural changes.

Due to limited formal sector capacity caused social structure and mobility between sectors to absorb labor force runs comparatively very slow compared to economic growth. It ultimately leads to distortion in the pattern, activity type, employment, work hour as well as macro characteristics of other employment.

Wirutomo (2004) questions the present informal sector in the economy sector globally. The informal sector is still required to fulfill third world population need.

According to François Valentijn (in Candrakirana, 1995: 2) activities as proposed in the informal economy since Batavia (Jakarta) 1724. At that time hawkers carried sorts of goods traded in the streets. They sell an assortment of vegetables, porcelain, fabrics, handicrafts, tea, bread, water, flower, used clothing, socks and others. Such sales practice had been previously banned by the VOC. The ban was lifted at 1739.

Simanjuntak (1995: 98-99) provides characteristics of the informal sector which are classified as follows:

a. Business activities are generally simple;

b. The relatively small scale of business;

c. Informal sector enterprises generally do not have a business license;

d.Obtain work in the informal sector more easily than in the formal sector.

Hans Singer (in Chandrakirana, 1995: 16) explains that informal sector is similar to giraffes, it has undistinguished shape but recognizable once one gaze upon it. Dipak Mazundar (in Manning and Effendi, 1996: 12) defines informal sector as an unprotected labor market. One important difference between formal and informal sector is informal sector is riddled with unfixed working hours. This is caused by the absence of long-term employment contract relationship in the informal sector and wages tend to be calculated per day or per hour as well as the prominence of independent business. Jan Breman (in Manning and Effendi, 1996: 139), without specifying the clear terms but distinguishes formal and informal sectors are pointing to an economic sector each with its own consistency and structure dynamics. The formal sector is used in the sense of daily wage workers or permanent work which include:

a. A number of interrelated work that is part of a structure of the interwoven job and very organized;

b. Work is officially registered in the economic statistics.

De Soto (1992) suggests that division of economic activities into the formal sector and the informal sector will have a bad influence on the State's economy in general. Consequences arising is subject to decreased productivity, decreased capital investment, inefficient tax system, public service rates increase, undeveloped technology level, and a number of difficulties hamper the preparation of the State's economic policies.

Furthermore, De Soto said there are two things at the informal activities that result in a decreased capital investment. First, informal entrepreneurs use more labor intensive technology, because business as economic institutions tends to move towards the informal sector. Second, given the difficulties faced by informal employers to ensure that the contract is not violated, and the high interest they have to pay when they borrow money on the capital providers. There will be a lot of long-term investments for production. Capital investment also dropped due to the high costs in the informal sector.

Manning and Effendi (1991) suggest that some economy expert and government representatives believe that more resources, better processing, and stronger informal sector growth, the city can provide a better life to its citizens, including the workers in the informal sector.

Sethuraman (1991) suggests that the term "informal sector" is usually used to indicate a number of small-scale economic activities. But it would be misleading to so-called "business" small scale, for several reasons. The informal sector is regarded as a manifestation of the situation of employment growth in the developing countries, mainly aims to seek employment and income rather than profit. Those involved in this sector are generally poor, low-educated, unskilled, and mostly immigrants.

In other words, the informal sector in the city, especially seen as units of small-scale involved in the production and industrial goods are still in a process of evolution rather than regarded as a group of small-scale companies with big capital and management (managerial) input.

The existence of the informal sector cannot be separated from the development process. There are two ideas that flourish in understanding the link between development

and the informal sector. First, thought process stating that the presence of the informal sector as a symptom of a transition in the development process in the developing countries. The informal sector is the stage that must be passed on to the modern stage. This view argues that the informal sector would gradually evolve into a formal sector with increasing development. It means that the existence of the informal sector is a temporary phenomenon and will be corrected by development success.

Second, thought processes that argued the informal sector is a symptom of an imbalance in development policy. The presence of the informal sector is seen as a result of development policy which in many cases are more severe in the modern sector (urban) or industry than the traditional sector (agriculture). The informal sector will continue to be present in the development process while the traditional sector is not progressing. Further adherents of this view argue that the development of the informal sector depends on the attitudes of development policies. During its development policies tend to favor the modern sector and the traditional sector is only seen as a provider of raw materials for the modern sector as well as their attitude of "sacrifice" of the traditional sector, the informal sector will remain and are likely to increase.

METHODS OF RESEARCH

This study is a descriptive study, the research illustrates the current state based on the facts, therefore method used in this study is a survey method in order to describe the conditions of informal sector workers as stone breakers.

Research Variables. Variables defined in this study concerning the socio-economic problems of the workers as stone breakers, among other things are age, education, status in the household, production result, income received, the work system, wage system , reasons that pushed to engage in such business, health, the perceived negative impacts, issues, and expectations.

Sample Determination and Collection Technique. Results initial survey exhibits that there's uncertainty on a total number of women were involved as stone crushers, these women are spread in 10 urban villages/villages in North Moramo South Konawe (Results interview North Moramo District, September 29th, 2016).

For the purpose of sampling, researchers set 5 regions out of 10 urban villages considering its concentrated number of stone workers in North Moramo. The villages involved were 1) Lalowaru Village, 2) Wawatu Village, 3) Mata Wawatu Village, 4) Sanggula Village, and 5) Lamokula Village.

Since there is no definite figures and number of stone worker relatively homogenous data, then the determination of the sample size was set at 10% of the number of families in each region/village sample. There were 93 samples taken. Determining workers sample used random sampling.

Data Collection Technique. To collect a wide range of primary and secondary data, researchers used the following data collection techniques:

1. Questionnaires/list of questions. Data collection through the dissemination of the list of questions (questionnaire) which are open nature and there's no predetermined answer, each respondent answer prepared questions.
2. Interviews. Interviews were conducted on informants, such as Head of District, the Village Head, Community Leaders, Stone Entrepreneurs/Businessmen, stone transporter driver. This activity aims to obtain additional data or confirm the results of the data obtained from the workers.
3. The document, i.e the data regarding the condition of the area in general, either geographical data, demographic, social, cultural and economic condition of the North Moramo district.

Data Analysis Techniques. Data analysis techniques used is descriptive analysis, which is a form of analysis that describes conditions of the study object in accordance with the purpose of research. The results of this study are presented in the form of frequency tables, percentages, and provide recommendations on the parties which is competent in

dealing with stone-crushing workers as informal sector enterprises to the family economy in particular, and the region's economy in general.

RESULTS AND DISCUSSION

Social condition. The social conditions intended in the study are objectively stated about the family circumstances which may be studied and analyzed in relation to work and income in aiding family economic life. Discussion on family social conditions, is related to their family members. Those aspects are children, tuition fees, house status, and house condition.

Family members. Family member associated with work and incomes. Received income will be used for daily need cost, especially for children's school tuition fee. The results exhibit the degree of variation in the number of children. The respondent families have been grouped into several categories as presented in Table 1.

Table 1 – Respondents by Number of Family Members 2017

Number	Family Member	Number	Percentage
1	≤ 2	3	3.22
2	3-5	70	75.27
3	≥ 6	20	21.51
Total		93	100.00

Source: processed questionnaire.

Table 1 exhibits a number of workers family member. These workers generally have a large family, which is between 3 to 5 members (75.27% of all respondents). There are workers having 6 or more family members. These facts prove that the family's head burden is heavy, so it is reasonable if the workers (mothers) participated working to ease the burden on their husbands as family heads obliged to bear the economic life of theirs.

This research also examined a number of children the workers have. The number of children will affect family life as children require education expenses. Ultimately it requires mothers to work hard to earn money to meet the children's need/schooling expense. The details of respondents' number of children are presented in Table 2.

Table 2 – Respondents by Number of Children 2017

Number	Children's	Number	Percentage
1	≤ 2	45	48.39
2	3-5	42	45.16
3	≥ 6	6	6.45
Total		93	100.00

Source: processed questionnaire.

The table above exhibits a number of children as a family burden. Respondents having 2 children were 48.39% out of total respondents. Respondents having 3 to 5 people were 45.16%. Therefore mothers/housewives endeavor to find a job and work in order to increase household economy.

House Status. Direct field research results showed that all respondents possess their own housing. No respondents come to work specifically to rent a house. Respondents are generally native citizens who have hereditary life and make a living in the Moramo District, where they already have their own home as a residence.

House Shape/Condition. Respondent's home form is generally still semi-permanent, meaning that not all the walls of their houses are made of stone. On the other hand the respondents possessing permanent house are still burdened with shortcomings, such as not having glass windows.

Economic Conditions. Economic conditions meant is to determine and explain things related to workers lives. Economic conditions will be discussed in the general level of

earnings/income from work per day / per month, number of suplit stones produced, wage/salary system, suplit stone size generated, sale system, and the statement about the job that can support family economically.

Income level. The results showed earned income as stone crushers for suplit stone manufacturing. More details categories amount of income received, as shown in Table 3.

Table 3 – Respondents Daily Income 2017

No.	Revenues (US$)	Amount	Percentage
1	10-20	9	9.68
2	25-30	51	54.84
3	≥ 35	33	35.48
Total		93	100.00

Source of data: processed questionnaire.

The table shows the respondents' income levels which are grouped into three categories. Generally, respondents receive 25-30 thousand per day, meaning that respondents earn revenue based on a number of stone produced. The level of income means that each respondent produced suplit stone in the size of 2x1 cm as much as 5 to 6 arco (the measure used). The workers are paid each acro submitted at an average of IDR 5,000, -

Each worker receives revenue between IDR 750.000 to IDR 900.000 each month. This sum relatively can be used to gain additional daily needs. Furthermore, there are respondents who earn IDR 35.000 up to 50.000 per day. The respondents worked from early morning until late afternoon with a little break to obtain more result and income within the time allotted. Respondents are relatively young therefore they are capable to work full time.

Stone Productionю Production referred to the amount of mountain stone made into suplit stone. Based on the foregoing discussion that a number of revenues received based on the suplit stone produced. Based on the research result, a number of suplit stone produced is at least 2 (two) arco each worker, and most can reach 8 even be up to 10 Arco per day. With this level of production, it could be inferred respondents took this occupation as primary job support family life/economy. These women are working seriously to break more stones each day.

Salary/Wage System. Salary or income they receive is paid based on the number of stones produced. Produced stone is measured using arco as a tool to measure salaries/wages. As previously noted, the calculation is IDR 5,000 up to IDR 6,000/arco. The payment system is in the form of direct cash paid for buyers (employers truck) who are ready to transport the stone to be sold due to numerous requests from the city for house construction.

Suplit Stone Size Type. Mountain stone is generally called *batu glondongan* (boulder), these stones are to be broken into pieces/chunks. The stones are originated from mountains surrounding Moramo. These *batu glondongan* are then broken into suplit stones in various sizes. Women workers broke the suplit stones into various sizes, ranging from the size of 2x1 cm, 2x3 cm, 3x5 cm and 5x7 cm size. Most of these workers produce 2x1 cm suplit stones as there's high demand for that particular size to be used in casting. There are also demands for other sizes, but most were conducted through specified orders.

Suplit Sale System. Batu glondongan were broken into suplit stone chunks then sold to businessman trucks coming to buy stones. Stone owner negotiated a sale price of stone per truck. After the price was agreed on, then the owner of the truck immediately hire labors to load the suplit stones into the trucks. Labor wages or salaries (separate from wages from breaking stones) for loading each truck is about IDR 50,000 to IDR 80.000.

Statement Supporting the Family Economic Life. According to interviews with workers (December 12th, 2016) states that what they are doing now is very supportive of their family life. Working as stone crushers helped them in fulfilling children needs. The economy issue in the family has been solved as they obtain daily income from producing suplit stones.

CONCLUSION

Based on the research result, socioeconomic level of women suplit stone breaker is still relatively low; it was studied in several aspects pertaining to the socio-economic conditions. The level of education is relatively low, they generally went to primary/elementary school education or never received any form of education. They managed to produce 4 to 10 arco of suplit stone per worker. Revenue received by workers on average is IDR 30,000 per day. Working as stone crushers has negative impact on eye and breathing. Women workers were mostly housewives who help their husbands and families to supplement the household income to support the family's economic life.

These women work as stone crushers due to lack of capital to conduct business. The negative impact is health hazard on eye and breathing. The desired expectations are in the form of assistance from other parties, such as government or employers in the form of working capital, equipment, and labor, as well as safety equipment such as masks and eye protection.

Income received by the workers used to meet basic daily needs in the form of food and other type daily needs. Therefore basic needs could be fulfilled using income received in daily work. Workers stated suplit stone crushers occupation is very helpful and capable to support family economy.

REFERENCES

1. De Soto, H. 1992. Still No Other Way: Hidden Revolution in the Third World. Obor Indonesia. Jakarta.
2. Effendi, TN 1993. Human Resources Employment Opportunities and Poverty. PT. Tiara discourse Yogya. Yogyakarta.
3. Hart, K. "Informal Income Opportunities and Urban Employmentin Ghana". In Manning, C. and Effendi, TN 1991. Urbanization, Unemployment, and the Informal Sector in the City, Obor Indonesia, Jakarta.
4. Hidayat. 1978. "Development of the Informal Sector in National Development: Problems and Prospects". In Effendi, T.N.Human Resources Employment Opportunities andPoverty. PT. Tiara Discourse Yogya. Yogyakarta.
5. Hugo, GJ "Participation of Migrants in Urban Economies in West Java". In Manning and Effendi.1991.Urbanization, unemployment, and the Informal Sector in thecity.Obor Indonesia. Jakarta.
6. Lewis, A, "Economic Development With Unlimited Supplies of Labor". In Rachbini and Hamid. 1994. Urban Informal Economy: Symptoms involution Second Wave. PT. Reader LP3ES. Jakarta.
7. Mabogunje, AL 1991. A New Paradigm for UrbanDevelopmnet.In Summers. LH and Shirvan (ed). Procedding of the World Bank, Annual Confrence on Development Review and the World Bank Research Observer.
8. Manning, C. 1980. “Segmentasi Pasar Tenaga Kerja di Sektor Industri di Jawa”. Dalam Effendi, TN 1993. Sumber Daya Manusia Peluang Kerja dan Kemiskinan. PT. Tiara Wacana Yogya. Yogyakarta.
9. , 1981. “ Penyerapan Tenaga Kerja Di Indonesia : Jawa dan luar Jawa dan Implikasi untuk Sumatera Selatan”. Kertas Kerja Tidak Diterbitkan. Dalam Effendi, TN 1993. Sumber Daya Manusia Peluang Kerja dan Kemiskinan. PT. Tiara wacana Yogya. Yogyakarta.
10. Manning, C dan Effendi, TN 1991. Urbanisasi, Pengangguran, dan Sektor Informal di Kota. Yayaysan Obor Indonesia. Jakarta.
11. Mappangaja, AN 1991. Pedagang Kaki Lima Dalam Prospek pembangunan Kota Madya Ujung Pandang (tesis). Program Pascasarjana Universitas hasanuddin. Ujung Pandang.
12. Mazumdar, D. 1976. “The Urban Informal Sector”. Dalam Effendi, TN 1993. Sumber daya Manusia Peluang Kerja dan Kemiskinan. PT. Tiara Wacana Yogya. Yogyakarta.

13. McGee, TG “Perombakan Struktural dan Kota di Dunia Ketiga : Suatu Teori Involusi Kota”. Dalam Manning dan Effendi, TN 1991. Urbanisasi, Pengangguran, dan sektor Informal di Kota. Yayasan Obor Indonesia. Jakarta.
14. Nasution, MZ 1988. Sektor Informal di Perkotaan. Pusat Antar Universitas, Stusi Sosial. Yogyakarta.
15. Nurul Widyaningrum Resmi Setia, 2011. Usaha Kecil dan Sektor Informal. http://akatiga.org/index.php/penelitian/usaha-kecil/107-topik-penelitian-usaha-kecil
16. Pembangunan Ekonomi Daerah Sektor Informal (Hasil Penelitian 2011). http://bappeda.pontianakkota.go.id/dok/BAB%20III%20Kajian%20PKL.pdf
17. Rachbini, DJ dan Hamid, A. 1994. Ekonomi Informal Perkotaan: Gejala Involusi Gelombang Kedua. PT. Pustaka LP3ES. Jakarta.
18. Sethuraman, SV 1985. “Informal Sector In Indonesia: An Assesment Of Policies”. Technical Report, WEP. ILO, Geneva. Dalam Rachbini, DJ dan Hamid, A. 1994. Ekonomi Informal Perkotaan : Gejala Involusi Gelombang Kedua. PT Pustaka LP3ES. Jakarta.
19. , 1991. “Sektor Informal di Negara Sedang Berkembang”. Dalam Manning, C dan Effendi, TN Urbanisasi, Pengangguran, dan Sektor Informal di Kota. Yayasan Obor Indonesia. Jakarta. Squire, Lyn. 1986. Kebijaksanaan Kesempatan Kerja di Negeri-Negeri Sedang Berkembang: Sebuah Survei Masalah-masalah dan Bukti-bukti. University of Indonesia. Jakarta.
20. Strategi Pengembangan Sektor Informal Untuk Meningkatkan Pertumbuhan Ekonomi Daerah http://www.slideshare.net/suparmono/2-sektor-informal

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.21

INFLUENCE OF TRANSFER MOTIVATION AND TRAINING RETENTION TOWARDS TRAINING TRANSFER ON EMPLOYEE'S PERFORMANCE

Septana Deva*, **Umar Husein**
University of Esa Unggul, Tangerang, Indonesia
*E-mail: dseptana@gmail.com

ABSTRACT
The objectives of this research can be arranged consistently to answer the formulation of research problems, which are to know the perception of the participant's preparation that influences the transfer motivation on the training transfer; to know the perception of the colleagues' supports that influence the transfer motivation on the training transfer; to know the perception of the employer's supports that influence the transfer motivation on the training retention. The research method used in this research is conclusive research design, in which this research is a type of research that aims to test the hypothesis associated with various variables. The results of this study are: transfer motivation has a positive influence on training transfer, where strong self-motivation, support from employer, and colleagues can increase the activity of training transfer in the workplace. This gives an influence on improving employee's performance; training retention in the form of reward both intrinsic reward in the form of praise, appreciation; and extrinsic reward in the form of material or money, career as a reward do not influence positively on the employee's performance in implementing the result of training that they have obtained as one of the ways to improve the ability to achieve the rewards/incentives provided by the organization; training transfer gives a positive influence on employees and organizations in which employees contribute by applying training provided to them to improve employee's performance.

KEY WORDS
Employee's performance, transfer motivation, training retention, training transfer.

One of the activities undertaken in human resource management is getting competent people to fill the organization. Typically, those dealing with this issue are coordinated by the Human Resources Department and other related sections are involved. However, there is an important step that must be taken before accepting a new manpower which is to determine the type or quality of the desired employee to fill the position and details of the quantity that will occupy the position. Thus, the first function or activity in human resource management is to get the right people, both in quality and quantity. After that, the withdrawals of manpower, placement selection, orientation, promotion, and transfer or mutation are done.

The need for skilled workers is a demand that cannot be postponed anymore. In the era of globalization as today, the top management should be more aware that having good human resources must be done continuously. One of the ways is through education and training which are planned in accordance with needs analysis that can produce employees who are reliable, have high competence and added value from the financial perspective. In addition, human resource education and training will be able to accelerate the improvement of knowledge, skills and attitude changes according to the needs of the organization at all levels of employees. With education and training, it will also be able to improve employee's performance which is a function of motivation and ability in completing tasks, responsibilities, or works that they have.

A person's willingness and skills will not be effective at doing things without a clear understanding of what to do and how to do it. One of the fast ways to produce employees who have adequate skills is by providing appropriate planned and continuous education and training programs. A training is successful or effective if the participants can accept and have increased knowledge, skill, and attitude which are appropriate and are given by the appropriate instructor/trainer too, as well as the achievement of improved

performance/competence of employees. From several studies, one of them is Sulistyohadi (2002) who shows that approximately only 10% of the investment spent on training has changed the attitude of trainees when they return to the workplace. In many studies, it has been found that the success in the training transfer process itself is influenced by the characteristics of the participants and the characteristics of the work environment. One of the characteristics of the training participants is called personality variables consisting of locus of control and self-efficacy are hypothesized as factors affecting the training transfer process. Similarly, the characteristics of the work environment will be able to influence the training transfer process (Baldwin and Ford, 2008; Smith, *et al,* 2001, Tziner and Haccoun, 2001; Colquit, *et al.,* 2000).

Crider (2003) mentions the characteristics of internal locus of control, such as like to work hard, have high initiative, always try to find problem solving, try to think as effective as possible, always have perception that effort must be done if success is willing to achieve. While, the characteristics of external locus of control are lack of initiative, have a hope that there is a few correlation between effort and success, lack of effort because they believe that the external factors which control it, and they are lack of searching information to solve the problems.

In training situations, trainees who have strong beliefs, they can control organizational outcomes, such as promotion and salary increase. It can be as an extension of more work that makes it possible to apply the content of training in the work. Individual believing that he is able to conduct and complete the task well because of his own effort can be said that the person has an internal locus of control. Individual who considers that success and failure are due to their surroundings, then it can be said that the person has an external locus of control.

In line with that effort, to align the needs of organizations with human resources at PT. Gandum Mas Kencana, the management continues to evaluate the productivity made by the Training and Development Department in order to fulfill its responsibilities professionally and be able to answer the challenges faced by the organization with the locus of control approach.

Department of Training and Development at PT. Gandum Mas Kencana is a container that is formed to unite the interests of the organization and the people in it by designing and reviewing the needs of the organization as stated in the vision, mission, target, future goals, both short-term and long-term goals, strategy, and organizational culture (core value). The other side should also be able to bring the people who are in the organization, both from knowledge, skills and behavior leading to what has been established by the organization as a standard work in running organizational goals.

The problems that emerged at the Training and Development Department in 2016 published by the Internal Audit Department are findings of infringement in the *Corrective Action Report (CAR)* based on mistakes included in the five categories: Human (HUM), Facility (FAS) , Machine (MES), Environment (LIN), and Method (MET). The report showed that HUM accounted for the biggest mistake of about 21 cases, followed by FAS which has 12 cases, 15 cases of MES, LIN with 11 cases, and MET has 9 cases out of 68 cases.

The objectives of this research can be arranged consistently to answer the formulation of research problems, that are 1) to know the perception of participant preparation that influences transfer motivation in training transfer, 2) to know the perception of colleagues supports that influence transfer motivation in training transfer 3) to know the perception of superiors' supports that influence transfer motivation in training retention.

METHODS OF RESEARCH

This research is a causal research conducted to detect causal relationships in order to know the relationship between two or more variables. Sugiono (2012) stated that with causal research, a theory that functions to explain, to predict, and to control an event can be built. This research is also qualitative with deductive modeling. To illustrate the details of the procedure that will be used in the implementation of this research, a research framework is

needed to elaborate the information required by a research framework to describe the information needed in solving the research problems.

The research method used in this research is conclusive research design in which this research is a type of research that aims to test the hypothesis associated with various variables. The research process with conclusive research is very formal and structured; the sample used is ordinarily many and is quantitative (Malhotra, 2010). The type of conclusive research used in this research is causal research. Causal research is a research that aims to determine the relationship of a causal cause of something. This research aims to prove the relationship of influencing and being influenced of the variables studied (Malhotra, 2010).

The initial step of this research is pretest to test the questionnaire made to 30 respondents. Furthermore, the sample of questionnaires that have been spread are processed and if they are proven valid and reliable, then the questionnaires are distributed back to the larger respondents to obtain primary data. The researcher will spread the questionnaires to get directly the data obtained and adapted to the measuring instruments used, in this case as many as 200 respondents.

RESULTS AND DISCUSSION

Structural Model Analysis. It is a model that describes the data structures used in business processes, as long as the structural model analysis presents the logic of the data without showing how data is stored, created, or manipulated so that the analyst can focus on the business.

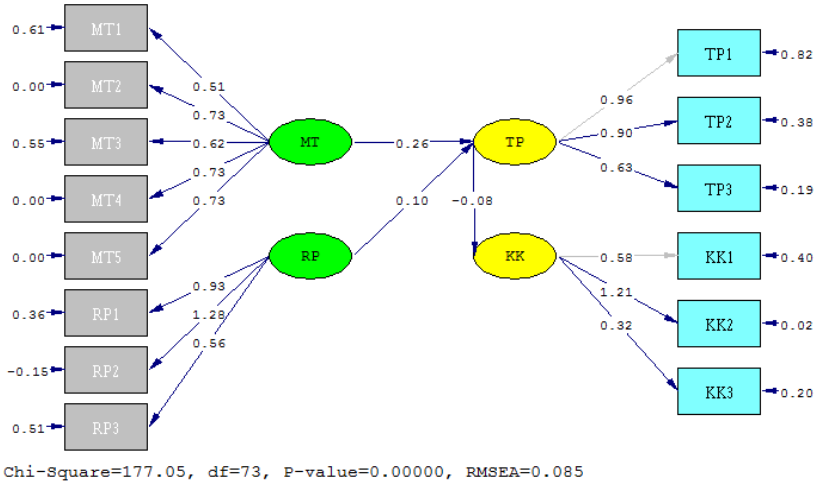


Figure 1 – Structural Equation Model – *Estimation*

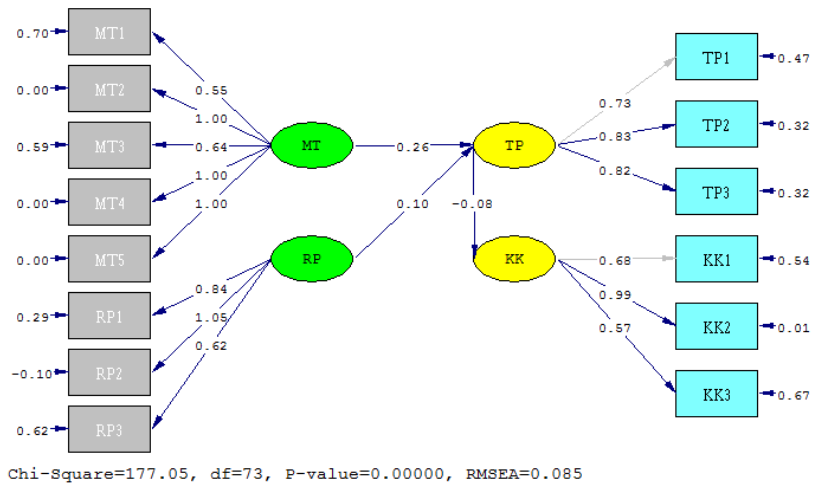


Figure 2 – Structural Equation Model - *Standardized Solution*

Structural model presents something, concept ideas that exist in the problem domain, and presents relationships that occur. The structural model is a model of the relationship structure that forms or explains causality between factors. In this research, structural model testing is conducted to find out the relationship between transfer motivation (MT), training retention (RP) on employee performance (KK) through training transfer (TP). A hypothesis can be accepted or declared significant if the value of t ≥ 1,96. The following is the result of causality calculation from each research variables.

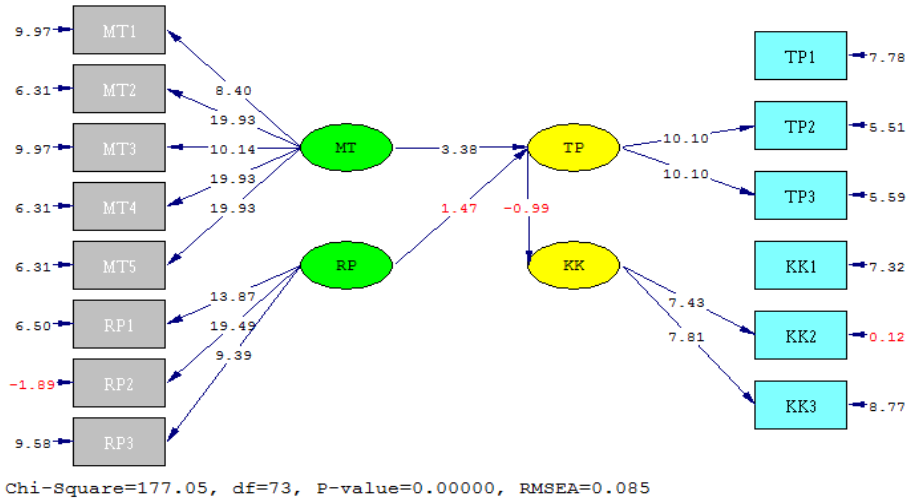


Figure 3 – Structural Equation Model - *t Value*

Furthermore, from the figures, the researcher can tabulate the data as result of research hypothesis which are as follows:

Table 1 – Result of Research Hypothesis

Variable Relationship	Estimates	Loading Factor	t Value (> 1,96)	Conclusion
MT - TP	0,26	0,26	3,38	Significant
RP - TP	0,10	0,10	1,47	Not significant
TP - KK	-0,08	-0,08	-0,99	Not significant

Based on the structural equation model, the t-value of each relationship between latent variables RP - TP and TP - KK are not significant, while MT - TP has value above 1,97 meaning that it is significant. Afterwards, *goodness of fit* test is conducted to assess whether the data collected fit and match the model. There are three types of measures to test whether the SEM model as a whole fits into fit good data. Sizes and values are outlined in the following table:

Table 2 – Structural Model Match Testing (*Goodness of Fit)*

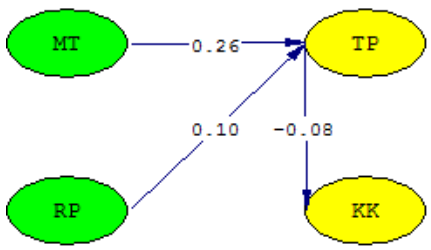
Size	Description	Value	Conclusion
Absolute Fit Measures			
Chi squared	≥ 0,05 fit model	177,05	Good Fit
Goodness of Fit Index (GFI)	≥ 0,90 fit model, 0,80 ≤ GFI ≤ 0,90 model marginal fit	0,89	Marginal Fit
Adjusted goodness of fit index (AGFI)	≥ 0,90 fit model, 0,80 ≤ AGFI ≤ 0,90 model marginal fit	0,84	Marginal Fit
Root Mean Square Residual (RMR)	Difference between model estimates covariance matrix, ≥ 0,05 fit model	0,06	Good Fit
Standardized RMR	≥ 0,05 fit model; 0,05 ≤ SRMR ≤ 0,1 acceptable fit; SRMS> 0,1 poor fit	0,06	Good Fit
Root mean square error of approximation (RMSEA)	≤ 0.05 model of good fit; 0.05 ≤ RMSEA ≤ 0.08 model is quite good	1,08	Fit
Expected Cross Validation Index (ECVI)	The value is close to 1 good fit model	1,21	Good Fit

Table 3 – Structural Model Match Testing (*Goodness of Fit)*

Size	Description	Value	Conclusion
Incremental Fit Measures			
Normed fir Index (NFI)	≥ 0,90 model of good fit	0,90	Good Fit
Non-normed fit index (NNFI)	≥ 0,90 model of good fit	0,92	Good Fit
Relative fit Index (RFI)	≥ 0,90 model of good fit	0,88	Marginal Fit
Incremental fit Index (IFI)	≥ 0,90 model of good fit	0,94	Good Fit
Comparative fit Index (CFI)	≥ 0,90 model of good fit	0,94	Good Fit
Parsimony Fit Measures			
Akaike information criterion (AIC)	AIC value <model good fit	241,05	Good Fit
Consistent goodness of fit index (CAIC)	AIC value <model good fit	378,60	Good Fit
Parsimony goodness of fit index (PGFI)	The value of PGFI> models and ranges from 0 to 1	0,62	Good Fit
Parsimony normed fit index (PNFI)	The value of PNFI> model and ranges from 0 to 1	0,72	Good Fit

From the description of structural model match testing above, it can be concluded that the whole model can be said good or *good fit.*

Analysis of Causal Relationships. The problem of causality is actually a matter of probability. For instance, how much the probability of decreasing a person's depression after failure in applying training results at work? However, in a developing country like Indonesia, the problem of causality is rarely linked to probability. “Does X affect Y” can be seen from statistical inference and rarely involves causal inference. Analysis of causal relationships is used to determine the causal relationship of each variable, and it can be seen as follows:



Chi-Square=177.05, df=73, P-value=0.00000, RMSEA=0.085

Figure 4 – Path of Causal Relation - t Value

As for the result of calculation of structural equations and reduced form equations, the output of *lisrer 8.7* program which is formed automatically at program output can be seen as follows:

Structural Equations:

$$TP = 0.26*MT + 0.10*RP, \text{ Errorvar.} = 0.92 , R^2 = 0.084$$
$$KK = - 0.077*TP, \text{ Errorvar.} = 0.99 , R^2 = 0.0059$$

Reduced Form Equations

$$TP = 0.26*MT + 0.10*RP, \text{ Errorvar.} = 0.92, R^2 = 0.084$$
$$KK = - 0.020*MT - 0.0079*RP, \text{ Errorvar.} = 1.00, R^2 = 0.00050$$

Based on the estimation of research model causal relationships above, the analysis of causal relationship can be done. First, values of t-*value* and coefficients of structural equations are summarized in the following table:

Table 4 – Values of t value and Coefficient of Structural Equation

No.	*Path*	*t Value* (t ≥1,96)	Conclusion
1	MT - TP	3,38	Significant
2	RP - TP	1,47	Not significant
3	TP - KK	-0,99	Not significant

Based on the above table, it can be identified that the coefficient of MT - TP has the absolute t value ≥ 1.96 which means significant, while the coefficients of RP - TP and TP - KK have values of 1.47 and -0.99 below the standard value (≤ 1.96) which mean not significant.

Hypothesis Testing. In this study, there are three hypotheses. Hypothesis testing is done with a significance level of 5 % resulting in a critical t value. The hypothesis is accepted if the value of t is greater or equal to 1,96 and the hypothesis is rejected if the value of t is smaller or equal to 1,96. Based on the value of t, hypotheses are tested to see whether the proposed model is supported by the data attached in the following table:

Table 5 – Values of t value and Coefficients of Structural Equation

Hypothesis	Path	t Value (t ≥1,96)	Conclusion
H1	High transfer motivation can improve training transfer	3,38	The data supports the hypothesis
H2	High training retention can improve training transfer	1,47	The data rejects the hypothesis
H3	High training transfer can improve employee performance	-0,99	The data rejects the hypothesis

DISCUSSION OF RESULTS

Motivation Transfer Influences Training Transfer. Based on the result of the table test, it shows that the analysis results support the hypothesis H1. The calculation result is known that the motivation of transfer has a positive relation to training transfer, with t value equal to 3,38 bigger than standard value that is 1,96 (3,38>1,96). The results of this study support the first hypothesis meaning that H1 is accepted, specifically there is a positive relationship between transfer motivation and training transfer. High transfer motivation can improve training transfer. The results of the analysis indicate that the motivation of transfer consisting of self-preparedness, superiors support, peer support, extrinsic supporting aids in the form of rewards, intrinsic supporting aids in the form of praise on employees affect the transfer of training.

According to Awais Bhatti et al, (2010) the role of readiness of trainees in the training transfer process is based on basic skills to perform different activities during training and basic knowledge of different tasks and needs to be implemented during the training. If the trainee has basic skills, then training activities will be better done. It means that basic skills allow employees to be ready to perform with different training tasks. Peer support is measured by appreciating new skills applied by participants and expectations of the effect of applying these new skills and finding a positive relationship of peer support to transfer of training through transfer motivation (Seyler, 1998). Based on Goldstein and Ford (2002), superior support in the area of training effectiveness is essential in which it functions as a controller for optimizing the use of knowledge and attitudes gained in training (Nijmat, *et al.,* 2006). Supporting aids in the form of intrinsic rewards and extrinsic rewards positively influence the transfer motivation (Tharenou, 2001) where employees do not transfer the skills they learn if they feel this effort does not have impact on their career or remuneration.

The relation with this research is that dimension of the transfer motivation has positive value meaning that the motivation of transfer in PT. Gandum Mas Kencana from participants' readiness factors, peer support, superiors support and supporting aids in the form of intrinsic rewards and extrinsic rewards support training transfers. Furthermore, the positive effect of

transfer motivation on overall training transfers shows that the planned training to employees, especially the production operators on the regular training materials that have been set cost and schedule to each participant goes according to plan. Preparedness and training as important things to be done with high awareness make the training goes according to plan and fulfills the purpose of the training. Physical conditions such as good vision of the participants, the lighting of the training room and the room setting support to run the training, as well as the participants' sense of speech, to express opinions on things that are not understood. In addition, the opportunity to ask is always given by the trainer at any time with a customized pattern; there is an interactive part where the participants immediately ask when there are things that are not understood and can also provide a special session for the question at the end of each material. Distributed long-distance schedules to participants have a positive impact on where they prepare for the exam both before the training and after the training and this also gives participants confidence to challenge the test results with their own ability. The material given after the training to the participants is also a positive thing in which employees re-read the material when they apply it in the workplace. Training for employees at PT. Gandum Mas Kencana not only becomes a regular agenda, but also it is expected by employees to improve their competence in knowledge, skills, and attitudes that must be aligned with the demands of the organization.

Training Retention does not Influence Training Transfer. Based on the results of data analysis, the results of this study reject the second hypothesis which means that H2 is rejected. From the data that has been analyzed by the researcher, the calculation results are known that training retention has a value below the standard t value which is smaller than the standard t value. The value obtained in this study amounted to 1,47 which is smaller than the default value of 1,96. It indicates that training retention in PT. Gandum Mas Kencana does not have significant influence on the training transfer process.

According to Velada, *et al.,* (2007) the concept of training retention is similar to cognitive abilities and explains the extent to which trainees retain content/material after the training is completed. Training retention is an important factor in undertaking training transfer in which the more trainees understand the content/materials; the more helpful they are for companies to improve employee knowledge and skills without having to repeat the same thing. It can hamper the provision of new training materials for employees and wastage of costs occurs. On the other hand, it can also create a cadre of trainers who can lower this knowledge around them. It becomes something that is very profitable for the organization if it can run.

The results reject the hypothesis mean that there is a weakness of the employees on the retention of training in the form of remembering the training materials that have been executed, can easily answer questions about the content of material that has been studied and the material studied should be repeated in the same year because the test after the training has a value below the standard (exam score <70) or failing to pass the training exam on the material at PT.Gandum Mas Kencana, as it relates to company policy that is less concerned with this. The absence of punishment or reward for participants who do not enforce predetermined rules against training retention is there as well.

One of the important things to see employees' success in training retention in remembering the material that has been given is to randomly ask the employees about the material content theoretically and they are able to answer it well, as Indonesian citizens who are asked to mention one of the principles of *Pancasila*, because we have studied from elementary school and it continues to be repeated, then automatically if the question arises about this matter, a responsive response is directly given. That is the measure of an employee's success towards the mastery of material that has been given. Employees who have received training are expected to easily answer what they have learned, especially in informal situations where the material has become very inspiring to them, let alone this material is repeated every year as compulsory materials of ISO 9001: 2008 on management quality and ISO 22000: 2005 *food safety.*

Training Transfer does not Influence Employee Performance. Based on the results of the analysis test in Table 5-54, it is described that the third hypothesis or H3 is also rejected.

High training transfer cannot improve employee performance. Based on data that have been analyzed by the researcher, the result of the calculation can be known that the training transfer has a significant positive relation on employee performance, with the value of t = -0,99 smaller than the standard t value of 1,96. It explains that strong training transfers do not influence employee performance, as employee performance measurement focuses more on concrete matters such as sales and production capacity. The trainings are provided only as an obligation to meet internal or external audit standards or requirements. When an employee conducts training transfer in his workplace, the employee feels unlikely to have the opportunity to demonstrate the abilities and skills he has acquired during training with good preparedness, open colleagues support, superior support, and intrinsic and extrinsic supporting aids.

Superiors are satisfied with the performance shown by their subordinates to increase productivity, but it has not been an annual assessment or as KPI where individually they apply the abilities and skills provided in practice, when the spread of training participants to the material is evenly distributed and every employee runs it in the workplace automatically produces increased work productivity, if translated in HACCP and GMP material results, employee errors decline due to knowing the procedures established by the system in handling production to obtain a good product.

The quality of work provided also increases where the application that occurs directly corrects wrong patterns of evaluation of the application by employees at the workplace. This report becomes a datum that should be considered by superiors to take steps to improve the production process in order to create good and standardized products that have been determined. Implementation performed by each employee is sometimes able to exceed the capacity expected by superiors and company. The details of the untouched and the big impact make the employee able to contribute above his or her task and exceed expectations. It is very good for the company in increasing the sales profit in which indirectly the things that cannot be drawn can be found by employees at the time of implementation of training results in the workplace.

Employees who have experienced training and applied the training to their workplaces can also complete the work in a timely manner as they are happy to work from the results of implementing their own training. It is positive for organizations where they have the drive to get the job done and continue to apply good training results for the company's business development with super-quality products. Implementation of training results also increase employee cooperation because to perform successful implementation, they must cooperate with each other since the production line is the part that constitutes a unity called production system. Implementation without cooperation from employees will not be seen if done partially. Precisely, it is a major problem when this application is implemented in part because it will not reach the maximum point in its implementation and it can damage the existing system. Cooperation is needed to establish new methods of applying training results. If the results of one material are thoroughly implemented, the result will increase work productivity and will automatically improve employee performance. Employee performance refers to the ability of employees in performing the overall tasks that become their responsibility. The performance of employees will increase if they actively involve, participate, and become the parts of the team in the process of the activities of the organizational unit where they work.

Managerial Implications. The programs that will be run are adjusted to the results of the research in which the motivation of transfer influences the transfer of training, but the retention of training does not have influence on training transfer and training transfer does not have influence on employee performance. The researcher will describe the managerial implications that have only influence which motivation transfer to training transfer. Transfer motivation supported by participants' readiness, peer support, superior support and supporting aids in the form of intrinsic rewards and extrinsic rewards have an influence on training transfer that defines the extent to which employees apply the results of their workplace training and have a positive influence on employee performance at PT. Gandum Mas Kencana. The superior can support the participants/subordinates after the training by

providing literature to solve problems faced by the participants in terms of applying the skills learned in the workplace. In addition, the superior may discuss different methods of applying the skills learned at the workplace and set goals to encourage employees to use training on the job. Finally, this study argues that if the superior plays his role effectively, the transfer of training can be increased again and continuously according to how much the role played by the superior to achieve the company's goals related to the implementation of the training results provided.

Referring to the support of colleagues in the training transfer process, this study suggests that colleagues may also play their role to maximize training transfer. Colleagues should encourage participants to participate in training activities and assist trainees to apply workplace learning skills in order to improve performance and to achieve organizational tasks. In addition, colleagues should give appreciation, when they use training on their work, rewards and encouragement motivate participants to use training on the job. Finally, colleagues expectations of the trainees also play an important role in training transfer. The expectations of colleagues in terms of using job training also motivate participants to apply the skills learned in the workplace.

Another important consideration for corporate trainers is that employees should be ready to participate in training activities. The findings of this study suggest that prior to starting the training program, it should be made sure that the trainee has the basic skills and knowledge to participate in the training activities. It is because knowledge and skills about training activities motivate participants to take parts in training activities for the transfer of skills learned in the workplace. For example, if employees will learn about a good food handling system, it is important for employees to have HACCP and GMP knowledge and skills to operate the machine as well as the meaning of the system symbols. If employees lack knowledge of HACCP and GMP, it will be difficult for employees to actively participate in training activities and maximize learning. In conclusion, superiors and trainers should provide basic skills to employees who help them to demonstrate training tasks and actively participate in training activities. Therefore, learning is better during training because it will motivate the trainees to transfer training on the job.

Human resource development and trainers should explain practically to participants with the model and characteristics of trainees, as it concerns how they can apply the skills learned in the workplace and increase the success rate of trainees leading to training transfers. Therefore, the trainer should provide more practical examples during the training sessions by helping the trainees understand how the training is closely related to their work. Therefore, using real-life examples and day-to-day work can build participants' confidence and motivate them to transfer training to the job. In addition, top management, coaches, and superiors should appreciate, encourage, and motivate participants to take parts in training activities.

The factors that need to be considered to improve the transfer of training is how much improvement preparation should be done by employees in training, the extent of involvement of colleagues in implementing the training that has been run, how much support of superiors to provide space and employee freedom in applying training that has been accepted in the workplace, and how important rewards for employees who want to apply workplace training. The following part describes the influence of transfer motivation on training transfer.

CONCLUSION

Based on the results of the research analysis, the discussion and the description in the previous chapters, the conclusions are obtained: 1) the transfer motivation has a positive influence on the training transfer, where strong self-motivation, support from superiors and colleagues can increase the activity of training transfer in the workplace. It has an influence on improving employee performance, 2) training retention in the form of reward for intrinsic reward in the form of praise, reward; and extrinsic reward in the form of material or money, career as a reward do not positively influence the employee's performance in implementing the results of the training they have obtained as one of the ways to improve the ability to

achieve the rewards/incentives provided by the organization. In this research, the influence given is weak so if in their transfer motivation is high, then it must be conducted repeatedly to maintain the given materials. It means that employees at PT. Gandum Mas Kencana has the drive to do the training to apply the training results, but it is less concerned if asked to maintain the training by remembering the material theoretically. It is clear that employees prefer practicing directly in the field to textbook theory, 3) training transfer has a positive influence on employees and organizations in which employees contribute by applying training provided to them to improve employee performance.

REFERENCES

1. Awais Bhatti, M. (2013) Transfer of training: does it truly happen? An examination of support, instrumentality, retention and learner readiness on the transfer motivation and transfer of training. European Journal of Training and Development, 37(3), 273-297.
2. Baldwin, T. T., & Ford, J. K. (1988). Transfer of training: A review and directions for future research. Personnel Psychology, 41: 63-105.
3. Colquitt J. (2000). Toward an integrative theory of training motivation: A meta-analytic path analysis of 20 years of research. Journal of Applied Psychology, Vol. 85(5), Oct 2000, 678-707.
4. Crider, Andrew B, (2003).Psychology. Scott, Foresman & Company.
5. Malhotra. (2010). Marketing Research: An Applied Orientation Sixth Edition Pearson Education.
6. Smith, Jentsch KA., Salas, E, & Brannick, MT. (2001). To transfer or not to transfer? Investigating the combined effects of trainee characteristics, team leader support, and team climate. J Appl Psychol, 86(2):279-92.
7. Sugiyono. 2012. Metode Penelitian Kuantitatif Kualitatif dan R&D. Bandung: Alfabeta.
8. Sulistyohadi T, (2002), Beberapa Isu Penting Dalam Program Pelatihan Dan Pengembangan Sumber Daya Manusia, Majalah Manajemen & Usahawan Indonesia, Lembaga Manajemen FE -UI,No. 05 TH), pp. 11-14.
9. Tziner, A. and Haccoun, R.R. (1991) Personal and Situational Characteristics Influencing the Effectiveness of Transfer of Training Improvement. Journal of Occupational Psychology, Vol. 64: pp. 167-177.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-010.22

THE IMPACT OF JOB PERFORMANCE AND REWARD SYSTEM AS A MEDIATOR AND MODERATOR VARIABLE BETWEEN ORGANIZATIONAL COMMITMENT AND JOB SATISFACTION OF LECTURERS AT PRIVATE COLLEGES IN EAST JAVA, INDONESIA

Fathorrahman
Management Program, STIE ASIA, Malang, Indonesia
E-mail: faturrahman.asia.74@gmail.com

ABSTRACT
The quality of a college is determined by many components, one of which is lecturers. Lecturers at colleges play a strategic role in improving college's quality. There are opinions stating that the quality of an education can be improved by first improving the lecturers' quality. Lecturers' job satisfaction and job performance become important topics to review in order to improve the lecturers' quality. This is a causality research which uses stratified random sampling method with 105 lecturers as the sample, and 95 respondents who submit the questionnaires in a complete manner. The results of hypotheses testing from this research are as follows: (1) Organizational commitment has a positive impact on lecturers' job performance; (2) Job performance has a positive impact on lecturers' job satisfaction; (3) Organizational commitment has a positive impact on lecturers' job satisfaction; (4) Job performance mediates the correlation between organizational commitment and lecturers' job satisfactionl; and (5) Reward system moderates the correlation between lecturers' job performance and job satisfaction.

KEY WORDS
Organizational commitment, job satisfaction, job performance, reward system.

Globalization connects people in many aspects of life, such as politics, technology, socioculture, and economics (Giddens, 2001:5). The globalization progresses rapidly thanks to inventions in technology, communication and information. It even changes the world economic order and characteristics of business environment. It also begins to affect many life aspects, not excluding the field of education, and within it, the higher education. The society, as a result of the globalization, demands a better quality in higher education. This is only natural and has to be solved immediately. This means the learning process in colleges/higher education institutes should be highly qualified; it should meet the assigned standard of quality. A college's existency and challenges depend on its stakeholders' assessment of the college's quality.

The quality of a college is determined by many components, for example the quality of academic programs (college inputs, learning process, and college outputs/graduates), the human resource, the facilities and infrastructures, and the academic environment. Among the others, the human resource component, namely the lecturers, becomes significant in order to raise a college's quality.

Lecturers at colleges play a strategic role in academic and student development. There are opinions stating that the good quality of an education can be attained by first improving the lecturers' quality. Such opinion stems from the fact that lecturers become the agent of science and knowledge transformations towards the students; hence it is expected that the higher quality of a lecturer, the higher quality of students and graduates. What can be found in previous discovery is that "the man behind the system" plays significant role in education. Human resource is the key factor in determining the power of education. Moreover, education as a service industry is a "*front line provider and determine the quality of service delivery system*", which places lecturers in the front line in deciding the quality of service (Sallis, 2002:35).

THEORETICAL REVIEW AND HYPOTHESES

Organizational commitment is the individual's attachment to the organization in which he/she works. There are three components of organizational commitment, namely affective commitment, continuance commitment, and normative commitment (Allen & Meyer, 1990; Meyer & Allen, 1997). Affective commitment deals with emotional attachment, identification, and involvement of employees within an organization. Continuance commitment deals with benefit considerations if some employees leave the organization. Lastly, normative commitment deals with the employees' sense of obligation to their organization.

It is related to the employees' job performance, that is, if employees are highly committed, they will be able to improve the organization's job performance. This is in accordance with the study conducted by DeCotiis and Summers (1987), which states that organizational commitment is a strong predictor against the employees' performance, and also Jaramillo *et al*., (2005) which states that between organizational commitment and performance there is a positive correlation towards sales and non sales employees. Still in parralel with the previous ideas, there are also studies by Chen and Francesco (2003), and Sudiro (2008). On the other hand, Yiing and Zaman (2009), shows an opposite result where commitment does not affect employees' job performance. Meanwhile Wiener and Vardi (1980) conclude that organizational commitment has an unclear relationship towards job performance. From the aforementioned study results, the writer develops the first hypothesis:

H1: Organizational commitment has a positive impact towards lecturers' job performance.

Study about the relationship of job satisfaction and performance becomes one of the most significant studies in industrial-organizational psychology. The interest towards the relationship between workplace behavior and productivity exists since the period of Hawthorne studies (Roethlisberger & Dickson, 1939); and this topic continues to be researched until now, either quantitatively (Brayfield dan Crockett, 1955; Herzberg *et al.*, 1957; Locke, 1970; Schwab & Cummings, 1970) or quantitatively (Laffaldano & Muchincky, 1985; Petty *et al.*, 1984). However, Hawthorne studies are commonly preferential because they highlight the relationship between employees' behavior and job performance, and attract many researchers to investigate the relationshipAfter the Hawthrone studies, the most influential narrative review on the correlation between job satisfaction and performance is the one published by Brayfield and Crockett (1955). They conclude that between job satisfaction and job performance exists "minimal or no relationship".

Following Brayfield and Crockett (1955), several narrative reviews were published (Herzberg *et al.,* 1957; Locke, 1970; Schwab & Cummings, 1970; Vroom, 1964). But, these reviews are greatly different than the previous one: they express things concerning the correlation between job satisfaction and performance in an optimistic tone. Another research by Orpen (1986) observes employees in an electronic factory, and concludes that there is an insignificant correlation between job satisfaction and performance. Chen (2004) researched groups of employees in SME's (small and medium-sized enterprises) engaging in service as well as manufacture sectors, and found out there is no significant relationship between job satisfaction and employees' performance. A study on employees of wood manufacture also points out that the relationship between job satisfaction and performance is not significant (Michael *et al*., 2005; Gagnon and Michael, 2004). Other researches that results in a similar conclusion are those conducted by Joyce and Slocum (1984) dan Joyce *et al.* (1982).

It is evident from the previous researches that a controversy about the relationship between job satisfaction and job performance exists and becomes an interesting topic. Some opinions state that job satisfaction does have its impact on job performance, yet some others have the opposite opinion: it is the job performance that affects the job satisfaction (Judge *et al.,* 2001). From the research results stated above, the writer develops the second hypothesis:

H2: Job performance has a positive impact on lecturers' job satisfaction.

The controversy between job satisfaction and job performance, according to Judge *et al.*, enables developing a new research model by adding a moderator or mediator variable

between work performance and satisfaction variables. Hence, in this research, the writer adds reward system as a variable that moderates the correlation between work performance and satisfaction variables. The writer tries to review and modify the research results of Porter and Lawler (1971) which was developed from Vroom's expectancy theory. The latter states that job satisfaction and performance are closely related although they can be resulted from different causes. Vroom assumes that reward system creates job satisfaction and in some cases job performance generates reward. Porter and Lawler in their research draws a conclusion that reward system, both extrinsically and intrinsically, moderates the correlation between job performance and satisfaction. This means when an employee feels that the reward he/she received does not match his/her job performance, then the job satisfaction will be weak.

In this research, modification of Porter and Lawler's concept is done by the writer's adding organizational commitment variable, which could also affect someone's job satisfaction. A commitment is understood as an employee's will to stay working for the organization (Meyer, 1997). Thus, an employee who has a strong organizational commitment towards his/her organization would feel a greater job satisfaction. In opposite, an employee without organizational commitment would find the job less satisfactory.

Lee and Mowday (1987) mentions that job satisfaction and organizational commitment are related. The organizational commitment has a reciprocal impact on job satisfaction. It means that if an employee finds a job satisfactory, then he/she will have a strong commitment towards the organization. Reciprocally, an employee with a strong commitment towards his/her organization will feel a greater satisfaction from his/her job (Sudiro, 2008); Westover *et al.*, (2010).

Researches done by Gunz dan Gunz (1994), Knoop (1995) serta Young *et al*.(1998) discovers the existence of correlation between job satisfaction and organizational commitment. This result is similar to some other studies: a research conducted by Martin & O'Loughlin (1984), which shows that job satisfaction in a battalion of US Army consistently impacts the enhancement of organizational commitment; a research by Carmeli *et al.* (1984), which finds out that job satisfaction has impact on job commitment and achievements; another one by Westover, *et al*. (2010) which observes 215 employees of a social organization in US as its sample and concludes that oganizational commitment has a significant impact on job satisfaction. On the other hand, Yiing and Zaman (2009) presents an opposite result, that is: organizational commitment have a significant negative impact towards job satisfaction. Based on the controversy of the research results above, the writer develops the third, fourth, and fifth hypothesis as follows:

H3: Organizational commitment has positive impact on lecturers' job satisfaction.

H4: Job performance as a mediator variable in determining the impact of organizational commitment on the lecturers' job satisfaction.

H5: Reward system as a moderator variable in determining the impact of organizational commitment on the lecturers' job satisfaction.

METHODS OF RESEARCH

This is a causality research. The sample is a part from the whole population of lecturers working at A-graded private colleges in East Java (the grades are given by the National Accreditation Board for Higher Education/BAN-PT), which is comprised of 10 private colleges in Surabaya and Malang. This research uses stratified random sampling method with 105 people as the sample. The data are acquired from the distribution of questionnaires. From 200 questionnaires that were distributed, 95 were returned in a complete manner. Validity and reliability test have proved all the items in this research variables as valid and reliable. The valid-and-reliable data were then tested using *Generalized Structured Component Analysis* (GeSCA).

RESULTS OF STUDY

GeSCA Structural Model Test Result. This research uses GeSCA model; reward system becomes a moderator variable between lecturer's job performance and job satisfaction, and there is also a mediator variable between the correlation of commitment to job satisfaction. The correlation between indicators and latent variables is completely reflexive. Here are table 4.1 and figure 4.1 containing GeSCA calculations with mediation and moderation.

Table 1. GeSCA Structural Model Result

Variable Correlation	Direct impact			Indirect impact	Information on mediation and moderation attribute
	Estimate	SE	CR	Estimate	
COMMITMENT (X1) -> PERFORMANCE (Y1)	0.191	0.066	2.06*	-	-
PERFORMANCE (Y1) -> SATISFACTION (Y2)	0.433	0.075	5.74*	-	-
COMMITMENT (X1) -> SATISFACTION (Y2)	0.217	0.065	3.31*	0.299	Full Mediation
REWARD SYSTEM (Z) -> SATISFACTION (Y2)	0.024	0.094	0.26	-	-
INTERACTION Z*Y1-> SATISFACTION (Y2)	0.274	0.065	4.24*	-	Pure Moderation

CR = significant at α=0.05 level.*

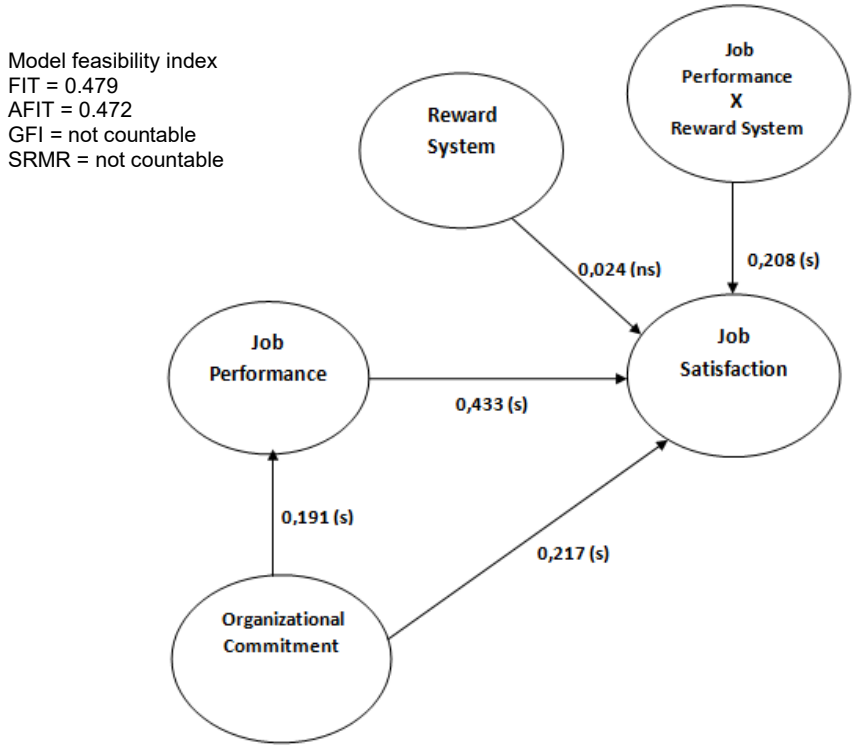


Figure 1 – GeSCA Modelling with Moderation

According to Table 1 above, the path coefficient 0.191 (CR=2.06) representing correlation between organizational commitment and lecturers' job performance is significant. path coefficient 0.217 (CR=3.31) representing the correlation between organizational commitment and lecturers' job satisfaction is significant. The path coefficient 0.433 (CR=5.74) representing the correlation between job performance and lecturers' job satisfaction is significant. The path coefficient 0.024 (CR=0.26) representing the correlation between reward system and lecturers' job satisfaction is not significant. Meanwhile, the path coefficient 0.208 (CR=4.10) representing the correlation between the interaction of job performance & reward system and lecturers' job satisfaction is significant. The last two coefficient test results prove that reward system is attributed as pure moderation.

Hypotheses Testing. There are five hypotheses in this research: three hypotheses concerning direct impact, one concerning mediated impact, and the last one concerning moderated impact. Here are the results on the three hypotheses.

H1: Organizational commitment has a positive impact towards lecturers' job performance.

The path coefficient 0.191 (CR=2.06) representing correlation between organizational commitment and lecturers' job performance is significant with positive direction. The lecturers' job performance will improve if they have stronger organizational commitment, which means hypohtesis H1 in this research is acceptable.

H2: Job performance has a positive impact on lecturers' job satisfaction.

The path coefficient 0.433 (CR=5.74) representing the correlation between job performance and lecturers' job satisfaction is significant with positive direction. Lecturers with good job performance will find a greater satisfaction from his/her job, which means hypothesis H2 in this research is acceptable.

H3: Organizational commitment has positive impact on lecturers' job satisfaction.

The path coefficient 0.217 (CR=3.31) representing the correlation between organizational commitment and lecturers' job satisfaction is significant with positive direction. Lecturers who have stronger organizational commitment will gain more satisfaction from his/her job, which means hypothesis H3 in this research is acceptable.

H4: Job performance as a mediator variable in determining the impact of organizational commitment on the lecturers' job satisfaction.

The path coefficient 0,299 representing the indirect correlation of organizational commitment towards lecturers' job satisfaction through lecturers' job performance is significant with positive direction. The test result explains that job performance acts as a full mediation between the lecturers' organizational commitment and job satisfaction. Lecturers who have stronger organizational commitment which are mediated by a good job performance will gain greater job satisfaction, which makes hypothesis H4 in this research acceptable.

H5: Reward system as a moderator variable in determining the impact of organizational commitment on the lecturers' job satisfaction.

The path coefficient 0.433 (CR=5.74) representing the correlation between job performance and lecturers' job satisfaction is significant with positive direction. The path coefficient 0.024 (CR=0.26) representing the correlation between reward system and lecturers' job satisfaction is not significant. The path coefficient 0.208 (CR=4.10) representing the correlation between the the interaction of job performance & reward system and lecturers' job satisfaction is significant with positive direction. The test result explains that reward system acts as a pure moderation between the lecturers' job performance and satisfaction.

The job satisfaction will be greater in lecturers who has good job performance and whose workplace/college gives a suitable reward system; this means hypothesis H5 in this research is acceptable.

DISCUSSION OF RESULTS

Based on the hypotheses testing above, the writer could map the correlations between variables as follows.

The Impact Of Organizational Commitment Towards Job Performance (X1→Y1). From the test result of the first hypothesis, path coefficient 0.191 (CR=2.06) representing correlation between organizational commitment and lecturers' job performance is significant with positive direction. This means that the first hypothesis, stating that organizational commitment has a positive impact towards lecturers' job performance, is verified/acceptable. The path coefficient has a postitive mark, which theoretically means that impact of organizational commitment towards job performance is a one way correlation. This indicates that lecturers who have stronger organizational commitment will also have better job performance. Whereas the lecturers who have a weaker organizational commitment may experience a decline in their job performance.

Normative commitment ($X_{.1.2}$) with *loading factor* of 0.835 and continuance commitment ($X_{.1.3}$) with *loading factor* of 0.803 become important indicators in reflecting the organizational commitment towards the job performance of lecturers working in *tri dharma* supporting department (education, research & development, community service) ($Y_{.1.4}$) variable, with *loading factor* of 0,811 dan towards the job performance of lecturers working in teaching department ($Y_{.1.1}$) with *loading factor* of 0,778. It could be interpreted that a lecturer's commitment is reflected in his/her strength of will to stay working in the organization and in the strong feeling that he/she would suffer a loss should he/she quit from the organization.

This research result corresponds with Darwito (2008), Burton (2002), Jaramillo, *et al.* (2005), and Sudiro (2008), whose research results show that organizational commitment has a positive impact towards the employees' job performance. However, it differs with Wiener and Vardi (1980); Mathieu and Zajac's (1990); and Yiing and Zaman (2009), whose research results state that organizational commitment does not give a direct impact on job performance.

The Impact of Job Performance Towards Job Satisfaction (Y1→Y2). From the test result of the second hypothesis, path coefficient jalur 0.433 (CR=5.74) representing correlation between job performance and lecturers' job satisfaction is significant with positive direction. This means that the second hypothesis, stating that job performance has a positive impact towards lecturers' job satisfaction is verified/acceptable. The path coefficient has a postitive mark, which theoretically means that impact of job performance towards lecturers' job satisfaction is a one way correlation. This indicates that lecturers who have better job performance will also experience greater job satisfaction. Whereas the lecturers who have a poorer job performance may experience a lack of job satisfaction.

The indicator of work performance of lecturers who work in tri dharma supporting department ($Y_{.1.4}$) has a *loading factor* of 0.811 meanwhile that of lecturers in teaching department ($Y_{.1.1}$) has a *loading factor* of 0.778. These become dominant indicators in reflecting the following variables: job performance toward lecturers' job satisfaction about supervision ($Y_{.2.3}$) with *loading factor* of 0.856; and lecturers' job satisfaction towards co-workers ($Y_{.2.5}$) with *loading factor* of 0.838. It could be interpreted that a lecturer's job performance is reflected in his/her efforts, be it doing better in tri dharma or teaching the students in a better way.

This research result corresponds with Lawler and porter (1967); Siegel and Bowen (1971); Stumpf and Hartman (1984); Karatepe and Tekinkus (2006), which state that employees' job performance will impact their job satisfaction.

The Impact of Organizational Commitment Towards Job Satisfaction (X1→Y2). From the test result of the third hypothesis, the path coefficient 0.217 (CR=3.31) representing correlation between organizational commitment and lecturers' job satisfaction is significant with positive direction. This means that the third hypothesis, stating that organizational commitment has a positive impact towards lecturers' job satisfaction, is verified/acceptable. The path coefficient has a postitive mark, which theoretically means that impact of organizational commitment towards job satisfaction is a one way correlation. This indicates that lecturers who have stronger organizational commitment will also experience greater job satisfaction. Whereas the lecturers who have a weaker organizational commitment may experience a lack of satisfaction from their job.

Normative commitment ($X_{.1.2}$) with *loading factor* of 0.835 and continuance commitment ($X_{.1.3}$) with *loading factor* of 0.803 become important indicators in reflecting the following variables: job performance toward lecturers' job satisfaction about supervision ($Y_{.2.3}$) with *loading factor* of 0.856; and lecturers' job satisfaction towards co-workers ($Y_{.2.5}$) with *loading factor* of 0.838. It could be interpreted that a lecturer's commitment is reflected in his/her strength of will to stay working in the organization and in the strong feeling that he/she would suffer a loss should he/she quit from the organization.

This research result corresponds with Sudiro (2008); Westover *et al.* (2010); who state that employees with strong organizational commitment will experience a greater satisfaction from their jobs. However, it is contrary with Yiing and Zaman (2009) whose result conveys that organizational commitment has significant negative impact on job performance.

The Impact of Organizational Commitment Towards Job Satisfaction Through Job Performance) (X1→Y1→Y2). The test shows that: the organizational commitment's direct impact on job performance is significant with a positive direction, job performance's direct impact on job satisfaction is also significant with positive direction, and the organizational commitment's direct impact on job satisfaction, too, is significant with a positive direction. Therefore, path coefficient {0.217 + (0.191*0.433)} = 0.299 representing organizational commitment's indirect impact on job satisfaction through job performance is significant and positive. This means that the fourth hypothesis, stating that job performance as a mediator variable in determining the impact of organizational commitment on the lecturers' job satisfaction, is verified/acceptable.

The path coefficient has a postitive mark, which theoretically means that impact of organizational commitment towards job satisfaction is a one way correlation.

This indicates that lecturers who have stronger organizational commitment will also experience greater job satisfaction. Whereas the lecturers who have a weaker organizational commitment may experience a lack of satisfaction from their job.

This research result corresponds with the study by Bono *et al*. (2001), which state that job performance is used as a mediator variable to investigate impact of organizational commitment towards job satisfaction.

The Impact of Reward System As A Moderator Variable In Determining The Impact of Organizational Commitment On The Lecturers' Job Satisfaction (Y1 Z→Y2).* From the result of the testing of fifth hypothesis, the path coefficient 0.433 (CR=5.74) representing the impact of lecturers' job performance towards job satisfaction is significant with a positive direction. The path coefficient 0.024 (CR=0.26) representing the correlation between reward system and lecturers' job satisfaction is not significant. The path coefficient 0.208 (CR=4.10) representing the correlation between the interaction of job performance & reward system and lecturers' job satisfaction is significant with positive direction. The test result explains that reward system acts as a pure moderation to the correlation between lecturers' job performance and job satisfaction.

The path coefficient has a postitive mark, which theoretically means that the impact of the interaction job satisfaction is a one way correlation. The job satisfaction will be greater in lecturers who has good job performance and whose workplace/college provides a suitable reward system. Contrariwise, the sense of job satisfaction will decrease in lecturers who have good job performance, but the workplace/college cannot provide a suitable reward system.

The involvement in tasks ($Z_{.1.3}$) has a *loading factor* of 0.773; and significance of tasks ($Z_{.1.2}$) has a *loading factor* of 0.747. These become the dominant indicators to reflect rewars system variable, which has a loading factor of 0.773. This could be interpreted as follows: how much a reward system is desired by an lecturer/employee is reflected from the his/her involvement in tasks given by the organization/employer.

This research result corresponds with the study by Porter *and* Lawler (1971) which concludes that reward system moderates the correlation between of job performance towards job satisfaction, and also the study by Ivancevich (1979) which concludes that intrinsic reward system moderates the correlation between of job performance towards job satisfaction. It means that a lecturer's good job performance will not automatically result in a greater job satisfaction. The job satisfaction will increase for the lecturers with both good job performance and provision of suitable reward system from the organization/college.

Implications of the Research. This research result provides a practical implication that private colleges should give more attention to the lecturers' job performance and job satisfaction, because lecturers' betterment of job performance will help the college to progress, develop, and keep the organization's continuity in the increasingly tough competition. Therefore, it is important for the head of private colleges to pay attention to factors that enhance lecturers' job performance and satisfaction, such as motivation-building, lecturers' competency upgrading through continuous trainings in developing learning methods, experiment skills, national and international scientific journal skills; and also enhance the organizational commitment through implementation of policies and rules, and

creating good academic atmosphere. In addition, the suitable reward system–whether material or nonmaterial–would be very helpful to enhance the lecturers' job satisfaction. For the lecturers, nonmaterial rewards (being involved/assigned in organizational tasks) are more preferred as their means of self-actualization than material rewards.

Limitations of the Research. The research results still have limitations in these regards:

1. The research scope has not yet covered all the private-owned colleges in East Java: it is limited only to those which are accredited with an A grade.
2. During the distribution of questionnaires to the respondents, the writer had trouble in personally meeting and doing in-depth-interview with the respondents. Therefore, in some study programs, the writer distributed the questionnaires through the head of program, and does the interview with the head of the study program. This may cause respondents to have a perception bias on the questionnaires distributed.
3. This research is only temporarily valid: only during the period around when the questionnaires were distributed; so if there are changes in the lecturers' job performance and satisfaction, it cannot be accessed continuously. Hence, the results cannot be generalized as a long-term correlation between organizational commitment and job satisfaction variables.

CONCLUSION

Based on the purpose and result of the research, conclusions can be made as follows:

1. Organizational commitment has a positive impact on lecturers' job performance. The stronger organizational commitment is, the higher job performance of the lecturers can improve.
2. Job performance has a positive impact on lecturers' job satisfaction. The better job performance they have, the more job satisfaction they obtain.
3. Organizational commitment has a positive impact on lecturers' job satisfaction. The stronger organizational commitment is, the more job satisfaction the lecturers obtain.
4. Job performance mediates the correlation between organizational commitment and job satisfaction. Organizational commitment will improve job performance and furthermore the lecturers' job satisfaction.
5. Reward system moderates the correlation between lecturers' job performance and job satisfaction. The job satisfaction will be greater in lecturers who has good job performance if the college gives a suitable reward system.

REFERENCES

1. Allen, N. J., and Meyer, J.P. 1990, The measurement and antecedents of affective, continuance, and normative commitment to organization. Journal of occupational psychology, 63, 1–18.
2. Bono, J.E, Judge, T.A., Thoresen, C.J. and Patton, G.K., 2001, The job satisfaction-job performance relationship: a qualitative and quantitative review. Psycological Bulletin, Vol. 127 No. 3, pp. 376-407
3. Burton, E., Gene, 2002, Jepang vs Amerika Serikat: Sebuah Perbandingan Lingkungan Perusahaan dan Karakteristik, Manusia Manajemen Sistem, 8 (2), 167-173.
4. Brayfield, A.H. and Crockett, W.H. 1955. Employee attitudes and employee performance. Psycological Bulletin, 52, 396-424.
5. Carmeli, A. and Freund, A. 2004." Work commitment, job satisfaction and job performance: An empirical investigation", International Journal of Organisation Theory and Behaviour, vol 7 No. 3, pp. 289-309
6. Chen, Z.X. and Francesco, C., 2003, The relationship between the three components of commitment and employee performance in china. Journal of Vacational Behaviour, Vol. 62 No. 3, pp. 490-510

7. Darwito, 2008, Analisis Pengaruh Gaya Kepemimpinan Terhadap Kepuasan Kerja Dan Komitmen Organisasi Untuk Meningkatkan Kinerja karyawan (Studi Pada RSUD Kota Semarang). http://eprints.undip.ac.id/16933/1/DARWITO.pdf
8. DeCotiis, T. and Summers, T., 1987, A path analysis of a model of the antecedents and consequences of organizational commitment. Human Relations, Vol. 40, pp. 445-70.
9. Gagnon, M.A. and Michael, J.H., 2004, Outcomes of perceived supervisor support for wood production employees. Forest Product Journal, Vol. 54 No. 12, pp. 172-7
10. Giddens, A., 2001, Runaway Word, London: Profile Books Ltd
11. Gunz, H.P. and Gunz S.P., 1994, Profesional/organizational commitment and job satisfaction for employed lawyers. Human Relations, 47, pp. 801-817
12. Herzberg, F., Mausner, B., Peterson R.O. and Capwell, D.F., 1957, Job Attitude: Review of Research and Opinion, Pittsburgh PA, Psychological service of Pittsburgh.
13. Ivancevich, John M., 1999. Organizational behavior and Management. Fifth edition.New York: Mc Graw-Hill.
14. Jaramillo F., J.P. Mulki, and G.W. Marshall, 2005, A Meta-analysis of the relationship between organizational commitment and salesperson job performance: 25 years of research. Journal of Business Research 58, pp.705-714
15. Joyce, W. and Slocum, J.W., 1984, Collective climate: agreement as a basis for defining aggregate climates in organizations. Academy of Management Journal, Vol. 27 No. 4, pp. 721-42
16. Joyce, W. and Slocum, J.W. and Glinow, M.A., 1982, Person-situation interaction: competing models of fit. Journal of Occupational Behaviour, Vol. 3 No. 4, pp. 265-80.
17. Judge, T.A., Thoresen, C.J., Bono, J.E and Patton, G.K., 2001, The job satisfaction-job performance relationship: a qualitative and quantitative review. Psycological Bulletin, Vol. 127 No. 3, pp. 376-407
18. Karatepe M.O. and Tekinkus M., 2006, The effects of work family conflict, emotional exhaustion, and intrinsic motivation on job outcomes of front line employees. International Journal of Bank Marketing, Vol. 24 no. 3, pp. 173-193.
19. Knoop, R., 1995, Relationship among job involvement, job satisfaction and organizational commitment for nurses. The Journal of Psychology, 129, pp. 643-649.
20. Laffaldano, M.T. & Muchinsky, P.M., 1985, Job Satisfaction and Job Performance: A Meta-analysis, Psychological Bulletin, pp. 251-273
21. Lawler, E.E. and Porter, L.W., 1967, The effect of performance on job satisfaction, Industrial Relations, October 1967, pp. 20-8
22. Lee, T.W. & Mowday, R.T. 1987. Voluntarily leaving an organization: An empirical investigation of Steers and Mowday's of turnover. Academy Management Journal. 721-743
23. Locke, E.A., 1970, Job Satisfaction and Job Performance: A Theoritical Analysis, Organizational Behaviour and Human Performance, pp. 484-500
24. Martin, T.N. and M.S. O'Laughlin, 1984, Predictors of organizational commitment: The study of part-time army reservists. Journal of vocational Behaviour, Vol. 25 No. 3, pp. 270-283
25. Mathieu, J.E., & Zajac, D.M. 1990. A review and meta-analysis of the antecedents, correlates, and cobsequences of organizational commitment. Psychology Bulletin, 108: 171-194
26. Meyer, J.P. and N.J. Allen, 1997, Commitment in the workplace: Theory, Research, and Application. Thousand Oaks, CA: Sage Publication, Inc
27. Michael, J.H., Evans, D.D., Jansen, K.J. and Haight, J.M., 2005, Management commitment to safety as organizational support: relationships with non-safety outcomes in wood manufacturing employees. Journal of Safety Research, Vol. 36 No. 2, pp. 171-9.
28. Miller, R.I., 1980, Appraising institutional performance, Improving Academic Management, USA: John Wiley and Sons
29. Orpen, C., 1986, The effect of job performance on the relationship between job satisfaction and turnover. Journal of social psychology, Vol. 126 No. 2, pp. 277-8

30. Petty, M.M., McGee, G.W., & Cavender J.W. 1984. A Meta-analysis of the relationships between individual job satisfaction and individual performance. Academy of Management review, 712-721
31. Porter, L.W. and Lawler, E.E., 1968, Managerial Attitudes and Performance, Dorsey Press, Homewood, IL
32. Roethlisberger, F.J. and Dickson, W.J. 1939. Management and the Worker, Harvard University Press, Cambridge, MA
33. Sallis, E., 2002, Total Quality Management in Education, London: kogan Page Limited.
34. Schwab, D.P. and Cummings, L.L. 1970. Theories of Performance and Satisfaction: A Review. Industrial Relations, 9, 408-430.
35. Siegel, J.P. and Bowen, D., 1971, Satisfaction and performance: causal relationships and moderating effects. Journal of Vocational Behavior, Vol. 1, pp. 263-9
36. Stumpf, S.A. and Hartman, K., 1984, Individual exploration to organizational commitment or withdral. Academy of Management Journal, Vol. 27, pp. 308-29
37. Sudiro Achmad, 2008, Pengaruh Timbal Balik Anatara Kepuasan Kerja dengan Kepuasan Keluarga dan Komitmen Kerja serta Dampaknya terhadap Prestasi Kerja dan Karier Dosen, Jurnal Manajemen dan Kewirausahaan, Vol. 10 No.1, hal. 38-49, Universitas Kristen Petra Surabaya.
38. Vroom, V.H., 1964, Work and Motivation. Wiley, New York, NY.
39. Westover H. Jonathan, A.R. Westover, and A.L. Westover, 2010, Enhancing long-term worker productivity and performance: The connection of key work domains to job satisfaction and organizational commitment. International Journal of Productivity and Performance Management, Volume 59 Iss: 4, pp 372-387
40. Wiener, Y. & Vardi, Y. 1980. Relationships between job organization and career commitment and work outcomes-an integrative approach. Organizational Behavior and Human Performance, pp 81-96.
41. Yiing H.Lee. and K. Zaman Bin Ahmad, 2009, The moderating effects of organizational culture on the relationships between leadership behavior and organizational commitment and between organizational commitment and job satisfaction and performance. Leadership & Organization Development Journal, vol. 30 No. 1, pp. 53-86.
42. Young, B.S., S. Worchel, and D.J. Woechr, 1998, Organizational commitment among public service employee. Public Personal Management, pp. 339-348
43. Zimmerman D. Ryan and T.C. Darnold, 2009, The impact of job performance on employee turnover intentions and the voluntary turnover process. A meta analysis and path model. Personal review, Vol 38 no 2, pp. 142-158.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.23

МЕТОДИЧЕСКИЙ ПОХОД К ФОРМИРОВАНИЮ МАРКЕТИНГОВОЙ ТОВАРНОЙ СТРАТЕГИ ПРЕДПРИЯТИЙ АПК НА РЕГИОНАЛЬНОМ УРОВНЕ

METHODICAL APPROACH TO THE FORMATION OF THE MARKETING COMMODITY STRATEGY OF AGRO-INDUSTRIAL COMPLEX AT THE REGIONAL LEVEL

Шашло Н.В., кандидат экономических наук
Shashlo N.V., Candidate of Economic Sciences
Владивостокский государственный университет экономики и сервиса, Владивосток, Россия
Vladivostok State University of Economics and Service, Vladivostok, Russia
E-mail: ninelllsss@gmail.com

АННОТАЦИЯ
В статье представлен методический подход к формированию маркетинговой товарной стратегии предприятий агропромышленного комплекса на региональном уровне. Выделены цели анализа товарной политики предприятия, объект и предмет анализа. Доказано, что с целью усиления ориентации на повышение качества маркетинговой товарной политики целесообразно проводить анализ и корректировку продуктового портфеля согласно разработанным этапам. Разработана модель формирования маркетинговой товарной стратеги предприятий АПК, включающая формирование стратегического подразделения предприятия, определение товаров и рынков, маркетинговый стратегический анализ, прогнозирование, установку целей, формирование товарной стратегии. Предложена технология построения маркетинговой стратегии на региональном рынке. Обоснованы этапы формирования маркетинговой товарной стратегии на региональном уровне: анализ условий производства и продаж, выбор перспективных ассортиментных групп, разработка маркетинговой товарной стратегии, установление обратной связи между товаропроизводителем и региональным рынком.

ABSTRACT
The article presents methodical approach to the formation of marketing commodity strategy for enterprises of the agro-industrial complex at the regional level. The objectives of the analysis of the enterprise's product policy, the object and the subject of analysis are singled out. It is advisable to analyze and adjust the product portfolio according to the developed stages in order to strengthen the orientation on improving the quality of marketing commodity policies. A model for the formation of the marketing commodity strategy of enterprises of the agro-industrial complex, including the formation of the strategic division of the enterprise, the definition of goods and markets, marketing strategic analysis, forecasting, setting goals, the formation of commodity strategy. The technology of building marketing strategy in the regional market is proposed. There are substantiated stages of formation of the marketing commodity strategy at the regional level: the analysis of production and sales conditions, the selection of promising product groups, the development of marketing commodity strategy, the establishment of feedback between the producer and the regional market.

КЛЮЧЕВЫЕ СЛОВА
Маркетинговая товарная политика, маркетинговая товарная стратегия, портфель продукции, ассортимент, стратегические единицы бизнеса, маркетинговые исследования.

KEY WORDS
Marketing commodity policy, marketing commodity strategy, product portfolio, assortment, strategic business units, marketing research.

В условиях нестабильности современной экономики отечественные предприятия уделяют все больше внимания формированию маркетинговой стратегии как главному инструменту осуществления эффективной маркетинговой деятельности в постоянно изменяющихся условиях. Это связано с тем, что значительное количество стратегических решений, которые принимает любая компания, находятся в сфере маркетинга. Товарная политика является составляющей комплекса маркетинга, определяет содержание ценовой, распределительной, коммуникационной составляющих и эффективность производственно-хозяйственной деятельности предприятия в целом. К основным задачам товарной политики относятся управление качеством, конкурентоспособностью, жизненным циклом товаров, а также товарным ассортиментом и номенклатурой. Большинство этих задач являются стратегическими, поскольку их решение предполагает выявление целевых потребителей и конкурентных позиций. В современных условиях хозяйствования рост динамичности и неопределенности экономических процессов предопределяет необходимость обеспечения гибкости стратегий, их своевременной адаптации к изменениям среды. Однако следует отметить, что в теории товарной политики именно стратегические аспекты остаются наименее изученными: не существует общепринятого определения и классификации товарных стратегий, ощущается недостаток конкретных рекомендаций относительно методов их разработки.

Проблемам формирования маркетинговых стратегий в целом посвящены научные труды таких исследователей как Л. Багиев, Л.В. Балабанова, П. Дойль, К.Л. Келлер, Д. Кревенс, Ф. Котлер, Н.В. Куденко, Ж.-Ж. Ламбен, М. МакДональд и др. [1-7]. Однако товарные стратегии рассматриваются авторами лишь как один из многочисленных разновидностей стратегий маркетинга. Теоретико-методологические проблемы формирования и реализации маркетинговой товарной политики является предметом исследования западных ученых, в частности К. Альбрехта, Д. Анкера, Р. Брэнсона, Д. Делла, М. Голдмена, М. Портера, А. А. Томпсона, Х. Хеннесси и др. [8,9].

Основной задачей предприятия, которое хочет функционировать на рынке и занимать на нем лидирующие позиции, является разработка, создание, защита и поддержка конкурентных преимуществ, а также стратегии. На основании обобщения категориально-понятийного аппарата [10-12] предложена трактовка маркетинговой товарной стратегии как комплекса стратегических решений, определяющих, с одной стороны, номенклатуру, ассортимент и объемы производства (товарная подстратегия), а с другой - методы сегментации рынков, выбора и охвата целевых сегментов, определения темпов роста, а также позиционирование продукции (рыночная подстратегия). Формирование стратегии - это достаточно сложный и трудоемкий процесс, который требует соблюдения определенных правил, принципов, процедур и логической последовательности. Осуществлять этот процесс целесообразно, соблюдая последовательность следующих этапов: исследование текущей стратегии; оценка факторов; осуществление анализа портфеля продукции; выбор стратегии и оценка выбранной стратегии.

К внешним факторам целесообразно отнести масштаб деятельности предприятия и ассортимент производимой продукции; диверсификацию предприятия; изменение в структуре капитала предприятия; структуру и направленность деятельности; возможности, на которые было ориентировано предприятие, отношение к внешним угрозам. Внутренние факторы представлены целями предприятия; критериями распределения ресурсов и структурой капиталовложений; отношением к финансовому риску как со стороны руководства, так и в соответствии с осуществляемой финансовой политикой; уровнем и степенью концентрации усилий в области НИОКР; стратегией отдельных функциональных сфер (маркетинг, производство, кадры, финансы, научные исследования и разработки).

Рост динамичности и неопределенности во внешней среде вызывает необходимость перехода от концепции стратегического планирования, главным акцентом которой является изучение рыночных возможностей и угроз, формирование стратегий, к концепции стратегического управления, направленной на своевременную

адаптацию предприятия к изменениям. Таким образом, адаптацию целесообразно рассматривать как средство совершенствования стратегий в нестабильных условиях деятельности. При таких условиях результативность производственно-хозяйственной деятельности предприятий практически полностью определяться устойчивостью рыночных позиций. Поэтому адаптация маркетинговой товарной стратегии к новым условиям хозяйствования является адаптацией к динамичным условиям рынка, представляет собой целенаправленное согласованное приспособление рыночной и товарной подстратегий и отдельных стратегических составляющих к условиям рынка, осуществляемое путем активного воздействия лиц, принимающих управленческие решения, на элементы внутренней и внешней среды предприятия.

Успех предприятия в определенной степени определяется эффективностью маркетинговой товарной политики, анализ которой необходимо осуществлять в соответствии с целями:

- оценка результатов и дохода предприятия от реализации товара, товарных линий и товарного ассортимента;
- анализ отношения потребителей к товарам предприятия и товаров конкурентов, товаров-субститутов;
- анализ ассоциаций, связанных с данными товарами;
- исследование возможностей и угроз макросреды, а также сильных и слабых сторон продукта;
- оценка целесообразности и эффективности процесса разработки и внедрения новых товаров предприятия на рынок;
- определение согласованности товарного ассортимента с целями предприятия и его сбалансированность с учетом жизненного цикла товаров;
- мониторинг отношений различных субъектов рынка к структурным элементам товара, разработка мероприятий по улучшению и оптимизации товарного ассортимента [1, 10].

Решение вышеуказанных задач требует выявления объекта и предмета анализа. Объектами анализа товарной политики предприятия АПК являются:

- товарная единица и элементы ее структуры (характеристики, брэндинг, упаковка);
- товарная линия и товарный ассортимент;
- новый товар предприятия и процесс его разработки;
- портфель продукции.

Предметом анализа товарной политики являются:

- потребительская ценность товара;
- экономические выгоды предприятия от выпуска и реализации товара;
- характеристика марки товара для отдельных видов продукции (популярность, лояльность потребителей, стоимость) и его упаковка;
- эффективность внедрения новых товаров на рынок;
- показатели ассортимента и его сбалансированность с позиций жизненного цикла товара [1, 10].

С целью усиления ориентации на повышение качества маркетинговой товарной политики целесообразно проводить корректировку существующего продуктового портфеля на основе формирования маркетинговой товарной стратегии, которая позволит оптимально использовать маркетинговый потенциал товара. Анализа портфеля продукции необходимо осуществлять поэтапно. В частности:

1. Выбор уровней на предприятии для проведения анализа портфеля продукции. Иерархия уровней анализа портфеля продукции должна начинаться на уровне отдельного продукта и завершаться на верхнем уровне предприятия.

2. Фиксация единиц анализа, которые формируют стратегические единицы бизнеса (далее - СЕБ), с целью их использования при позиционировании на матрицах анализа портфеля продукции. При этом СЕБ могут охватывать как один продукт, так и несколько продуктов, удовлетворяющих схожие потребности; в отдельных случаях можно рассматривать СЕБ как продуктово-рыночные сегменты.

3. Определение параметров матриц анализа портфеля продукции, который проводится для выбора переменных, по которым будет проводиться анализ портфеля.

4. Сбор и анализ данных по направлениям, среди которых наиболее важными являются: привлекательность отрасли с позиции наличия в ней положительных и отрицательных сторон, характера и степени риска; конкурентная позиция предприятия; возможности и угрозы, которые оцениваются по отношению к предприятию, а не в отношении отрасли; ресурсы и квалификация кадров, рассматриваемые с позиции наличия у предприятия потенциала для проведения конкурентной борьбы в конкретной отрасли.

5. Построение и анализ матриц портфеля продукции предприятия с целью получения представлений о текущем состоянии портфеля продукции, на основе которого руководством предприятия АПК могут быть сделаны прогнозы относительно ожидаемого портфеля продукции.

6. Разработка динамики изменения матриц.

7. Принятие управленческого решения о необходимости формирования нового портфеля продукции.

8. Определение желаемого портфеля продукции, отвечающего целям предприятия АПК.

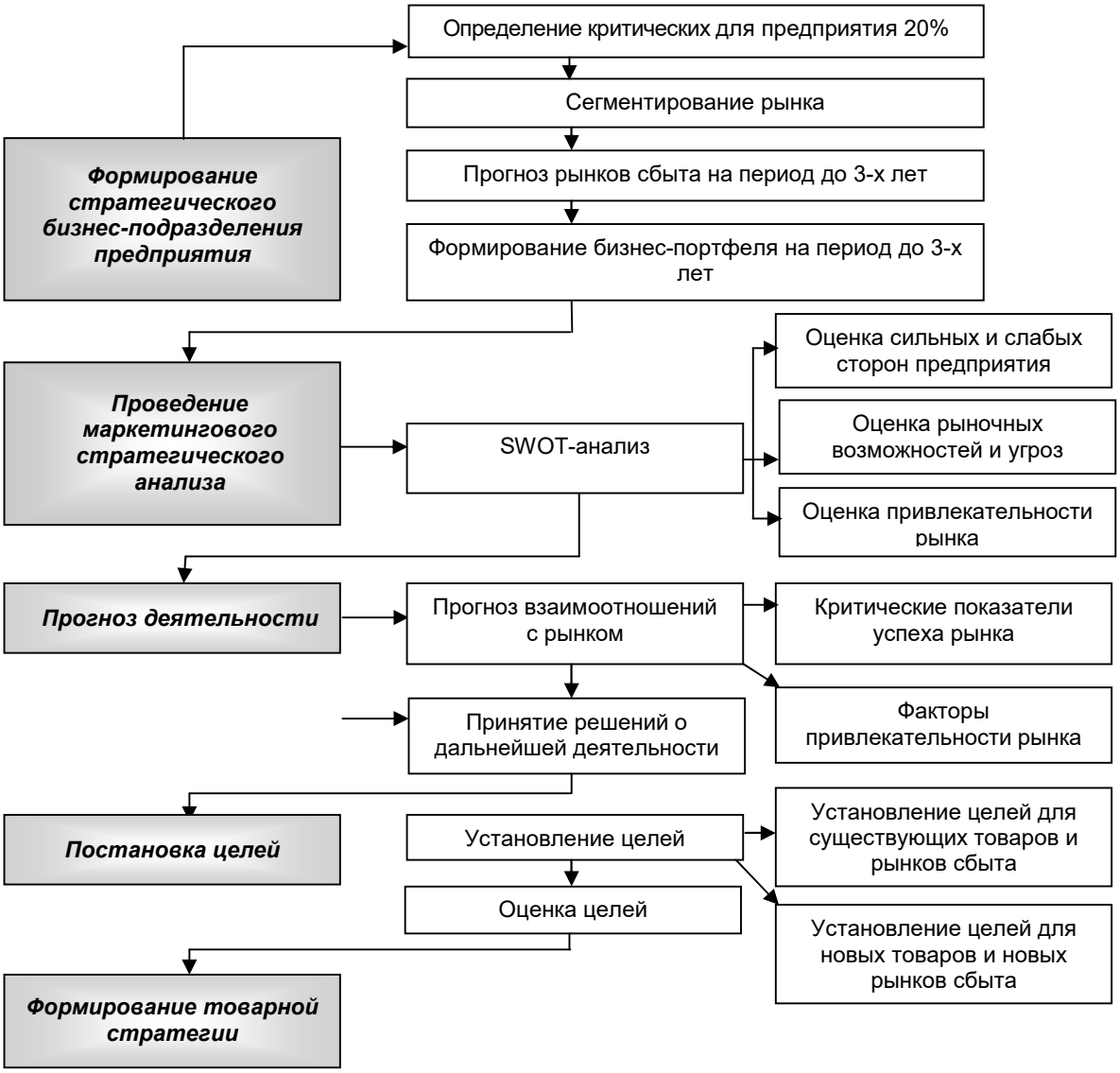


Рисунок 1 – Модель формирования маркетинговой товарной стратеги предприятий АПК

Выбор стратегии предприятия осуществляется руководством на основе анализа ключевых факторов, характеризующих состояние предприятия, с учетом результатов анализа портфеля продукции, а также сущности реализуемых стратегий [13].

Одним из средств повышения эффективности маркетинговых товарных стратегий является внедрение на предприятиях современного научно-методического обеспечения. Методический подход к формированию маркетинговой товарной стратегии можно представить в виде последовательности взаимосвязанных действий (рисунок 1).

В общем виде процесс формирования товарной стратегии должен осуществляться в следующей последовательности: определение, формирование стратегического подразделения; определение товаров и рынков; маркетинговый стратегический анализ; прогнозирование; установка целей; формирование товарной стратегии - определение основных направлений развития и соответствующей линии поведения. Следует отметить, что каждая стратегия должна быть конкретизирована в маркетинговом плане. Набор маркетинговых товарных стратегий ограничен. Прежде всего, следует выделить, три базовые стратегии М. Портера: дифференциация, лидерство в издержках, концентрация [8].

Существует три основных стратегических направления формирования маркетинговой товарной стратегии предприятия [14-16]:

1. Стратегии инновации товара: дифференциации, диверсификации.
2. Стратегии вариации товара: вариация функциональных свойств; вариация физических свойств; вариация дизайна товара; вариация стиля; вариация марки; вариация дополнительного эффекта.
3. Стратегии элиминации товара: специализации, изменения качества.

Маркетинговая региональная товарная стратегия включает разработку направлений по оптимизации ассортимента, формированию жизненного цикла, повышению конкурентоспособности и разработку новых товаров, необходимых для эффективной работы предприятий АПК на региональном рынке. Технология построения маркетинговой товарной стратегии на региональном уровне отражены на рисунке 2.

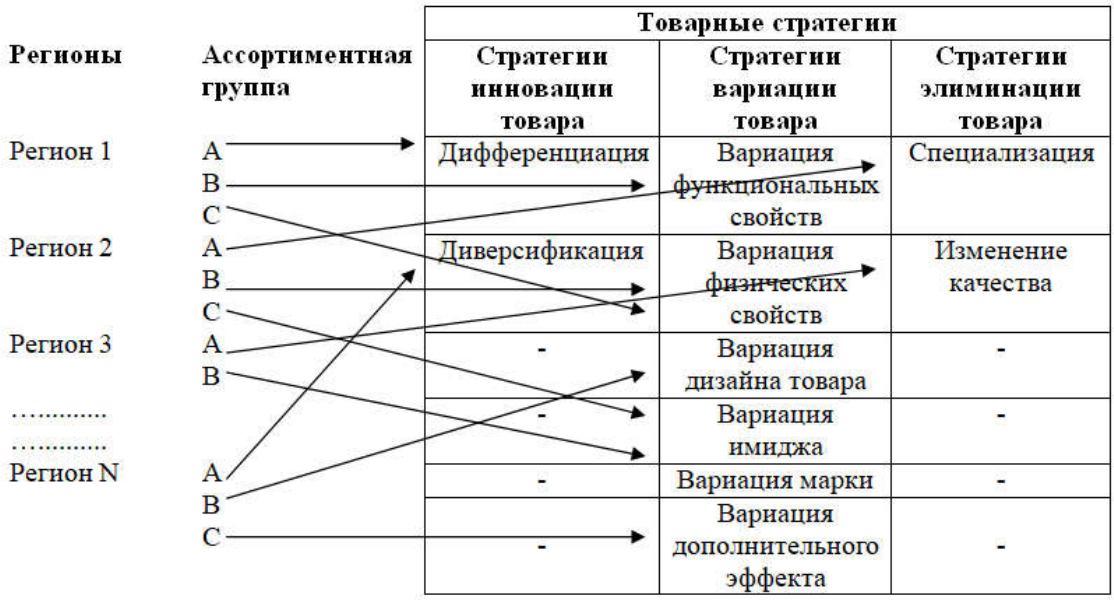


Рисунок 2 – Технология построения маркетинговой товарной стратегии на региональном рынке

Этапы формирования маркетинговой товарной стратегии на региональном уровне отражены на рисунке 3.

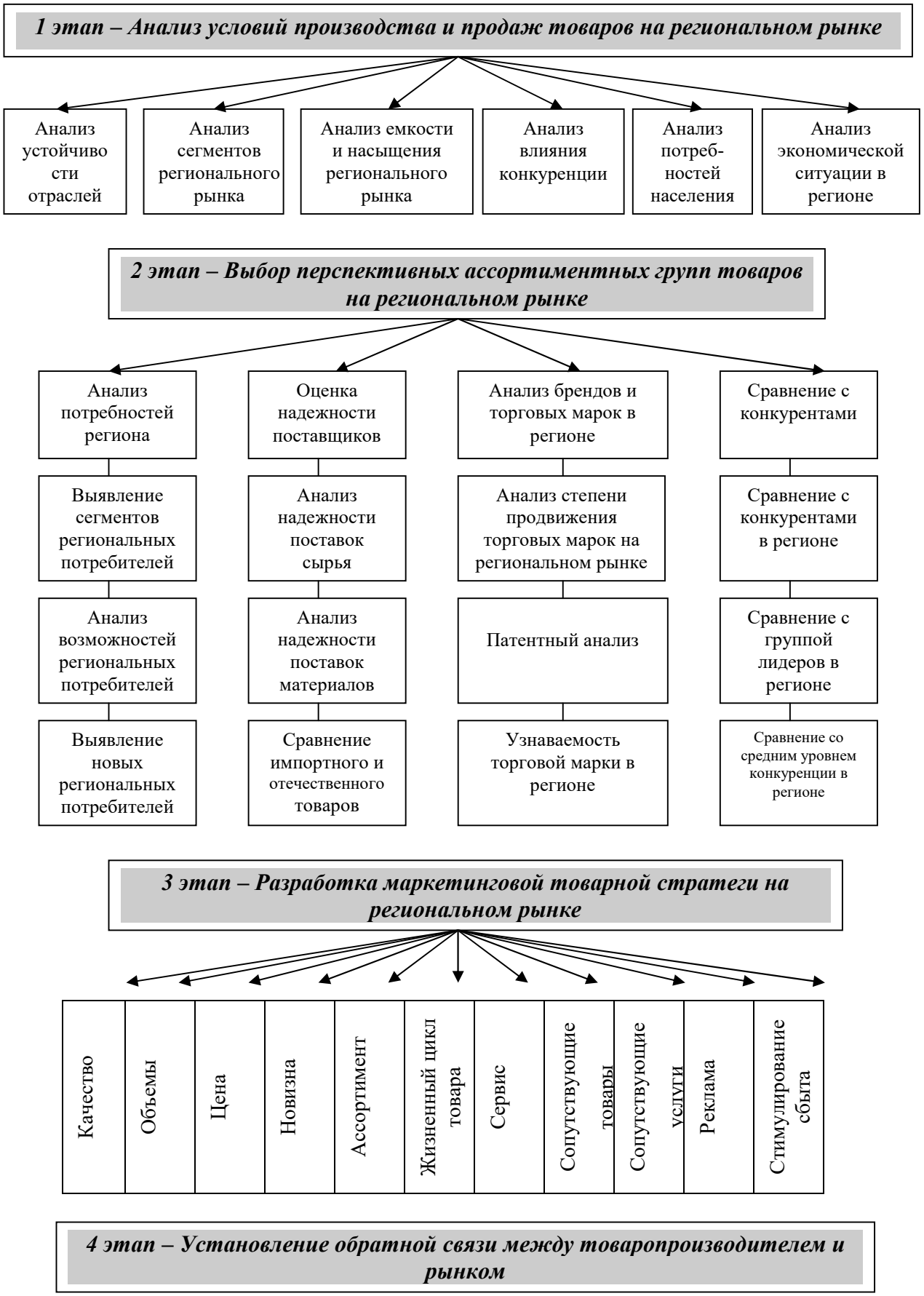


Рисунок 3 - Этапы формирования маркетинговой товарной стратегии на региональном уровне

На первом этапе формирования товарной стратегии проводится анализ устойчивости отрасли, к которой относятся предприятия. Определяется емкость регионального рынка и его насыщенность, проводится сегментация рынка с учетом выявленных конкурентов и общей экономической ситуации в регионе благодаря установлению потребностей населения в продовольственных товарах. При этом следует отметить, что на основе анализа регионального рынка определяется привлекательная группа товаров для производства и продажи, тогда как на втором этапе идет уже детализация и определение перспективных товарных подгрупп и товарных позиций.

Второй этап начинается, прежде всего, с поиска конкретной товарной позиции для целевого сегмента с учетом потребностей региона. Для этого определяются целевые сегменты регионального рынка, проводится анализ их возможностей, выявляются новые региональные потребители.

Перспективность подгрупп товаров определяется уровнем конкуренции и степенью продвижения торговых марок на региональном рынке. Уровень конкуренции в регионе среди производителей устанавливается в результате сравнения конкурентоспособности товаров данного предприятия с продукцией лидера или всех конкурентов как отечественных, так и зарубежных. В результате анализа степени продвижения торговой марки на региональном рынке определяется степень узнаваемости торговой марки.

Третий этап является решающим, поскольку после выбора перспективной товарной позиции формируется товарная стратегия на региональном рынке и общая стратегия развития предприятия. При этом учитываются такие параметры товара как качество, ассортимент, объемы производимого товара, его цена, планируются стадии жизненного цикла с учетом рекламных и стимулирующих мероприятий.

Четвертый этап, заключительный, предусматривает контроль выполнения выбранной стратегии и установление связи между товаром и региональным рынком благодаря проведению маркетинговых исследований и корректировки разработанного комплекса маркетинга для целевого сегмента.

Результаты проведенных исследований свидетельствуют о том, что агропромышленные предприятия не придерживаются одной концепции. Как правило, используют симбиоз стратегических ориентаций [17]. Таким образом, предлагаемый методический подход к формированию маркетинговой товарной стратегии позволит расширить классификацию маркетинговых товарных стратегий, то есть их многовариантность и повысить эффективность формирования общей стратегии развития предприятий АПК на региональном рынке. Формирование товарной стратегии – сложный и трудоемкий процесс, требующий выполнения определенных правил, принципов, процедур и логической последовательности. Предложено данный процесс осуществлять по этапам: исследование текущей стратегии, проведение анализа портфеля продукции, выбор товарной стратегии, оценка стратегии.

Разработанный методический поход к формированию маркетинговой товарной стратеги представленн в виде последовательности взаимосвязанных процедур, схематически отраженных в модели формирования маркетинговой товарной стратеги предприятий АПК. В общем виде процесс формирования маркетинговой товарной стратеги включает четыре блока: формирование или определение стратегического подразделения, маркетинговый стратегический анализ, прогноз будущей позиции товаров и рынков, установление целей, разработка стратегии. Маркетинговую товарную стратегию предприятий АПК региона целесообразно выстраивать по таким направлениям: товарная дифференциация, товарная узкая специализация, товарная диверсификация, товарная вертикальная интеграция.

БИБЛИОГРАФИЯ

1. Багиев Г.Л. Маркетинг: учебник; под ред. Г.Л. Багиева. – СПб. : Питер, 2008 – 736 с.

2. Балабанова Л.В., Орлов В.В. Управління інноваціями у маркетинговій товарній політиці підприємства: концепція, інтегрована система, результативність Донецьк: ДонНУЕТ, 2016. 341 с.
3. Дойль П. Маркетинг, менеджмент и стратегии / П. Дойль, Ф. Штерн. – СПб.: Питер, 2007. – 544 с.
4. Кревенс Д. Стратегический маркетинг / Д. Кревенс. -М.: Вильямс, 2008-512 с.
5. Котлер Ф. Основы маркетинга / Ф. Котлер, Г. Армстронг, Дж. Сондерс, В. Вонг ; пер. с англ. – 2-е европ. изд. – М. ; СПб., К. : Издательский дом «Вильямс». 2002. – 1152 с.
6. Ламбен Ж.-Ж. и др. Менеджмент, ориентированный на рынок / Ж.-Ж. Ламбен, Р. Чумпитас, И. Шулинг. СПб., 2011. 720 с.
7. McDonald M. Strategic Marketing Planning: Theory and Practice // The Marketing Review.2006. 6. P. 375-418.
8. Портер Е. Майкл Конкурентная стратегия: Методика анализа отраслей и конкурентов / Майкл Е. Портер; Пер. с англ. 2-е изд. - М.: Альпина Бизнес Букс, 2006. - 454 с.
9. Томпсон А.А., Стрикленд А.Дж. Стратегический менеджмент. – М.: Вильямс, 2009. – 307с.
10. Балабанова Л.В. Маркетингова товарна політика в системі менеджменту підприємства: навчальний посібник / Л.В. Балабанова, О.А. Бриндіна. – Донецьк : ДонДУЕТ, 2006. - 262 с.
11. Журавлева А. Ю. Маркетинговое управление продажами на рынке товаров длительного пользования: [монография] / А. Ю. Журавлева, Л. М. Капустина, Е. М. Фельдман. Урал. гос. экон. ун-т. - Екатеринбург: Изд-во Урал. гос. экон. ун-та, 2013. - 171 с.
12. Пичурин И. И. Особенности промышленного маркетинга в России на этапе импортозамещения: монография/ И. И. Пичурин. - Екатеринбург: Из-во УМЦ УПИ, 2015. - 182 с.
13. Иванов А.Г., Юлдашева О.У. Маркетинг взаимоотношений и управление потенциалом покупателя на рынках B2B: Монография. – СПб.: Изд-во СПбГУЭФ, 2004. - 139с.
14. Маркетинговый анализ: теория и практика: монография / И.П. Савельева, Ю.В. Асташова, Н.А. Беляев и др.; под ред. И.П. Савельевой. – Челябинск: Издательский центр ЮУрГУ, 2013. - 209 с.
15. Капустина Л. М. Интернет-маркетинг. Теория и практика продвижения бренда в Сети монография / Л. М. Капустина, И. Д. Мосунов. Урал. гос. экон. ун-т. – Екатеринбург: Изд-во Урал. гос. экон. ун-та, 2015. - 102 с.
16. Кузубов А.А., Максимова В.С. Взаимодействие финансово-кредитного механизма субъектов хозяйствования на принципах маркетинга // Вектор науки Тольяттинского государственного университета. Серия: Экономика и управление. 2016. № 3 (26). С. 46-50.
17. Шашло Н.В. Идентификация и развитие компетенций агропромышленных предприятий // В сборнике: Актуальные проблемы экономической теории и практики. Сборник научных трудов. Под редакцией В.А. Сидорова. Краснодар, 2012. С. 84-90.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.24

PUSH FACTOR ANALYSIS OF YOUNG FARMER COMMUNITY BASED ON AGRIBUSINESS IN MALANG REGENCY OF INDONESIA: A CASE STUDY IN CURUNGREJO, WONOSARI AND PLAOSAN VILLAGES

Arvianti Eri Yusnita, **Gunawan Cakti Indra**
University of Tribhuwana Tunggadewi, Malang, Indonesia
E-mail: cakti.irdh@gmail.com

ABSTRACT
Youth collective life in the majority of Indonesian society will create a community, including a community of young farmers. Young farmers community need to be formed because the young generation is one of the main hopes for the creation of sustainable agriculture as well as through one of the efforts to increase agricultural businesses. The formed community is influenced by driving factors including government, family, capital and farming. This study aims to determine the push factors that influence the formation of a young farmer community, the driving factors which are the most dominant and determine the best model on the formation of young farmer communities in Malang. The method used quantitative descriptive, with multiple linear regression analysis. The sampling method used was stratified random sampling, the total sample of 55 young farmers. The results showed that the push factors that influence the formation of communities of young farmers, governments, families, and farming, as well as the most dominant factor is the government. Young farmer community formed due to the model of the region of farming like citrus farming that is supported by the full involvement of the government, in this case the government advisors who are able to carry out its functions and its role as agricultural advisors by transferingtechnology and increasingthe farmers' Knowledge, Skills and Attitude (MCC).

KEY WORDS
Push factor, community, young farmers.

Collective society is easier to achieve the desired goal, than working individually. Indonesia's population is accustomed to working in groups in the form of appropriate cultural and local conditions and circumstances exist. In addition, the group or the community functions as a place to learn together. The community can exchange experiences and knowledge. Since government institutions have limits in assisting all layers of society, this problem can be tackled by empowering communities to implement societal development with the expectation to achieve positive goals for other layers of society. (Czepiel et al., 2013). According to Kedi, S. (2008), who states that farmers' decision-making process community-based action, can be used as entry pointfor technology dissemination efforts.

Many communities can be formed by society, especially a group or a community of young people. Most of the group of young people who are rarely found or may not even exist is a group of young farmers, According to BPS data Susenas Kor (2014), the number of youth in Indonesia is around 61.83 million or 24.53 percent from 252.04 million. This number is very crucial for the formation of youth groups. On the otherside they tend to spend a lot of time to get together, the level of curiosity to find friends, and loved a hobby or pleasure is still high, but the government's attention on the agricultural sector is very large (Ngangi, Charles. 2011). We can find there are more young farmers in villages than cities, perhaps the younger rarely take higher education, get married at young age and also because in their village have agricultural land so that it can directly work there as farmer, Muksin Amri, jahi Margono Slamet and Djoko Susanto (2009) says, the majority of rural young farmers areworking on small plots of land or even landless, very minimum level of communication with the agricultural advisor, and having a positive perception that their natural environment surrounding is basically can be utilized.

Of course, many factors contributeto low interests among young generation towardsagriculture.Therefore, it isdifficultto find young farmers, according to Arvianti, et al., (2015) one of the most dominant factors affecting the interest of the young farmers towards agriculture transpormasi is income aspect. Ning F, et al., (2015), also said that farming is not regarded as a promising work and economically unstainable by youth. There is also low involvement of youth in sustainable agricultural activities. In addition, there is low parental socialization and peer cohesiveness. Meanwhile, According to Manuaba, et al., (2010) rural peasant youth can be categorized as marginal groups that still require special facilities to help improving its ability, because according to Nurmala, et al., (2012), the agricultural sector acts as a source of livelihood of the principal portion of the villagers.

Government programs through the Department of Agriculture or the AdvisingHall has been widely applied.For example the formation of farmers' groups and farmers women means the members of these farmer groups are all those who have a profession as a farmer without any classification from any aspect, meanwhile according Triman Tapi, H.M. Tahir Kasnawi, H.M. Dervish DPS, they states that the social construction of farmers in the formation of farmer groups, is strongly influenced by cultural values and local traditions, in addition, the formation of farmer groupsare regarded as serving the government's needs (stakeholders) instead ofthe farmers', thereforethe formation of a peasant youth group is possible because they have anti-establishment rebellious attitude, hard working, never give up and always optimistic.Even the potentials among theyouth is greater and the spirit of hard working is higher and they are certainly a driving factor and future generations to agriculture, for institutional or farmer groups tend to be positioned as mere instrument to implement project, not as an attempt for a more fundamental and thorough empowermentsince the farmers themselves also still lacks ofenthusiasm and participation. In order to be able to act as a participatory farmer groups, according to Ajzen, I. (1991) institutions should be designed as an effort to improve the ability of the farmer groups itself as for example by forming a group or community of young farmers to become self-sufficient in supporting the development of sustainable agriculture agribusiness area.

Indonesian Statistic Center (BPS) estimatedEast Java population to be 38,847,561 with 11,874,351 people of it belong to youth (aged between 15 years to 34 years old), Malang regency population to be 2,544,315 and 779,250 people of it belong to youth of 15-34 years age group (data BPS Regency, Malang, 2015), and seen from these numbers of youththere is a potential to develop agribusiness based young farmer community through government program that creates sustainable farming which expected to help development in Indonesian agricultural sector. However, what are the influencing factors that cause the absence of young farmer community formation? Therefore, a problem that can be explored in this study is "analyzing the push factor on young farmers' agri-based community and be able to create strategies and best models in shaping young peasant communities.

METHODS OF RESEARCH

The research was conducted in Kepanjen, Malang Regency in three villages, namely: Curungrejo, Wonosari, and Plaosan. The research location is determined purposively based on the consideration that the three villages in Kepanjen is the villages which have an active group of farmers that are under the guidance of the District Extension Centers Kepanjen and there are farmers who are still relatively young. This study is limited to young farmers who handle the citrus crop.

Data collection methods used in this research is direct observation (observation), interviews, questionnaires, documentation, and literature review. The population in this study were young members of farmer groups in three villages (Curungrejo, Wonosari, Plaosan) in Kepanjen with the age range from 17 to 40 years, the number of samples to be taken as many as 55 people by using proportionate stratified random sampling technique pegambilan samples that belong to the probability sampling is a sampling technique that can provide equal opportunities for every member of the population to become members of the sample

and is used when the populationhave members or elements that are not homogeneous and stratified proportional (Sugiyono, 2016).

With the following conditions:

In Curungrejo village there are three groups of farmers: Tani Muda, Maju Makmur, and Muda Jayawith the total number of peasant youth are 25 people. In Wonosari there are two groups: Jaya Muda Tani and Makmur Sejati with 20 young farmer members. In Plaosan village there are three groups of farmers: Jaya I, Jaya Makmur Tani, and Tani Santosa. The number of young farmers is 10 people. The total population of young farmers in three villages is 25 + 20 + 10 = 55.

In orderfor each taken sample is representingeach population in the three villages, the formula is the total population of each village is divided by the total population of the three villages multiplied by the number of samples used (respondents).

Mathematically the formula can be written as following:

$$Sample = \frac{the\ total\ population\ of\ each\ village}{the\ total\ number\ of\ population\ in\ the\ three\ village} X\ number\ of\ respondents$$

Variable measurement Y variable or a dependent variable and the dependent variable, in this study, the dependent variable is the formation of communities (Y = community building.)

Y, for the driving factors that influence the formation of a community of young farmers are given the approach to land ownership, capital, the number of young members of the farming community. Factors that drives the formation of communities is the government (X1), family (X2), capital (X3), farming (X4).

To perform the test of the hypothesis is done by using multiple linear regression model:

$$Y = a + b1 + b2\ X2 + X1\ ....\ Xn + bn.$$

Where: Y = Given an approach to land ownership, capital, and the number of young members of the farming community; a = constant; X1 = government; X2 = family; X3 = capital; X4 = farming; b1, b2, b3, = coefficient of regression

RESULTS AND DISCUSSION

Respondents Characteristics. Respondents Characteristics used in determining the limits of information and knowledge that can be given to respondents to be analyzed by the researchers. The characteristics of the respondents shall include age, employment status, educational level and status of land ownership.

Age. All respondents who becomes the object of research are those who 17 to 40 years oldthat belong to farmer groups and who have become members of farmer groups. Age between 17 to 40 years old are categorizexd by researchers as a young age according to legislation and the the experts opinion on the definition of youth.

Job status. In the three villages used as research field, respondents have a profession as a farmer, explained from daily works, 80% of their incomes are from agriculture and from 55 respondents who had studied only 10 people with lease land ownership status, five people who are landless peasants, and

40 people own their own land. From 55 respondents,three people who have two professions; those who have bachelor degree level of education (civil servants and employees) will remain a member of farmer groups, because they are landless and work as farmers.

Level of education. From the diagram above we can conclude that from 55 respondents, there are 15 people who are junior highschool graduates(8%). 20 (62%)Junior High School (SMP) graduates, 17 (26%) High School (SMA) graduates, andthree (4%)

Bachelor (S1).The majority of respondent farmers are farmers who have education only at the level of elementary school (SD).

Table 1 – Level of Education Respondents

Education Level	Frequency	Percent	Valid Percent	Cumulative Percent
Elementary School	15	8,0	8,0	8,0
Junior High School	20	62,0	62,0	68,0
Senior High School	17	26,0	26,0	24,0
Bachelor (S1)	3	4,0	4,0	-
Total	55	100,0	100,0	100,0

Source: Data processed, 2017.

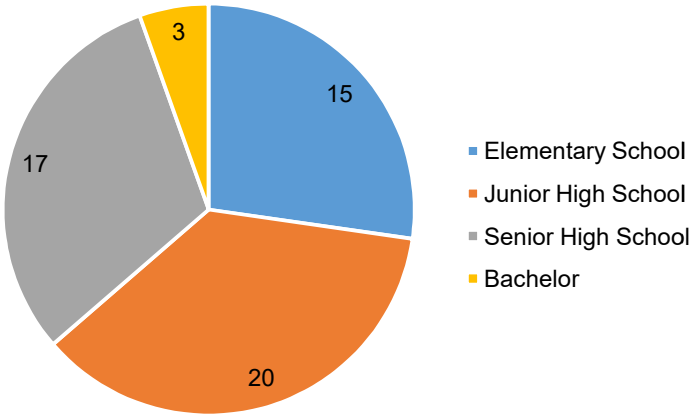


Diagram 1 – Level of education

Status of Land Ownership. From the diagram above we can conclude that as 55 (92%) own their own land which in a sense is not leased landnor owned by parents. Three people (6%) have land with lease status, and one person (2%)is landless.

Table 2 – Land Status

Land Status	Frequency	Percent
Personal	40	92,0
Lease	10	6,0
Landless	5	2,0
Total	55	100,0

Source: Data processed, 2017.

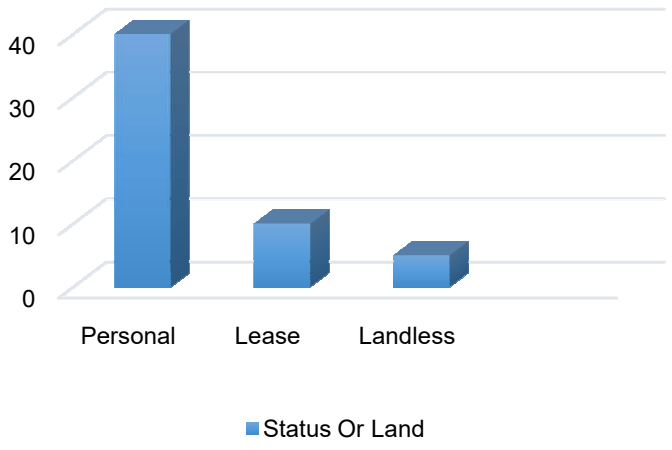


Diagram 2 – Status of Land Ownership

Land area. From the diagram above we can conclude that from 55 respondents, 42 people (84%) havezero to one hectare land area, nine people (12%)have land area of over 1 hectare up to two hectares, three people (2%) have more than 2 hectares of land up to 3 hectares and two people (2%) have more than 3 hectares of land with up to 4 hectares and no respondents who have a land area of over 4 hectares.

Table 3 – Land area

Land Area	Frequency	Percent	Valid Percent	Cumulative Percent
0-1 ha	42	84,0	84,0	84,0
≤ 2 ha	9	12,0	12,0	96,0
≤ 3 ha	3	2,0	2,0	98,0
≤ 4 ha	2	2,0	2,0	100,0
Total	55	100,0	100,0	

Source: Data processed, 2017.

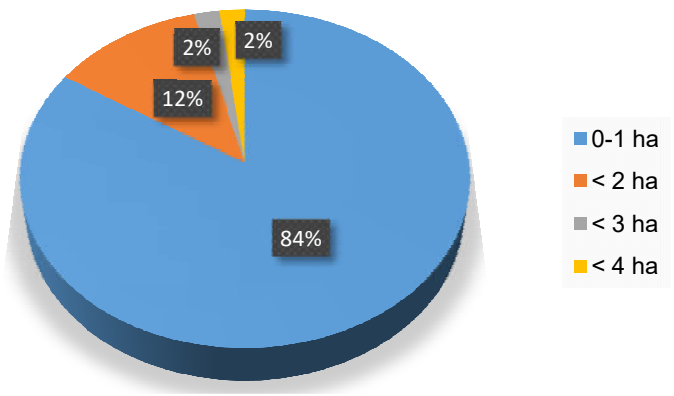


Diagram 3 – Land Area

Data Analysis Results with Multiple Linear Regression. After all regression assumptions are met, then the multiple linear regression analysis is conducted to obtain the effect of the independent variable on the dependent variable X Y. By using SPSS 21 software.

Research Hypothesis Testing:

Test F. Simultaneous testing is used to determine whether all of the variables used in the regression model have a significant effect on the variable Y (forming a community of young farmers). All of these variables were tested simultaneously using F test used in testing the hypothesis that simultaneous or simultaneously is as follows:

H0: there is no real influence of independent variables on Y

H1: there is significant influence between independent variables on Y

If the results are significant, then H0 rejected and H1 will be accepted. But if the results are not significant, then H0 and H1 rejected.

It can also be said to be as follows:

H0 is rejected if F arithmetic> F table, or the value of Significance <α.

H0 if F arithmetic <F table, or the value of Significance> α.

The Driving Factor:

Table 4 – Independent Variable Regression Coefficients Hypothesis Test towards Driving Factor Simultaneously

Hypothesis	Value	Decision
H0 Independent variables no significant effect simultaneously on Y H1 independent variables simultaneously significant effect on Yα = 0:05	F = 27,315 *sig* = 0.000 F_{table} = 2,56	Reject H0

Source: Data processed, 2017.

Based on the above table it can be seen that the values obtained Fhitung 27.315 and Ftable value of 2, 56 because of F larger than F table and has a significance value of 0.000 which is smaller than α (0:05), so that H0 is rejected. This means that simultaneously / concurrently, governments variable (X1), family (X2), capital (X3), and farming (X.4) there is real influence between independent variables to variable Y (young peasant communities).

T Test. Independent variable can be connoted as having signifficant influence on dependent variable. To test that relation, T Test is used by comparing $t_{count}$with t_{table}.Regression model formation independent variable is stated as significantly influencing if t_{count}>t_{table}or significant < a = 0,05.

Partial regression model testing is used to determine whether each independent variable individually forming the regression model.

H0: there is no significant influence of each independent variable to variable Y.

H1: there is significant influence between each independent variable to variable Y.

Decision-making:

H0 is rejected if | t | > Ttabel, or value Significance <α

H0 if | t | <Ttable, or value Significance>

Table 5 – Hypothesis Independent Variable Regression Coefficients Against Partial Incentives

Variable	B	t_{tabel}	t	Sig	Keterangan
(Constant)	14,766	1,675	16,366	,000	
Government	,288	1,675	5,871	,000	Significant
Family	-,542	1,675	-8,144	,000	Significant
Capital	-,086	1,675	-1,459	,151	Insignificant
Farming	,188	1,675	3,491	,001	ignificant

Linear Regression Coefficients Equations Factors Affecting Establishment of Young Farmers Community-Based Agribusiness Horticultural Crops can be written with a model of the following equation:

$$Y = 14.766 + 0.288\ X1 - X2\ 0.542 - 0.230 + 0.188\ X3\ X4$$

If the value of X_1rose 1 point then the Y value increased by 0.288 assuming the other variables constant. If the value of X_2down one unit then the Y value fell by 0.542 assuming other variables constant. If the value X3 down one unit then the Y value fell by 0.230 assuming the other variables constant. If the value X4 down one unit then the Y value fell by 0.188 assuming the other variables constant.

1) The driving factors that influence the formation of communities in Kepanjen young farmers in three villages (Curungrejo, Wonosari, Plaosan).

- Government (X_1):

Government (X_1) is the dominant variable, have t calculate equal to 5,871> ttable 1.675 with significantly 0,000 means that H_0 is rejected and concluded that motivation variables significantly influence the variable Y with the explanation that the more there is a push or government intervention against the farming community, then young farmers will increasingly want to become members of the farming community.

- Family (X_2):

Family (X_2) have $t_{calculate}$equal to -8.144 <t_{table}1.675 to 0.000 means significant H_0 accepted thus concluded that the variables of the family did not significantly affect the variable Y with the explanation that, the lesser encouragement from the family, the lesser willingness to become a member of the community as well.

- Farming (X_4):

Farming (X_4) have $t_{calculate}$equal to 5,871>t_{table}1.675 with significantly 0,001 means that H_0 is rejected and concluded that motivation variables significantly influence the variable Y with an explanation if more farms owned, it is increasingly makemore young farmers be more interested to become members of farming community.

2) The driving factors that do not affect the formation of communities in Kepanjen young farmers in three villages (Curungrejo, Wonosari, Plaosan).

- Capital (X_3):

Capital has t $t_{calculate}$ equal to -1.459 <t_{table}1.675 to significant 0.151 means H_0 accepted thus concluded that the variable capital does not significantly affect the variable Y because young farmers acquire the majority of the capital not from a farming community, but from a financial institution outside the community and peasant communities that exist in Kepanjen which averagely do not have a cooperatives or money lender agencies.

A model that can create horticulture plants agribusiness based young farmer community in Kepanjen, Malang Regency, can be formed due to the existance of young farmers in a region or teritory with the same interests, trust, values, age, intelectual level, and profession as farmer, with the full involvement of the government will be able to encourage them to form a community, they also have the encouragement of family, as well as having their own farm. Young farmers also would like to build social relationships with their good fellows, createsdefense and security in the society, want to improve the economy of the family and be able to adapt to current circumstances, so the target indicators for these young farmers must have a good partner internally and externally in order to be able to attract the attention of young farmers so that the young farmer community is finally formed. In Malang Regency, particularly Curungrejo, Wonosari, and Plaosan horticultural farming region, Citrus plants are very attractive to young farmers, young farmers prefer to use the land for horticultural such as oranges compared to others. The reason of this preference lays in the production results. Single time land processing and plantation can generate multiple harvests until plants productive age is exhausted.This is different compared to rice which only has one harvest for one plantation.

Statistic Description of Respondents Answers. Statistic Description of Respondents Answers is a statistical tool used to analyze the picture data that will be called individually or in groups and give a systematic overview of data that is factual and accurate information on the facts as well as the relationship between the phenomena studied or investigated. In this research, descriptive analysis performed using SPSS version 21 statistics frequencies.

Statistics Description Frequency. To describe respondents through Frequency Statistic Description analysis on the educational level of 55 respondents, with 15 people among themas elementary school(8%), 20 Junior High School graduates(62%) 17 Senior High Schoolgraduates (26%)and three Bachelors(4%). This means that the majority of farmers have education level of secondary school (high school) with the status of land ownership by 40 respondents with a percentage of 92% own land that is in the sense of not land lease nor owned by parents. 10 people (6%) have land with lease status and five people (2%) are landless peasants, it means the majority of population ownstheir own land. For Curungrejo and Wonosari village land owned by farmers (95%) is used for cit5rus plantation because it is a main commodity in both villages. While the majority of lands in Plaosan village are used for rice plantation or paddy fields. From both field utilization potentials in Curungrejo village, Wonosari with Plaosan vilage can also be compared through data from Kepanjen

From both the potential use of land in the village Curungrejo, Wonosari Plaosan village can be compared also with data owned by Technical Operating Unit-Developing Hall (UPT BP)in Kepanjen shows that the village land used for citrus plantationhave more young farmers than village land used for rice plantation.

CONCLUSION AND RECOMMENDATIONS

Based on the results of research and discussion that has been done related to research entitled "Analysis of Push Factor In Young Farmers Community-Based Agribusiness In Malang" it can be concluded that:

1. Push Factors that affect the formation of a community of young farmers, are the government, families, and farming;
2. The most dominant factor is the government;
3. A model that can create agribusiness based young farmers community in Kepanjen, Malang Regency, due to the existance of young farmers in a region or regions that have similar interests, beliefs, values, age, level of intelligence, as well as the similarity of the

profession as a farmer therefore the full involvement of the government that will be able to encourage them to form a community, they also have the encouragement of family, as well as having his own farm. Young farmers also certainly want to build good social relationships, creating a defense and security in the society, want to improve the economy of the family and be able to adapt to the circumstances now, so the indicators to be achieved and owned by a young farmer must have partners of both internal and external order to be able to increase the economic progress of young farmers as well as to attract the attention of young farmers so that the young farmer community finally formed. In Malang Regency,especially Curungrejo, Wonosari, and Plaosan village farming area in the form of citrus plantation are also very attractive to young farmers, young farmers prefer to use the land for one of the fruit plantations such as citrus compared to others because they prefer citrus plantation due to it's production results. One land processing and plantation can generate multiple harvest until plants productivity age is exhausted. Farmers only need to focus on the treatment. It's different compared to rice fields that one planting only can generateone harvest.

Suggestions:

For the farmers, especially young farmers,increase intention and participation to join a farmer community.Because within the community we can share the knowledge and experience of both of the members, other government and private agencies,and also with the existence ofactive young farmers are farming in Indonesia can continue.

For the farming community, the community is not a place or organization for individual welfare or to enrichonly the leadership itself but the leadersshould be serving for the sake of all rank and file collective and common prosperity.

For the government and private institution, mainly engaged in agriculture, cooperate with farmers and farming community to actualize farmers aspiration, but do not make the farming community as a place to implement only a mere project.

REFERENCES

1. Ajzen, I. 1991. Theory of Planned Behavior. Organization Behavior and Human Decision Precess, 50: 179-211.[29 Januari 2016]
2. Arvianti, E, Y. Asnah dan Prasetyo A. 2015. Minat Pemuda Tani Terhadap Transformasi Sektor Pertanian Di Kabupaten Ponorogo. Jurnal. Buana Sains Vol 15 No 2: 181-188, 2015.PS. Agribisnis, Fak. Pertanian. Universitas Tribhuwana Tunggadewi. Malang.
3. Bungin, Burhan. (2006). Sosialisasi Komunikasi: Teori, Paradigma, dan Diskursus Teknologi Komunikasi di Masyarakat. Jakarta:Kencana
4. Czepiel et al. 2013. Competitor analysis. [Onine], http://pages.stern.nyu.edu/~jczepiel/Publications/CompetitorAnalysis.pdf
5. Dapertemen Pertanian. (2007). Pedoman Umum Peraturan Menteri Pertanian Tentang Program Pengembangan Usaha Agribisnis Perdesaan.
6. Diperoleh dari http://aciin.blogspot.co.id/2014/11/masyarakat-dan-komunitas.html.
7. Homan, M. S. 2004. Promoting Community Change; Making It Happen in The Real World. Thomson Brooks/Cole. Kanada
8. Manuaba, I, B Putera. (2010). Memahami Teori Konstruksi Sosial. Jurnal Masyarakat Kebudayaan Politik. Vol.21,NO.3:221-230. Surabaya: Fakultas Ilmu Budaya, Universitas Airlangga.
9. Muksin, Amri Jahi, Margono Slamet dan Djoko Susanto. 2009.Kualifikasi Pemuda Tani Perdesaan di Jawa Timur. Jurnal Penyuluhan. Vol. 5 No. 1. Maret 2009. Departemen Sains Komunikasi dan Pengembangan Masyarakat. Fakultas Ekologi Manusia, Institut Pertanian Bogor
10. Ngangi,Charles. (2011). Konstruksi Sosial Dalam Realitas Sosial. Journal ASE,Vol.7.No.2:1-4
11. Ningsih, Fitri danSofyan Sjaf. 2015. Faktor-Faktor Yang Menentukan Keterlibatan Pemuda Pedesaan Pada Kegiatan Pertanian Berkelanjutan. Jurnal Penyuluhan, Vol. 11 No. 1. Maret 2015. Departemen Sains Komunikasi danPengembangan Masyarakat, Fakultas Ekologi Manusia, Institut Pertanian Bogor.

12. Sugiyono. 2016. Metodologi Penelitian kuantitatif, Kualitatif, dan R & D. Cetakan ke-23. Alfabeta. Bandung.
13. Saputra, Aksin. 2014. Perbedaan Masyarakat Dan Komunitas.
14. Suradisastra, Kedi. 2008. Strategi Pemberdayaan Kelembagaan Petani. Jurnal. Forum Penelitian Agroekonomi. Vol.26. No. 2. Desember 2008.
15. Tapi, Triman, H.M. Tahir Kasnawi ,Dan H.M. Darwis DPS. Konstruksi Sosial Petani Dalam PembentukanKelompok Tani Di Kabupaten Manokwari. Sekolah Tinggi Penyuluhan Pertanian Manokwari,Papua Barat. Pasca Sarjana Sosiologi, Fakultas Ilmu Sosial Dan Ilmu Politik, Universitas Hasanuddin, Makasar.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.25

ОСНОВНЫЕ НАПРАВЛЕНИЯ ВЗАИМОДЕЙСТВИЯ АГРАРНОГО ПРЕДПРИНИМАТЕЛЬСТВА И ГОСУДАРСТВА

THE MAIN DIRECTIONS OF INTERACTION BETWEEN AGRARIAN BUSINESS AND THE STATE

Отинова М.Е., кандидат экономических наук
Otinova M.E., Candidate of Economic Sciences
Научно-исследовательский институт экономики и организации агропромышленного комплекса Центрально-Черноземного района Российской Федерации, Воронеж, Россия
Research Institute of Economics and Organization of Agro-Industrial Complex of Central Black Earth Region of the Russian Federation, Voronezh, Russia
E-mail: 01maryina@gmail.com

АННОТАЦИЯ
В статье обоснована необходимость формирования взаимодействия аграрных предпринимательских структур и региональных органов управления и власти. Показано, что благодаря реализуемым государственным программам поддержки в областях Центрально-Черноземного региона восстанавливается производственно-технический потенциал агропромышленных предприятий, точечно внедряются инновационные технологии и высокопроизводительная техника, что способствует росту объемов производства отдельных видов сельскохозяйственной продукции.

ABSTRACT
In article need of formation of interaction of agrarian enterprise structures and regional governing bodies and the authorities is proved. It is shown that thanks to the realized state programs of support in areas of the Central Black Earth Region the technological capacity of the agro-industrial enterprises is restored, innovative technologies and the high-performance equipment point wise take root that promotes increase in production of separate types of agricultural production.

КЛЮЧЕВЫЕ СЛОВА
Основные направления, аграрное предпринимательство, государство, государственно-частное партнерство, социальное партнерство, правовое взаимодействие.

KEY WORDS
Main directions, agrarian business, state, public-private partnership, social partnership, legal interaction.

Научно обоснованное развитие сельского хозяйства во многом зависит от рационального использования государственных и предпринимательских ресурсов для вывода аграрной экономики на траекторию устойчивого роста. Необходимость формирования взаимовыгодных отношений между предпринимательскими структурами и органами власти вытекает из самой специфики сельского хозяйства, имеющего народнохозяйственное стратегическое значение. Для ее успешного функционирования необходима государственная поддержка. Оценка экономических результатов деятельности сельскохозяйственных предпринимательских структур показала, что государственная поддержка способствовала точечному восстановлению производственно-технического потенциала АПК на основе внедрения инновационных технологий и высокопроизводительной техники, а также обеспечила стабилизацию производства отдельных видов сельскохозяйственной продукции.

Вместе с тем, в процессе рыночных реформ предпринимателям была предоставлена свобода выбора способа и форм осуществления своей деятельности.

Это привело к смене приоритетов как у субъектов агробизнеса, выражающееся в снижении социальной ответственности перед обществом, государством и собственными работниками и в государственном регулировании, которое в большинстве случаев ограничивалось административными мерами воздействия, при этом, не используя мотивационный механизм, который бы способствовал социализации аграрных предпринимателей. Это обусловлено, прежде всего, недооценкой роли и возможностей аграрного предпринимательства в решении социальных задач сельских территорий. Позже государство пыталось переложить решение социально-экономических задач села на сельских предпринимателей, при этом совершенно не заботится какими ресурсами эти проблемы будут решаться.

Особенно остро стоят вопросы формирования и совершенствования социальной инфраструктуры сельских территорий для сохранения баланса между уровнем и качеством жизни городского и сельского населения.

Нерешенными остаются вопросы формирования и совершенствования организационно-правовых и экономических условий осуществления предпринимательской деятельности в аграрном секторе. Думается, что решению данных и будущих проблем будет способствовать система взаимодействия предпринимательских и властных структур на государственном и муниципальном уровнях на основе правового, организационно-экономического, научно-технического, социального обеспечения благоприятной предпринимательской среды для формирования и эффективного функционирования аграрного предпринимательства.

Взаимодействие аграрного предпринимательства и государства нами понимается как совокупность организационно-правовых, финансово-экономических и социальных отношений аграрного предпринимательства и государства с целью сбалансированного достижения целей по обеспечению устойчивого социально-экономического роста аграрной экономики и сельских территорий на принципах добровольности, ответственности и эффективности. Рассмотрим основные формы экономического взаимодействия аграрного предпринимательства и государственных органов власти в областях ЦЧР.

Положительным примером реализации принципа софинансирования инвестиционных проектов является Белгородская область, где в 2015-2016 гг. был реализован 71 проект на общую сумму 76,3 млрд руб. Наряду с развитием индустриального сельскохозяйственного производства, для обеспечения социальной стабильности, развития предпринимательства и экономической активности сельского населения в области разработана и реализуется программа «Семейные фермы Белогорья». Одним из важнейших направлений развития семейных ферм Белгородской области является полномасштабная реализация проектов комплексного развития, так называемых четырех «П» (поддержка, производство, переработка, продажа).

В Воронежской области на принципах софинансирования реализуется 11 программ поддержки предпринимательства, из которых только в молочном скотоводстве реализуется 5 крупных инвестиционных проектов. Построена и введена в эксплуатацию лаборатория по трансплантации эмбрионов. Для переработки животноводческих и биологических отходов, обеспечения ветеринарной безопасности запущено производство в ООО «Биотехнологии».

В Липецкой области в связи с увеличением производства картофеля в особой экономической зоне «Липецк» компанией «Белая Дача» реализуется проект по строительству завода по переработке и консервированию картофеля мощностью 15 т/ч. С целью повышения квалификации кадров молочного скотоводства на территории области организованы два учебных центра – «Школа действия» (ООО «ТРИО» Тербунского района») и Молочная бизнес-академия на территории Липецкого района.

В настоящее время эффективной формой экономического взаимодействия выступает государственно-частное партнерство (ГЧП). Вопросам формирования и развития ГЧП уделяется приоритетное внимание в Белгородской области, но пока эта форма сотрудничества слабо развита в сельском хозяйстве. Вместе с тем, развитие

государственно-частного партнерства способствует интенсификации агротуризма в современных условиях. К примеру, в Грайворонском районе Белгородской области одним из направлений диверсификации в сельской местности стал сельский туризм. С начала реализации программы сельского туризма разработано около 60 маршрутов по 9 направлениям экскурсионных туров: деревенский, краеведческий, православный, экологический, этнокультурный, спортивный, аграрный, кулинарный, спортивный. На туристическом комплексе «Лесной Хутор на Гранях» для отдыхающих действует 11 экскурсионных туров: 5 туристических программ семейного, корпоративного и индивидуального пребывания (туры выходного дня) и 6 туристических маршрутов по лесным тропам дубравы.

В Воронежской области государственно-частное партнерство получило развитие в рамках концепции развития потребительской кооперации. В перспективе планируется формирование кооперативно-государственного, кооперативно-муниципального партнерства – создание ПАО с участием субъекта Федерации, муниципальных образований.

Быстрыми темпами развивается в Липецкой области сфера туризма. Уже получили известность такие региональные туристические бренды, как «Антоновские яблоки», «Русборг», «Раненбургское застолье», «Казачья застава», «Липецкое городище», «Русская закваска». Развиваются туристско-рекреационные кластеры «Елец», «Добрый», «Шуховский», автотуристские кластеры «Задонщина» и «Ораниенбург».[2]

Понимание того, что ни государство, ни предпринимательство, ни местное самоуправление в отдельности не могут обеспечить благосостояние сельских территорий, их социально-экономическую стабильность и устойчивое развитие, предопределяет развитие социального партнерства. Наиболее актуальным направлением социального партнерства является охрана окружающей среды, расширение социальных гарантий для работников сельхозорганизаций, охрана труда и др.

Социальное партнерство, характеризующееся взаимодействием органов местного самоуправления, активно развивается в Белгородской области. Так, в Ракитянском районе в целях повышения эффективности местного самоуправления, вовлечения общественности к решению значимых территориальных проблем при главе райадминистрации, кандидате экономических наук В.Н. Перцеве образован Совет старейшин. Такой механизм нижнего звена самоуправления, позволяет не только формулировать и публично обсуждать социальные, экономические вопросы жизнедеятельности района, но и профессионально осуществлять взаимодействие труда, бизнеса и власти в повышении устойчивости сельской территории. [7]

В Курской области ООО «УК «Русский Дом», ООО УК «Объединенные кондитеры», ООО «АПХ «Мираторг», ЗАО «Агрокомплекс «Мансурово», ОАО «Михайловский ГОК» занимаются благоустройством сел, развивают социально-инженерную инфраструктуру территорий своего влияния. [1]

В Липецкой области с 2009 года проводится областная ярмарка социальных проектов НКО. За прошедшие годы в ярмарках приняли участие более 50-ти некоммерческих организаций области, их проекты поддержали 12 представителей бизнес-структур. Вместе с тем, отсутствует нормативная база формирования и оценки эффективности взаимодействия субъектов социального партнерства, отмечается низкая социальная активность сельских жителей, слабость информационной поддержки социального взаимодействия власти, бизнеса и общества. [2]

Для построения эффективного взаимодействия аграрного предпринимательства и государства необходимо совместно определять приоритеты социально-экономической, инновационной, экологической политик. На основе этого нами выделяются следующие направления взаимодействия. (рис. 1)

Экономическое взаимодействие в АПК предполагает повышение эффективности функционирования всех отраслей народного хозяйства и обеспечение высоких доходов сельского населения.

Рисунок 1 – Основные направления взаимодействия аграрного предпринимательства и государства

Аграрные предпринимательские структуры ожидают поддержку от государства в следующих формах:

- финансирования, льготного кредитования, субсидирования, создания технопарков, бизнес-инкубаторов;
- сокращения административных барьеров (упорядочение числа проверок, упрощение процедур открытия и ведения бизнеса и др.);
- обеспечения доступа к государственным заказам (заключение контрактов на поставки товаров, выполнения работ или оказания услуг для государственных, муниципальных нужд), предоставления поручительств, грантов.

Основные точки соприкосновения аграрного предпринимательства и органов управления могут касаться стратегического планирования развития отрасли сельского хозяйства; наполнения бюджета всех уровней; модернизации и инновационного развития АПК, при этом подразумевается, что поддержка будет оказываться всем формам хозяйствования.

Разработка, продвижение, тиражирование в АПК инноваций выступают как основа взаимодействия аграрного предпринимательства и государства. В частности, предметом взаимодействия может быть совместное финансирование инновационных исследовательских работ, страхование инновационных рисков, лицензирование, патентование, проведение инновационных форумов.

Эффективная политика региональных и муниципальных органов власти обуславливается выбранными формами взаимодействия предпринимательства и местных органов власти.

Нами предложена модель организационно-экономического взаимодействия органов управления и аграрного предпринимательства, содержащая формы, методы, механизмы и направления взаимодействия. (рисунок 2)

Ключевыми предпосылками для установления правового взаимодействия аграрного предпринимательства и государства являются инициатива сельхозорганизаций в области создания законопроектов и поправок к ним, стремление крупных агрохолдингов принимать участие в политических процессах.

Предпринимательские структуры в процессе взаимодействия с общественными структурами нацелены на: получение информационного обеспечения; консалтинга по правовым, налоговым, экономическим вопросам в сфере аграрного предпринимательства; представительство интересов субъектов малого и среднего предпринимательства в различных органах власти; взаимодействие с государственными органами законодательной и исполнительной власти, научными и исследовательскими учреждениями, правозащитными организациями, средствами массовой информации и др. [3]

Основные проблемы, которые волнуют предпринимательские структуры - это гарантии прав собственности и свобода от регулирования.

Социальное взаимодействие обусловлено повышением уровня и качества жизни, улучшение условий труда и направлено на обеспечение высокого качества окружающей природной среды, сохранение экологии.

Социальные задачи по развитию села можно успешно решать путем объединения усилий и ресурсов, но очень важно найти баланс интересов между сельским предпринимательством, государственной властью, местным самоуправлением и местными сообществами в вопросе об ответственности за благосостояние занимаемых территорий. Думается, что социально ответственные предприниматели самостоятельно стремятся обеспечить благополучие территории, а также организовать достойные условия жизни и труда для своих работников. В сфере пристального внимания должны быть и проблемы охраны окружающей среды в местах деятельности предприятия, благоустройство окружающей территории, создание программ поддержки для своих работников и членов их семей, развитие социальной инфраструктуры в сельских поселениях, где проживают сотрудники организации, а также в сфере образования и реализации национальных проектов, стратегии и программ развития.

Рисунок 2 – Организационно-экономическое взаимодействие аграрного предпринимательства и органов управления на различных уровнях [4]

Экологическое взаимодействие аграрного предпринимательства и государства обусловлено необходимостью сохранения и рационального использования природных ресурсов. Особую роль в решении экологических проблем играют: государство как система законодательных, исполнительных и судебных органов федерального и регионального уровня, политические партии, общественные экологические организации, предпринимательство и местное самоуправление.

Осознанное принятие обязанностей аграрными предпринимательскими структурами по охране природной среды и повышению качества жизни сельского населения осуществляется по следующим причинам:

- снижение производственных издержек в результате внедрения ресурсосберегающих технологий;
- создание положительного имиджа для привлечения новых потребителей и получения максимального дохода в будущем.

К сожалению, до настоящего времени руководители предпринимательских структур нередко отодвигают решение вопросов социально-экологической направленности на второй план, что объясняется их затратностью. В то же время такие инструменты, как экологическое страхование, сертификация, внедрение на предприятиях положений стандартов ИСО, а также социальные отчеты, содержащие экологический компонент, в первую очередь направлены на повышение конкурентоспособности организации, и, в конечном итоге, уменьшение рисков возникновения чрезвычайных ситуаций.

Безусловно решение проблем, связанных с ликвидацией экологического ущерба связано с серьезными финансовыми затратами, которые не могут быть осуществлены только за счет бюджетных средств, поэтому необходимо привлекать предпринимателей, обеспечивая экономически взаимовыгодные условия.

Широкое использование ГЧП в сфере переработки отходов отрасли животноводства возможно при разработке стабильных, прозрачных, взаимовыгодных правил взаимодействия сельского населения, государства и аграрного предпринимательства на основе равноценного разделения рисков и доходов от реализации таких проектов, которые должны быть закреплены не только в специальном законе РФ, регулирующем отношения в сфере ГЧП, но и в различных законодательных актах, относящихся к налоговому, бюджетному, земельному праву.

Заключение. Таким образом, формирование взаимодействия аграрного предпринимательства и государства обусловлено важностью назревших социально-экономических проблем, решение которых возможно путем объединения государственных и частных ресурсов. Для активизации сотрудничества аграрных предпринимательских структур органов управления необходимо развитие институциональной системы взаимодействия аграрного предпринимательства и государства, обеспечение благоприятных условий эффективного функционирования аграрных предпринимательских структур, совершенствование направлений и механизмов взаимодействия аграрного предпринимательства и государства, стимулирование развития социального партнерства, повышения социальной ответственности предпринимателей.

БИБЛИОГРАФИЯ

1. АПК Курской области – локомотив экономики региона. - [Электронный ресурс]. - http://apk.rkursk.ru/economic.html
2. Ежегодное послание высшего должностного лица субъекта Российской Федерации «Инвестиционный климат и инвестиционная политика субъекта РФ».- [Электронный ресурс]. - http://invest-lipetsk.com/pages/64
3. Маликов Р.И. Формирование механизмов эффективного взаимодействия властных и предпринимательских структур в регионе / Маликов Р.И., Сабирова Р.Р. // ПСЭ. 2011. №1. С.224-226

4. Перелетов А.А. Развитие агробизнеса в муниципальном районе: автореф.дис…канд.экон.наук: 08.00.05 / Перелетов А.А. – Воронеж, 2009. – 23 с.
5. Погудаева М. Основные формы экономического взаимодействия частного бизнеса и государства / М. Погудаева, М. Оркуша // Экономический журнал. 2012. №25.
6. Формирование инновационной системы АПК: механизм государственно-частного партнерства / Под ред. И.Г. Ушачева, И.С. Санду, В.И. Нечаева [и др.] – М.: ФГБНУ ВНИЭСХ, 2014. – 219 с.
7. Хицков И.Ф. Сельская территория и человеческий фактор / И.Ф. Хицков, В.Е. Петропавловский // Сб.науч.тр. Стратегические направления развития АПК Центрального Черноземья в условиях импортозамещения: сборник научных трудов ФГБНУ НИИЭОАПК ЦЧР России. – Воронеж: ФГБНУ НИИЭОАПК ЦЧР России, 2016. – С. 15-19.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.26

ТЕОРЕТИЧЕСКИЕ АСПЕКТЫ ОЦЕНКИ ЭФФЕКТИВНОСТИ ДЕЯТЕЛЬНОСТИ КОММЕРЧЕСКОГО БАНКА

THEORETICAL ASPECTS OF COMMERCIAL BANK'S EFFICIENCY EVALUATION

Шахватова С.А.*, кандидат экономических наук
Shakhvatova S.A., Candidate of Economic Sciences
Зарипова А.С., магистрант
Zaripova A.S., Graduate student
Российская академия народного хозяйства и государственной службы при Президенте РФ, Москва, Россия
Russian Presidential Academy of National Economy and Public Administration, Moscow, Russia
*E-mail: ssha76@mail.ru

АННОТАЦИЯ
В статье рассмотрены теоретические вопросы оценки эффективности банковской деятельности, которая в современных условиях позволяет принимать правильные управленческие решения для установления доверительных и взаимовыгодных отношений между банками и клиентами. На примере конкретного банка рассмотрены основные показатели, характеризующие эффективность деятельности.

ABSTRACT
In the article theoretical questions of an estimation of efficiency of bank activity which in modern conditions allows making correct administrative decisions for an establishment of confidential and mutually advantageous relations between banks and clients are considered. On the example of a particular bank, the main indicators characterizing the efficiency of the activity are considered.

КЛЮЧЕВЫЕ СЛОВА
Коммерческий банк, прибыль, рентабельность, эффективность деятельности.

KEY WORDS
Commercial bank, profit, profitability, efficiency of activity.

Современный уровень банковского сектора в РФ характеризуется стабильным развитием, поскольку большинство российских банков успешно преодолели последствия кризиса, улучшили качество активов, достигли базового уровня рентабельности. Этому способствовали макроэкономические условия деятельности банков: несколько увеличилась цена на нефть, оживилась деловая активность, сократился отток капитала, укрепился рубль, резко снизилась инфляция, достигнув минимального уровня за последние двадцать лет.

Выполняя различные функции, основной из которых является мобилизация и перераспределение свободных денежных ресурсов, коммерческие банки вступают в сложные взаимоотношения между собой и другими субъектами экономики, осуществляя кредитные, расчетные, депозитные и иные операции. Вместе с тем, банковская деятельность подвержена различного вида рискам, неверная оценка которых может привести к негативным последствиям, как для самого банка, так и для его клиентов. Банк России в 2016-2017 году продолжает работу по очищению банковского сектора от финансово неустойчивых организаций, неспособных обеспечить сохранность средств кредиторов и вкладчиков, поэтому крайне актуально своевременно оценить эффективность работы каждого конкретного коммерческого банка.

Необходимо отметить, что когда анализируют эффективность деятельности коммерческих банков, то эффективность конкретного банка в целом определяется исходя из близости значений показателей работы кредитной организации (например, прибыль, затраты и т. д.) к некой, уже определенной границе эффективности.

Прибыль или убыток являются количественным отражением эффективности работы банка, то есть абсолютным показателем. Однако эффективность банка характеризуется и относительными показателями, получаемыми в результате расчета финансовых коэффициентов. Данные показатели вместе с другими направлениями, и составляют базу анализа для оценки эффективности деятельности коммерческого банка. Чем больше величина прибыли и выше уровень рентабельности, тем эффективнее функционирует организация, тем устойчивее его финансовое состояние.

Таким образом, эффективность работы банка определяется рентабельностью проводимых им операций и его способностью максимизировать прибыль при соблюдении необходимого уровня рисков.

Рассчитав показатели рентабельности можно определить, сколько чистого дохода получило предприятие на единицу капитала, активов (и их отдельных составляющих), совокупного дохода, произведенных затрат. Значения показателей рентабельности находится в зависимости от показателей прибыли. При прочих равных условиях, рост прибыли всегда будет сопровождаться ростом рентабельности и, как следствие, эффективности всей деятельности организации или её отдельных направлений.

Рассматривая проблему эффективности и устойчивости банковской деятельности и обобщая все вышеизложенное, можно выделить основные направления анализа эффективности коммерческого банка, представленные в виде следующей поэтапной схемы (рис. 1).

Рисунок 1 – Схема анализа эффективности работы банка

Анализ следует начинать с исследования состава, динамики и структуры источников формирования банковских ресурсов (пассивов) и направлений их использования (активов). Это необходимо для понимания того какие активы играют определяющую роль для получения банком доходов, откуда взяты ресурсы для формирования данных активов и какова стоимость данных ресурсов. Для проведения данного направления анализа необходимо использовать методы горизонтального и вертикального анализа баланса. На втором этапе необходимо рассмотреть динамику ключевых показателей, формирующих финансовый результат банка. К таким показателям, прежде всего, относятся процентные доходы и расходы. При проведении анализа финансовых результатов необходимо учитывать, что положительной характеристикой является превышение темпов ростов доходов над темпами роста расходов.

Важным направлением анализа эффективности является расчет и оценка финансовых коэффициентов, основными из которых являются коэффициенты рентабельности. Проведя указанные выше расчеты, необходимо правильно оценить полученные результаты, определить факторы положительного и отрицательного влияния на финансовый результат; разработать мероприятия, направленные на снижение влияния негативных факторов и рост эффективности работы банка.

Таким образом, важным аспектом финансового менеджмента в любом коммерческом банке (независимо от масштабов и направлений его бизнеса) является анализ экономической эффективности, имеющей целью выявление резервов роста прибыльности банковской деятельности и формирование на этой основе рекомендаций по дальнейшей работе банка.

Рассмотрим анализ эффективности деятельности коммерческого банка на примере ПАО «Липецккомбанк».

ПАО «Липецккомбанк» работает на финансовом рынке с 1990 года. ПАО «Липецккомбанк» – средний по размеру активов банк, зарегистрированный в Липецкой области, дочерняя структура столичного банка «Зенит». Основные направления деятельности банка – кредитование и обслуживание счетов коммерческих организаций, привлечение средств граждан во вклады. В последнее время банк активно развивает направление пластиковых карт. Ключевым клиентом кредитной организации выступает ПАО «Новолипецкий металлургический комбинат». Банк имеет своей стратегической целью сохранение клиентской и ресурсной базы, контроль рисков. При этом основной акцент в развитии банка из года в год делается на улучшение качества обслуживания клиентов, развитие современных дистанционных каналов банковского обслуживания, оптимизацию региональной сети и повышении качества работающих активов.

В таблице 1 представлена динамика доходов, расходов и прибыли банка за последние годы. Общая величина доходов банка в 2014-2016 гг. имела тенденцию к снижению: 12700649 тыс. руб. в 2014 г., 14065807 тыс. руб. – в 2015 г.; 10937371 тыс. руб. – в 2016 г.

Снижение доходов в 2016 г. было связано, прежде всего, со снижением процентных доходов, доходов от банковских операций, а также операционных доходов.

В целом в 2015 году общество получило доход в размере 2,711 млрд. рублей увеличив его по сравнению с позапрошлым годом более чем на 300 млн. рублей. Больше всего финансовая компания получила процентных доходов от ссуд, предоставленных клиентам – 2,252 млрд. рублей. Меньше всего прибыли банк получил от вложений средств в ценные бумаги – 169,3 млн. рублей. Величина расходов банка в 2014 г. сложилась в сумме 12546220 тыс. руб., в 2015 г. – 15073585 тыс. руб., в 2016 г. – 11090219 тыс. руб. В 2016 г. по сравнению с 2015 г. отмечается снижение расходов банка. На это оказало влияние изменение в сторону снижения процентных расходов.

Убыток ПАО «Липецккомбанк» по итогам 2016 года по сравнению с 2015-м уменьшился в пять раз и составил 134,2 млн. рублей против 682,8 млн. руб.

Финансовый результат в отчетном периоде впервые достиг положительного значения и в 2016 году составил 63,9 млн. рублей против убытка в размере 537,7 млн. рублей в 2015 году. С начала 2016 года процентные доходы ПАО «Липецккомбанк» уменьшились на 328,2 млн. рублей и составили 2,4 млрд. рублей. Процентные расходы сократились почти в 1,4 раза и составили 1,3 млрд. рублей.

Несмотря на полученные убытки, финансовый результат банка до резервов составляет прибыль, что свидетельствует об эффективности его операционной деятельности, и подтверждает хороший уровень покрытия чистыми процентными и комиссионными доходами расходов на обеспечение деятельности. Все обязательные экономические нормативы, установленные Банком России, выполняются ПАО «Липецккомбанк» с достаточным запасом прочности. Объем высоколиквидных активов, то есть денежных средств в кассе, на корреспондентских счетах и высоколиквидных активах составляет порядка 10 млрд. руб., что также подтверждается хорошей

сбалансированностью активов и пассивов по срокам на краткосрочном и среднесрочном горизонтах.

Таблица 1 – Доходы, расходы и прибыль ПАО «Липецккомбанк» (тыс. руб.)

Наименование	2014 г.	2015 г.	2016 г.	Абсолютное отклонение, тыс.руб.		Относительное отклонение, проц.	
				2015 г. от 2014 г.	2016 г. от 2015 г.	2015 г. к 2014г.	2016 г. к 2015г.
1. Процентные доходы	2338931	2674424	2365894	335493	-308530	114,3	88,5
2. Другие доходы от банковских операций	442190	407787	12528	-34403	-395259	92,2	3,1
3. Доходы от восстановления резервов на возможные потери	0	0	3223417	0	3223417	-	-
4. Доходы от операций с ценными бумагами	896	2916	1662	2020	-1254	325,4	57,0
5. Положительная переоценка	6771601	6651493		-120108	-6651493	98,2	0,0
6. Другие операционные доходы	3127283	4283871	355839	1156588	-3928032	137,0	8,3
7. Всего операционные доходы	9899780	10938280	5335512	1038500	-5602768	110,5	48,8
8. Прочие доходы	19748	45316	53771	25568	8455	229,5	118,7
9. Всего доходов	12700649	14065807	10937371	1365158	-3128436	110,7	77,8
10. Процентные расходы	483117	1825714	1327388	1342597	-498326	377,9	72,7
11. Другие расходы	56359	40148	3731046	-16211	3690898	71,2	9293,2
12. Расходы по операциям с ценными бумагами	1251	3121	9266	1870	6145	249,5	296,9
13. Отрицательная переоценка	6774686	6648491	4509948	-126195	-2138543	98,1	67,8
14. Другие операционные расходы	3624110	5745423	626544	2121313	-5118879	158,5	10,9
15. Расходы, связанные с обеспечением деятельности кредитной организации	765349	763901	886019	-1448	122118	99,8	116,0
16. Всего операционные расходы	11165396	13160936	6031777	1995540	-7129159	117,9	45,8
17. Всего расходов	12546220	15073585	11090219	2527365	-3983366	120,1	73,6
18. Прибыль (убыток) до налогообложения	178639	-937860	-117798	-1116499	820062	-525,0	12,6
19. Налог на прибыль	109129	-255028	16352	-364157	271380	-233,7	-6,4
20. Прибыль за отчетный период	69510	-682832	-134150	-752342	548682	-982,4	19,6
21. Финансовый результат за отчетный период	69510	-537677	63893	-607187	601570	-773,5	-11,9

Основные факторы, влияющие на изменение доходов банка:

1. Снижение объема вложений юридических лиц в 2016 г. практически достигло 7%. Таким образом, средства клиентов к отчетной дате составили 19,6 млрд. рублей.

2. Вклады физических лиц и индивидуальных предпринимателей также сократились на 1,1 млрд. рублей и по итогам 2016 года остановились на отметке в 15,4 млрд. рублей.

3. Чистая ссудная задолженность за 2016 год сократилась на 8,5% и составила 14,9 млрд. рублей. Стоит также отметить, что ПАО «Липецккомбанк» часто предоставляет кредиты администрации Липецка на погашение дефицита бюджета. В октябре 2016 года банк выиграл аукцион на право предоставления чиновникам трех кредитных линий объемом 600 млн. рублей в среднем под 9,3% годовых.

4. Активы банка по итогам 2016 года сократились на 860 млн. руб., по итогам 2015 года – уменьшились до 24 млрд. рублей (25,4 млрд. рублей в 2014–м). Объем

пассивов также немного снизился – с 22,9 млрд. в 2014 году до 22,1 млрд. рублей в 2015-м.

Как отмечалось, об эффективности деятельности банка также можно судить по показателям рентабельности. На рисунке 2 представлена динамика рентабельности активов и капитала ПАО «Липецккомбанк».

В 2014 г. показатели рентабельности банка были положительными, хоть и имели низкие значения. В 2015 и 2016 г. значения показателей рентабельности были отрицательными, что свидетельствует об убыточности деятельности банка в этот период.

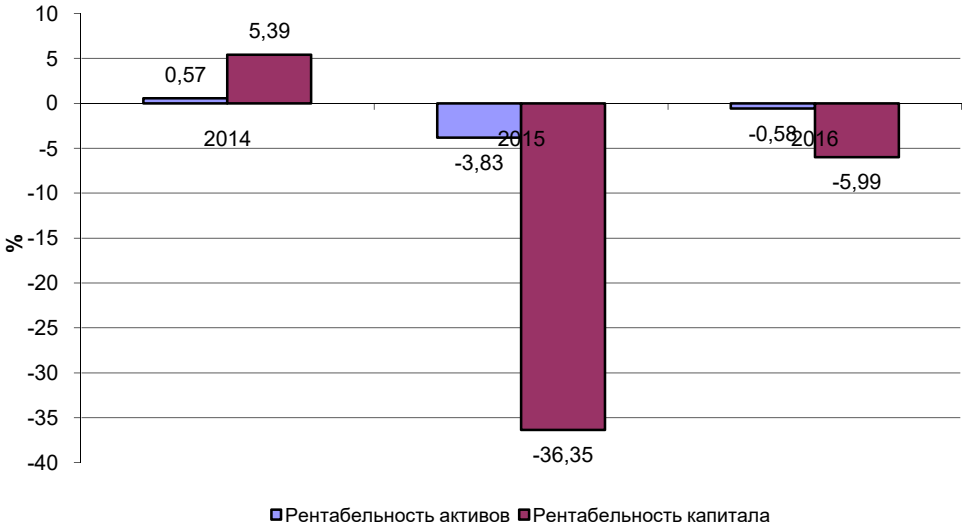


Рисунок 2 – Динамика рентабельности активов и собственного капитала ПАО «Липецккомбанк»

На рисунке 3 представлена динамика чистой процентной маржи и доходности ссудных операций.

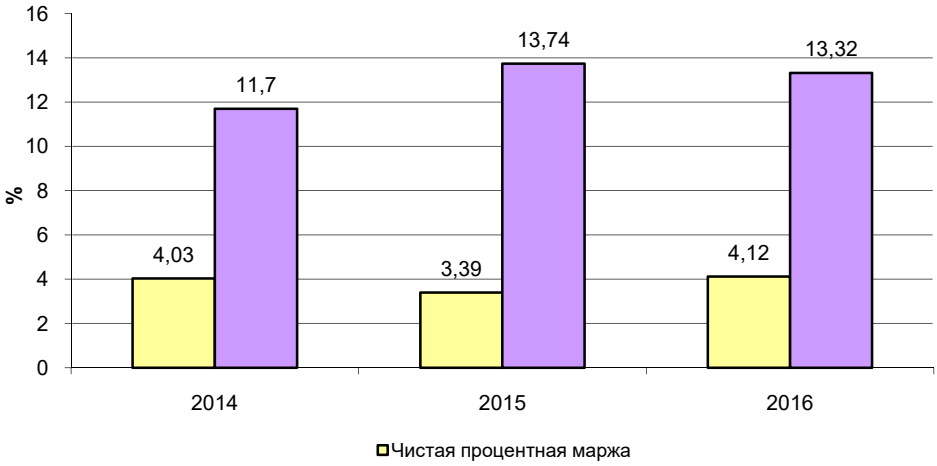


Рисунок 3 – Динамика чистой процентной маржи и доходности ссудных операций ПАО «Липецккомбанк»

Чистая процентная маржа в 2014 г. составила 4,03%, в 2015 г. – 3,39%, в 2016 г. – 4,12%. Наблюдается положительная динамика данного показателя, что оценивается положительно.

Ссудные операиции банка являются доходными, о чем свидетельствуют значения показателя доходности ссудных операций и его динамика.

Основными факторами, которые определяют уровень доходов и расходов банка, являются: стагнация экономики страны, что приводит к ухудшению качества кредитного портфеля и существенно ограничивает потенциал роста банковской системы; ужесточение регуляторных норм; рост конкуренции в российском банковском секторе; уровень инфляции; рыночные процентные ставки; кредитные риски; случайные или преднамеренные действия физических и (или) юридических лиц, направленные против интересов Банка; несовершенство организационной структуры Банка в части распределения полномочий подразделений и служащих, порядков и процедур совершения банковских операций и других сделок, их документирования и отражения в учете, несоблюдение служащими установленных порядков и процедур, неэффективность внутреннего контроля; сбои в функционировании систем и оборудования; неблагоприятные внешние обстоятельства, находящиеся вне контроля банка.

Конкурентными преимуществами ПАО «Липецккомбанк» оказывающими положительное влияние на его финансовые результаты, являются:

– заработанная положительная репутация на региональном рынке;

– обслуживание одного из самых крупных предприятий металлургии страны – ПАО «НЛМК» и связанных с ним клиентов;

– собственный процессинговый центр по обслуживанию банковских карт;

– большой опыт обслуживания клиентов и доверительные, личные связи менеджмента Банка с региональными клиентами и т.д.

Стабильность банка в ближайшей перспективе зависит во многом от темпов дальнейшего развития российской экономики, включая динамику реальных располагаемых доходов населения и финансовой результат корпоративного сектора экономики.

Приоритетной задачей ПАО «Липецккомбанк» в среднесрочной перспективе является повышение эффективности банковской деятельности, привлечение дополнительного капитала, сохранение финансовой устойчивости.

Таким образом, ПАО «Липецккомбанк» является средним российским банком. По оказываемым услугам банк в основном привлекает клиентские деньги, причем больше средств населения, а вкладывает средства в основном в кредиты.

Высокая деловая репутация банка, длительная история успешной работы на финансовом рынке, масштаб проводимых операций и темп их роста являются свидетельством наличия значительного запаса прочности и устойчивости перед негативными внешними факторами.

БИБЛИОГРАФИЯ

1. Анализ банков. URL: http://analizbankov.ru/bank.php?BankId=lipeckkombank–1242&BankMenu=nadezhnost&fform=kexpress
2. Вяленцева Н.И. Модель оценки эффективности деятельности коммерческих банков // Банковское дело. 2015. №2. С.64.
3. Илкин Н. С. Эффективность деятельности коммерческих банков // Научно–методический электронный журнал «Концепт». 2016. Т. 34. С. 122–126.
4. Лаврушин О.И., Ветрова Т.Н. Эффективность банковской деятельности // Банковское дело. 2015. №5. С.38.
5. Банк России сегодня. URL: http://www.cbr.ru/today/?PrtId=impbank/
6. Трошин В. А. Оценка эффективности деятельности коммерческого банка // Инновационная экономика: материалы Междунар. конф. Казань: 2014. С. 69–72.
7. Официальный сайт ПАО «Липецккомбанк» http://www.kombank.ru

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.27

МЕХАНИЗМ ОБЕСПЕЧЕНИЯ ПРОИЗВОДСТВА ЭКОЛОГИЧЕСКИ БЕЗОПАСНОЙ ПРОДУКЦИИ СЕЛЬСКОГО ХОЗЯЙСТВА

THE MECHANISM FOR ENSURING THE PRODUCTION OF ENVIRONMENTALLY FRIENDLY AGRICULTURAL PRODUCTS

Кузубов А.А., кандидат экономических наук
Kuzubov A.A., Candidate of Economic Sciences
Владивостокский государственный университет экономики и сервиса, Владивосток, Россия
Vladivostok State University of Economics and Service, Vladivostok, Russia
E-mail: alexceyk@gmail.com

АННОТАЦИЯ

Целью исследования является обоснование основ организационно-технологического механизма обеспечения производства экологически безопасной сельскохозяйственной продукции и выделение основных его характеристик. Формирование основных предпосылок создания рациональной экологически безопасной организационно-хозяйственной системы в аграрной отрасли является базой для дальнейшей разработки методического инструментария осуществления оценки эффективности экологической составляющей в контексте развития агропродовольственной сферы.

ABSTRACT

The aim of the study is justification of the foundations of the organizational and technological mechanism to ensure production of ecologically safe agricultural products and highlighting its main characteristics. The formation of the main prerequisites of creation of ecologically safe rational organizational-economic system in the agrarian sector is the basis for the further development of methodological instruments of assessment of effectiveness of environmental component in the context of the agro-food sector development.

КЛЮЧЕВЫЕ СЛОВА

Экологически безопасное аграрное производство, организационно-технологические основы, механизм, конкурентоспособность продукции, стратегические цели.

KEY WORDS

Ecologically safe agricultural production, organizational and technological basis, mechanism, product competitiveness, strategic goals.

Обеспечение экологической безопасности продуктов питания – глобальная проблема, поскольку затрагивает не только здоровье человека, но и влияет на всю экономику страны. Качество продуктов питания влияет на уровень жизни, социальную активность человека, а также и на демографический аспект ее существования. Поэтому, чтобы обеспечить высокий уровень жизни человека в государстве, развитие экономики, экологической безопасности продуктов питания необходимо уделять повышенное внимание.

Сегодня экологическая безопасность сельскохозяйственной продукции должна обеспечиваться путем реализации системы социально-экономических, организационно-технологических и других мероприятий, которые базируются на научных исследованиях влияния и возможных вредных последствиях применения новых научных технологий в агропромышленном комплексе (санитарные и ветеринарные мероприятия, соблюдение процедур соответствия, маркировки и сертификации, параметры безопасности продукции, меры экономического стимулирование и другие).

Учитывая экологическую и социальную значимость экологически безопасного производства сельскохозяйственной продукции, проблематика, что касается обеспечения организационно-технологических основ такого производства является достаточно актуальной.

Относительно научной литературы, то здесь существуют различные подходы к определению сущности экологизации. В частности, С.Н. Бобылев отмечает, что «понятие экологизации общественного производства, которое введено в научный оборот относительно недавно, имеет неоднозначное толкование». Автор убежден, что «его суть недостаточно четко раскрыта и обоснованная как с философской позиции, так и с точки зрения экономики» [1].

Отдельные исследователи отмечают, что «экологизация общественного производства имеет количественную и качественную определенность и выраженная целостной системой натуральных и стоимостных (эколого-экономических) показателей [2].

Философское экономико-естественное определение экологизации дает Н.В. Шехова, которая трактует ее «как создание устойчивой социо-эколого-производственной системы, находящейся в состоянии динамического равновесия и в которой главным критерием эффективности развития является качество жизни человека и общества в целом, которая учитывает материальное, физическое и духовное развитие» [3].

Непосредственно с сохранением здоровья человека и качества окружающей среды связывает определение экологизации продовольственного комплекса А.С. Астахов., под которой он видит «процесс внедрения технических, технологических, управленческих, экономических и других решений, которые смогут обеспечить нормальное восстановление, рациональное использование всех видов ресурсов, охрану окружающей природной среды, а также способствовать нормальной жизнедеятельности и работоспособности населения, поскольку питание имеет наиболее важное значение среди условий окружающей среды, которые постоянно влияют на человеческий организм» [4].

Однако до настоящего времени не проведена систематизация и четкое разграничение организационно-технологических основ относительно особенностей обеспечения производства экологически безопасной и традиционной сельскохозяйственной продукции, не разграничены их общие черты и различия.

На основании анализа научных публикаций как отечественных, так и зарубежных ученых нами обобщены понимание и определено понятие «экологическая безопасность». Установлено, что это:

– составляющая глобальной и национальной безопасности природного или техногенного характера;

– состояние развития общественных отношений и состояние окружающей природной среды, которое обеспечивает защиту интересов, жизни и здоровья человека от вредного воздействия, совокупность мероприятий, предусмотренных действующим законодательством;

– понятие, которое должно базироваться на постоянных научных исследованиях влияния и последствиях внедрение современных технологий в экологической сфере.

Относительно экологической безопасности и экологически безопасной сельскохозяйственной продукции, данные понятия соотносятся как общее и частичное. При этом, технология, которая используется при производстве экологически безопасной сельскохозяйственной продукции должна обеспечивать:

– во-первых, безопасные условия труда для человека, повышать ее производительность и культуру;

– во-вторых, производство качественной продукции и не причинять вреда здоровью животных;

– в-третьих, не осуществлять разрушительное воздействие на окружающую среду.

В технологиях производства сельскохозяйственной продукции, особенно в растениеводстве, в последние годами происходят значительные изменения, суть которых заключается в биологизации земледелия, уменьшении ресурсоемкости выполнения технологических операций, повышении экологической безопасности. Главными факторами, которые влияют на развитие технологий производства продукции и формирования технологической политики в аграрном секторе, являются: почвенно-климатические условия; требования агротехники выращивания сельскохозяйственных культур по параметрам качества и сроков выполнения технологических операций; стоимость материально-технических, энергетических и трудовых ресурсов; финансово-экономическое состояние отрасли; уровень материально-технического и кадрового обеспечения.

Растениеводство и земледелие, в которых преобладают биологические и агротехнические мероприятия и приемы выращивания сельскохозяйственных культур, в последнее время стали называть биологическими. В литературе встречаются разные его названия – альтернативное, экологическое, органо-биологическое, система АНОГ [5,6,7]. Однако их суть и цель одна - производство экологически чистой продукции и чистота окружающей среды.

Преимуществами экологического земледелия является то, что:

– полученные продукты питания являются экологически безопасными, более полноценными в пищевом отношении, повышают способность защитных систем организма человека противодействовать неблагоприятной воздействия окружающей среды;

– корма, выращенные по технологиям экологического земледелия, повышают производительность животноводства;

– экологическое земледелие и животноводство является ключевым фактором экологической безопасности сельских территорий.

Основным критерием разделения сельскохозяйственной продукции на экологически чистую и экологически безопасную целесообразно считать процесс производства такой продукции.

Организационно-технологические особенности производства экологически безопасной продукции сельского хозяйства можно рассмотреть по технологиям выращивания отдельных культур в растениеводстве, в частности, пшеницы, кукурузы, гречихи и подсолнечника. Способ выращивания этих культур по-обычному и экологически безопасному типу имеет некоторые отличия. Они заключаются в различиях обработки почвы, методах удобрения, способах посева, борьбы с сорняками, выращивания и сбора культур.

При экологически безопасной технологии выращивания данных культур большое значение имеет основной обработку почвы. Его проводят с учетом предшественника, типа почвы, рельефа, степени и особенностей засоренность поля. Для получения запланированного урожая с минимальным использованием органических средств защиты растений или вообще без них необходимо решить следующие вопрос: обеспечить чистоту посевов, сформировать заданную густоту растений к уборке и уменьшить полеганию растений в период уборки урожая.

Так, благоприятными в экологическом отношении являются полосовые посевы гречихи с озимой рожью и просом.

При посеве гречихи с просом строками, чередующихся ее урожай увеличивается на 6-7 ц/га. Для получения высокого и экологически чистого урожая семян подсолнечника необходимо размещать после озимой пшеницы, яровых зерновых, кукурузы. Возвращать на прежнее место допустимо не раньше как через 7-9 лет.

Используя метод проращивания среднего образца почвы, можно заранее планировать интенсивность борьбы с сорняками. Если в образце заранее отобранного грунта из слоя 0-10 см по 25-30 дней прорастает менее 10 шт на 1 м^2 лестницы сорняков, агротехнических приемов вполне достаточно. Если прорастает 10-50 шт – это средняя засоренность, при которой можно внести полосами альтернативное средство защиты растений от сорняков. При прорастании более 50 ростков поле,

использовать для получения экологически безопасной продукции нецелесообразно [8,9].

Для получения экологически безопасной продукции категорически запрещается размещать растения вдоль шоссейных дорог. Расстояние от посева до трассы должна быть не менее 0,5 км.

Важное значение для получения дружных, выровненных всходов имеет соблюдение равномерной глубины заделки семян, которые обеспечивается тщательным выравниванием почвы и правильным регулированием сеялки на заданную глубину.

Основной целью обработки почвы в засушливых районах является сохранение влаги на время сева сельскохозяйственных культур, в районах достаточного увлажнения – борьба с сорняками, качественная заделка послеуборочных остатков и удобрений.

Так, считается, что при правильном использовании почвы ее плодородие не теряется, а наоборот, повышается. Поэтому закон так называемой убывающей плодородия почвы, сформулированный учеными в XVIII в., уже Д. И. Менделеев определил, как необоснованный. Это отражено также в трудах экономистов конца XIX – начала XX века. Практика современного земледелия полностью это подтвердила: плодородие почвы можно удерживать на определенном уровне, снизить неудовлетворительной агротехникой и повысить, выращивая высокие урожаи [10, 11, 12].

Поэтому для создания рациональной экологически безопасной организационно-хозяйственной системы растениеводства необходимо учитывать:

– качество земельных ресурсов и особенности землепользования;

– агроклиматический потенциал отрасли (почвы, продолжительность вегетационного периода растений, тепловой режим, количество осадков, их распределение по месяцам, периодам вегетации);

– возможное направление специализации вновь создаваемого хозяйства и оценку целесообразности существующей специализации;

– основные культуры и структуру посевных площадей, севообороты, организацию производственных процессов с учетом размеров землепользования и специализации хозяйства;

– материально-техническую базу.

Уже сегодня, по нашему мнению, нужно внедрять экологические стандарты в сельскохозяйственную практику в первую очередь в тех районах где уже созданы или будут создаваться природоохранные территории. Особенно, это актуально для национальных природных парков России, где хозяйственные зоны занимают площадь 50-60% всей территории парка.

Нужно также сохранить культурные геосистемы с высоким биоразнообразием в пределах парков, возникновение и существование которых напрямую зависит от традиционного сельскохозяйственного использования; постепенно переходить к экологическому фермерству в пределах природоохранных территорий смешанного типа. Это приведет к реализации концепции интеграции, то есть внедрение и соблюдение определенных природоохранных мероприятий в природопользовании для сохранения окружающей среды и охраны биоразнообразия регионов.

Под экологическим фермерством мы понимаем такую систему сельского хозяйства, которая полностью зависит от имеющихся природных ресурсов, экологического баланса окружающей среды и развития биологических процессов, поддержки его оптимума. Естественное плодородие почв является первоосновой такого хозяйствования. Внесение органических удобрений (их количество четко оговорена) обеспечивая природный баланс почв.

На экологических фермах – всех без исключения – необходимо категорически запретить использование химических и минеральных удобрений, пестицидов и гербицидов. Для поддержания и восстановления естественной плодородия почв также нужно использовать различные системы севооборотов с участием бобовых), метод

замкнутого цикла питательных веществ (комбинация зернового хозяйства и животноводства без привнесения веществ извне). При таком ведении сельского хозяйства не возникают те экологические проблемы, которые являются типичными для обычных фермерских хозяйств.

Поскольку производительность угодий также зависит от природных свойств почвы, фермеры должны принимать меры по защите почв от эрозии, применяя для этого специальные технологии.

К сожалению, переход к экологическому земледелию в России осуществляется очень медленно, что обусловлено соответствующими причинами. В целом, сегодня можно выделить следующие слабые стороны экологически безопасного хозяйства:

1. Отсутствие законодательного признания экологически безопасного сельского хозяйства.

2. Незадействованная государственная система поддержки экологических хозяйств, несмотря на Закон РФ о торговле №381-ФЗ, изданный 28.12.2009 г.

3. Недостаточная обоснованность стандартов эко продукции, ее необязательность в маркировке.

4. Медленно внедряются новые технологии экологического производства.

5. Существуют недостатки в удовлетворении потребностей экологических хозяйств в специальной технике, альтернативных удобрениях, которые защищают растения от вредителей среды.

6. В стране не производится достаточное количество экологической продукции, необходимой для расширения ее переработки и экспорта.

7. Отсутствует кооперация производителей данной продукции.

8. Ограниченность информации о пользе употребления экологически безопасных и естественных продуктов.

9. Отсутствует соответствующая инфраструктура в системе реализации экологической и природной продукции, нет систематических исследований внутреннего и внешнего рынка, не используются элементы маркетинга.

10. Экологическая безопасность хозяйствования более понятное как элемент охраны природы, а не как перспективная отрасль хозяйствования.

11. Отсутствует региональная специализация экологического хозяйства.

12. Фермеры не имеют достаточных знаний относительно эко технологий и хозяйственных управлений.

13. Не проведена оценка конкурентоспособности продукции, производимой в экологических хозяйствах переходного периода.

14. Нет специальной системы консультирования экологических хозяйств, а в действующих консультативных инстанциях не хватает специалистов, которые могут предоставлять советы по-экологически безопасном хозяйствовании.

15. Сельские жители, не имея элементарных знаний в сфере охраны природы, не желая того, загрязняют среду, что влечет за собой ухудшение состояния их здоровья, увеличения загрязнения поверхностных и подземных вод, уменьшение стабильности природных экологических систем.

Таким образом, сегодня сельскохозяйственные товаропроизводители, которые переходят или перешли на производство экологически безопасной аграрной продукции должны сформировать ряд стратегических целей для достижения успехов в данном виде деятельности (табл. 1).

При этом, организационно-технологический механизм обеспечения экологически безопасной сельскохозяйственной продукции предусматривает целесообразность внедрения соответствующей технологии ведения сельского хозяйства путем принятия долгосрочной программы внедрения технологий ведение экологически безопасного (органического) сельского хозяйства.

Требуют дополнительного изучения и возможности бухгалтерского и статистического учета информации относительно производства экологически безопасной продукции. Ведь отсутствие в условиях четкой официальной информации о количестве производителей, объемов производства и реализации такой продукции

делает невозможным управление эффективностью отрасли. В основу для разработки такой информационной базы должны быть положены национальные стандарты экологического производства и технология производства экологической продукции, их интеграция в международную систему, использование зарубежного опыта при проектировании отчетных форм. Именно дополнения действующих форм статистических наблюдений такими показателями, как площадь угодий, занятая под экологическим земледелием, валовой сбор сельскохозяйственных культур, выращенных на них, объемы, цены и направления реализации (в т.ч. экспорт) экологически безопасной продукции, по нашему мнению, позволит реально оценить масштабы и эффективность такого производства в государстве на современном этапе и будет иметь перспективы для применения в будущем [13,14].

Таблица 1 – Стратегические цели предприятия, которое желает заниматься или занимается производством экобезопасной сельскохозяйственной продукции

Обучение и развитие	Бизнес-процессы	Клиенты и заинтересованные стороны	Финансы	Органический баланс
Хранить, накапливать, постоянно расширять знания в области экологического производства продуктов питания	Адаптировать управление сельским хозяйством к местных условиям, среды, культуры.	Потребители: обеспечить высокое качество производимой продукции, обеспечить разнообразие товарного ассортимента	Достичь высокого качества продукции при минимальных затратах	Улучшить показатели здоровья человека, увеличить уровень «экологичности» предприятия и окружающей среды
Отбирать лучшие технологии, которые дают возможность внедрять максимально качественные, технологические услуги и продукты клиентам	Разработать технологию ведения экологически безопасного сельского хозяйства, основой которого является замкнутый цикл производства	Общество: формировать положительное отношение к своему бизнесу собственной деятельностью	Завершать производственные проекты в срок с запланированным положительным эффектом	Добиваться удовлетворения «потребностей» почвы в процессе ведения бизнеса
Обеспечить на основе полученных знаний здоровое, безопасное и экологическое сельское хозяйство	Разработать и ввести систему управления хозяйством, основанную на органических стандартах и принципах менеджмента качества	Поставщики: строить взаимовыгодные отношения с поставщиками	Улучшать финансовое состояние предприятия	Поддерживать и постоянно совершенствовать достигнутые показатели экологически безопасного сельского хозяйства
Разрабатывать и вводить новые подходы к производству экологически безопасных продуктов, разработки и введение стандартов экологически безопасного производства и переработки	Разработать и ввести систему управления безопасностью пищевых продуктов	Персонал: быть примером положительного мышления, здорового образа жизни и ценностей Хартии ведения органического сельского хозяйства	Проводить стажировку работников в развитых странах мира для приобретения опыта ведения хозяйствования	Способствовать развитию новой культуры и применению лучших мировых практик органического земледелия в российские хозяйства

Кроме этого, организационно-технологический механизм обеспечения экологической безопасности сельскохозяйственной продукции, который предусматривает введение на селе экологического земледелия, наиболее тесно связан с обеспечением конкурентоспособности сельских территорий [15].

Таким образом, основными задачами в развитии отрасли экологически безопасного аграрного производства на современном этапе являются:

– обеспечение производства качественной, экологически безопасной продукции с минимальными энергетическими и трудовыми затратами при максимальном выходе ее

за единицу времени, на единицу биологических активов, что требует широкого внедрения сортовых, интенсивных, энерго - и ресурсосберегающих экологически целесообразных технологий;

– сочетание интенсивного производства аграрной продукции с комплексом агротехнических, агрохимических и мелиоративных мероприятий по сохранению и воспроизводству плодородия почв, биологических активов растительного и животного происхождения;

– производство аграрной продукции на базе современной совершенной и высокопроизводительной сельскохозяйственной техники, и высокоэффективной ее эксплуатации;

– борьба с потерями урожая при выращивании полевых культур, уборки и перевозки урожая, а также потерями животноводческой продукции во время хранения, транспортировки и первичной переработки;

– экономное и высокоэффективное применение органических удобрений, воды для орошения, средств защиты растений, комплекса противоэрозионных мероприятий, горюче-смазочных материалов, кормов, энергии др.

Выводы и перспективы дальнейших исследований. В процессе исследования установлено, что переход экологически безопасного сельского хозяйства крайне необходим России. Он будет способствовать развитию производства экологически безопасной сельскохозяйственной продукции, оздоровлению нации, а также даст возможность России занять достойную нишу в производстве и реализации экологически безопасной продукции на рынках Европы и мира. Все выше сказанное обуславливает чрезвычайную важность, уже сегодня, изменения регуляторной политики государства и внедрения системы экономического стимулирования политики экологически безопасного производства на отечественных предприятиях.

Выявлено, что исследования в этом направлении требуют дальнейшего более глубокого продолжение, исходя из потребностей и возможностей российского природоохранного законодательства, а также экологического развития институциональных основ государства. Разработка действенных механизмов активизации и внедрение концепции экологически безопасного производства на отечественных предприятиях должна быть непрерывным и налаженным процессом.

БИБЛИОГРАФИЯ

1. Бобылев С.Н. Экономика природопользования: Учебник. – М.: ИНФРА – М, 2013 – XXVI, 501 с.
2. Эколого-экономическая сбалансированность регионального развития: методологические и методические основы. Монография под ред. д.э.н., профессора М.Ф. Замятиной. СПб.: ИПРЭ РАН, ГУАП, 2013, 142 с
3. Шехова Н.В. Экологизация потребления в целях уменьшения экологического ущерба. // Экономика и менеджмент организации.2013. №8(106) с.59-63
4. Астахов А.С. Экологическая безопасность и эффективность природопользования / А.С. Астахов, Е.Я. Диколенко, В.А. Харченко. - Вологда: Инфра-Инженерия, 2009. - 323 с.
5. Крупкин П.И. Черноземы Красноярского края: Монография / П.И. Крупкин; Красноярск: КрасГАУ, 2002 – 332 с.
6. Блохин, В.Д. Научные основы земледелия на Дальнем Востоке России / В.Д. Блохин, А.А. Моисеенко, В.М. Ступин. - Владивосток: Дальнаука, 2011. - 216 с.
7. Дзюин, А.Г. Влияние длительного применения систем удобрений на баланс питательных ве¬ществ в почве / А.Г. Дзюин, Г.П. Дзюин // Агрохимический вестник, 2015. - № 6. - С. 14-17.
8. Кузубов А. А., Шашло Н. В., Чжан Ю. Функциональная роль экономического анализа в условиях инвестиционно-инновационного развития аграрной экономики // Научное обозрение: теория и практика. 2017. №8. С. 76-86.

9. Фаринюк Ю.Т. Организационно-экономические условия инновационного развития аграрного производства: монография. Тверь: АгросферА, 2011. 158 с
10. Фоменко Г.А. Экологические риски в устойчивом развитии и "зеленой" экономике // Сборник материалов VI Всероссийской с международным участием научно-практической конференции Формирование и реализация экологической политики на региональном уровне. Изд-во Академии Пастухова, 2013. С. 197-202.
11. Шайдаева Д.А. Экономический потенциал агропромышленного предприятия: сущность и структура / Д.А. Шайдаева // Проблемы развития АПК региона. - 2012. - №12. - С. 165 - 174.
12. Kuzubov A.A. Development factors of the biotechnological products' market in the world economy // Russian Journal of Agricultural and Socio-Economic Sciences. 2017. Т. 65. № 5. С. 20-25.
13. Григорьева И.Ю. Основы природопользования. – М.: Инфра – М, 2013. – 336 с.
14. Матвеев Д.М. Повышение эффективности государственной поддержки технического переоснащения сельского хозяйства/ Матвеев Д.М., Стадник А.Т., Крохта М.Г.//Вестник НГАУ. -2012. -Том -3 -№ 24. –С132–136.
15. Лукина А.В., Похвощев В.А. Упущенные возможности роста: недофинансирование «зеленой» экономики России // Научные Труды Вольного экономического общества России. 2015. № 1 (190) . С. 315- 325.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.28

ОСОБЕННОСТИ РЕАЛИЗАЦИИ ИННОВАЦИОННОГО ПОТЕНЦИАЛА ФЕРМЕРСКИХ ХОЗЯЙСТВ РОССИИ

FEATURES OF REALIZATION OF INNOVATIVE POTENTIAL OF FARMS IN RUSSIA

Кравченко Т.С., **Сухочева Н.А.***, кандидаты экономических наук
Kravchenko T.S., Sukhocheva N.A., Candidates of Economic Sciences
Орловский государственный аграрный университет, Орел, Россия
Orel State Agrarian University, Orel City, Russia
*E-mail: suhoceva@bk.ru

АННОТАЦИЯ
Фермерские хозяйства играют значительную роль в формировании продовольственной безопасности сельского хозяйства, определяют значительную долю в валовом национальном продукте. Основным регулятором развития данной организационно-правовой формы хозяйствования является государственная поддержка, которая в настоящее время осуществляется на основе реализации федеральной и областных программ развития сельского хозяйства и регулирования рынков сельскохозяйственной продукции, сырья и продовольствия на период до 2020 года.

ABSTRACT
Farmers play a significant role in the formation of food security of agriculture and determine a significant share in the gross national product. The main regulator of the development of this organizational and legal form of management is state support, which is currently implemented through the implementation of federal and regional agricultural development programs and regulation of markets for agricultural products, raw materials and food for the period until 2020.

КЛЮЧЕВЫЕ СЛОВА
Сельское хозяйство, объемы производства, инновации, государственная программа, субсидии, рынок.

KEY WORDS
Agriculture, production volumes, innovations, state program, subsidies, market.

В настоящие время одной из актуальной проблемы является самообеспечение страны и ее регионов высококачественными продуктами питания. Особая роль принадлежит сельскому хозяйству, являющейся важным сектором экономики народного хозяйства, производящей существенную часть товаров потребления. Крестьянские (фермерские) хозяйства, несмотря на их неоднозначные характеристики, заняли достойное место в социально-экономическом развитии сельских территорий страны (табл. 1).

Немаловажно отметить, что увеличение производства продукции в К(Ф)Х за последние шесть лет происходило достаточно быстрыми темпами - среднегодовой темп роста составил 54,2 % [15]. Наибольший удельный вес при производстве сельскохозяйственной продукции фермерскими хозяйствами приходится на продукцию растениеводства, так как затраты на воспроизводство значительно меньше. С помощью эконометрического моделирования, возможно изучить силу и характер влияния основных факторов на выход валовой продукции сельского хозяйства в Орловской области [1]. Таким образом, вышеприведенные данные доказывают значительное влияние КФХ на развитие сельского хозяйства, и в частности, на создание валовой продукции в стране [18].

Уровень жизни так же, как и размер заработной платы определяется масштабом и эффективностью производства, состоянием научно-технического прогресса. [4].

Малое предпринимательство является, одним из ключевых элементов устойчивого развития российской экономики, способствующего формированию «здоровой» конкурентной среды, увеличению производства внутреннего валового продукта, обеспечению занятости населения, росту его реальных доходов, повышению качества жизни [9]. Можно говорить, что развитие малого аграрного сектора экономики является одним из основных направлений экономического роста Российской Федерации в ближайшие десятки лет. В данный момент времени малый агробизнес во всех регионах страны является не только одним из основных структурных подразделений, но и ценным помощником в материальном обеспечении местного бюджета.

Таблица 1 – Производство продукции сельского хозяйства в Российской Федерации (в фактических ценах, млрд. руб.) [7]

Категории хозяйств	Годы							Среднегодовой темп роста, %
	2010	2011	2012	2013	2014	2015	2016	
Хозяйства всех категорий, в т.ч.	2587,8	3261,7	3339,2	3687,1	4319,1	5165,7	5626,0	113,8
растениеводство	1191,5	1703,5	1636,4	1918,8	2222,5	2791,4	3170,5	117,7
животноводство	1396,3	1558,2	1702,8	1768,3	2096,6	2374,3	2455,5	109,9
Сельхоз. организации, в т.ч.	1149,9	1540,6	1600,8	1756,0	2139,0	2658,0	2970,5	117,1
растениеводство	485,9	775,4	738,1	840,6	974,1	1307,1	1573,4	121,6
животноводство	664,1	765,2	862,7	915,4	1164,9	1350,8	1397,1	131,2
Хозяйства населения, в т.ч.	1250,5	1426,9	1440,9	1569,8	1750,3	1932,8	1953,3	107,7
растениеводство	572,1	699,0	676,9	800,4	917,9	1024,2	1019,8	110,1
животноводство	678,3	727,9	763,9	769,3	832,4	908,5	933,5	105,4
К(Ф)Х, ИП, в т.ч.	187,3	294,2	297,5	361,3	429,7	575,0	702,2	124,6
растениеводство	133,5	229,1	221,3	277,8	330,4	460,0	577,3	127,7
животноводство	53,9	65,2	76,1	83,6	99,3	115,0	125,0	115,0

Благодаря развитию малых форм хозяйствования население получает дополнительную материальную поддержку. При этом уменьшаются расходы на обеспечение населения трудоустройством. Стоит задуматься о том, что все расходы государства на поддержку малого агробизнеса, со временем докажут существующий макроэкономический эффект. Следовательно, на экономический рост в государстве, непосредственно влияет развитие и активное участие малых форм хозяйствования. Именно благодаря малому бизнесу, экономика страны быстро приспосабливается к различным экономическим обстановкам [10].

Приоритетными направлениями развития К(Ф)Х являются:

- развитие инфраструктуры хранения, транспортировки, первичной переработки и сбыта сельскохозяйственной продукции: возмещение части затрат на уплату процентов по кредитам и субсидии на создание инфраструктуры;
- развитие инновационных процессов в крестьянских (фермерских) хозяйств: элитное семеноводство, племенное скотоводство и субсидирование возмещения затрат на его содержание, приобретения новационного оборудования и сельскохозяйственной техники;
- повышение эффективной деятельности крестьянских (фермерских) хозяйств: предоставление субсидий на страхование урожая, на защиту сельскохозяйственных культур от сорняков, вредителей и болезней; на производство молока и мяса крупного рогатого скота; на горюче-смазочные материалы, а так же на строительство, реконструкции и модернизации животноводческих ферм.

Аграрным организациям не хватает современного оборудования и техники, велика их изношенность, денег на обновление нет, а существующая система кредитования слабо приспособлена к финансированию развития сельхозсектора [2]. В связи с этим в качестве основных направлений государственной поддержки К(Ф)Х выступают: льготное кредитование и предоставление субсидий и грантов в рамках мероприятий Государственной программы развития сельского хозяйства и

регулирования рынков сельскохозяйственной продукции, сырья и продовольствия на 2013-2020 гг. (табл. 2). Активно реализуется комплексная программа поддержки К(Ф)Х «Развитие крестьянских (фермерских) хозяйств и других малых форм хозяйствования в сельской местности на 2012–2015 годы» [5], а так же ее пролонгация в рамках областных программ до 2020 года по мероприятиям поддержки начинающих фермеров, развития семейной животноводческой фермы и по грантовой поддержке сельскохозяйственных потребительских кооперативов для развития материально-технической базы. Целью программы является повышение производительности и обеспечение финансовой устойчивости крестьянских (фермерских) хозяйств и других малых форм хозяйствования в сельской местности.

Таблица 2 – Субсидируемые кредиты в разрезе категорий сельхозпроизводителей Российской Федерации, 2008-2015 гг., млрд. руб. [14]

Показатели	2008	2009	2010	2011	2012	2013	2014	2015
Общий объем кредитов и займов, всего, в т.ч.:	372,7	411,9	480,0	483,3	366,2	733,9	786,2	817,9
краткосрочные	224,2	299,2	334,5	328,8	252,2	533,4	512,7	657,2
инвестиционные	148,5	112,7	145,5	154,5	114,0	184,4	261,6	156,0
МФХ	-	-	-	-	-	16,1	11,9	4,7
Из них получено малыми формами хозяйствования (МФХ), всего, в т. ч.:	48,3	41,8	50,8	63,4	49,5	30,5	25,1	14,7
ЛПХ	31,5	27,1	28,4	35,2	32,2	15,4	10,9	3,1
К(Ф)Х	12,1	11,7	17,9	24,1	15,6	14,2	12,8	10,6
СПоК и СКПК	4,7	2,9	4,5	4,2	1,7	0,9	1,4	1,0
Доля МФХ в общем объеме кредитов и займов, %	13,0	10,1	10,6	13,1	13,5	4,15	3,2	1,8
Доля К(Ф)Х в общем объеме кредитов и займов, %	3,2	2,8	3,7	5,0	4,3	1,9	1,6	1,3

Закредитованность К(Ф)Х не дает возможности развивать инновационную деятельность и внедрять инновационные технологии. Ключевой проблемой здесь является фактическая недоступность долгосрочных кредитов для многих из них, прежде всего, вследствие отсутствия достаточной залоговой массы и невозможности подтвердить требуемый банком уровень платежеспособности. Применение инноваций неизбежно в условиях дефицита земельных ресурсов, прежде всего, в регионах ЦФО. Вследствие этого очевидно, что резервы экстенсивного развития практически исчерпаны, увеличивать объемы производства можно только за счет интенсификации [13].

Конечно, трудно говорить о внедрении инновационных технологий в малых формах хозяйствования, мы привыкли, что инновации ориентированны на крупномасштабное производство – агропредприятия и холдинги. Однако, есть ряд направлений инновационного развития процесса производства в К(Ф)Х, которые вполне могут быть реализованы и в некоторые фермеры внедряют данные технологии:

- применение новых технологий возделывания зерновых культур в определенных природно – климатических условиях региона [12], так фермеры применяют ресурсосберегающие технологии выращивания зерновых;
- актуальна идея «точного земледелия»;
- спутниковая навигация - это способ экономии затрат производства и рабочего времени при выполнении агротехнологических операций и возможность сбалансированного внесения удобрений;
- освоение беспахотной ресурсосберегающей технологии, с учетом использования элитных семян и научно-обоснованными дозами удобрений;
- пименение методов точного земледелия на основе спутниковой навигации позволит превзойти достигнутый уровень урожайности;
- выращивание элитных семян новых сортов картофеля, приспособленных к региональным почвенно - климатическим условиям;

- в свиноводстве для максимального эффекта «гетерозиса» применяется рекомендованное наукой межпородное скрещивание свиней по голландской схеме;
- обеспечение животных собственной кормовой базой, с необходимыми добавками микроэлементов и витаминов;
- конструкция помещений, подъездов и входов, организация труда, методы необходимых дезинфекций — всё вместе обеспечивают хорошую ветеринарную ситуацию;
- обеспечение роботизации фермы – установка роботов по доению. Новая технология предусматривает свободного (бесстрессового) поведения животных;
- технологии «свободного выбора» соответствует и система кормления животных**.** Роботизация не заметит человека на сельскохозяйственных работах, она становится

Необходимо накапливать примеры эффективного применения современных технологических и технических инноваций в российских крестьянских (фермерских) хозяйствах**.**

Многие крестьянские (фермерские) хозяйства с самого начала были укомплектованы тракторами и основными прицепными или навесными сельхозорудиями, необходимыми для выполнения передовых в те годы технологий. Значительная часть первых фермеров имели агрономическое образование или богатый опыт возделывания зерновых и других культур в подрядных или арендных коллективах. Поэтому технологический уровень их работы был достаточно высоким. С самого начала фермерский сектор стал наращивать объемы производства основных товарных культур (зерновых, картофеля, подсолнечника) в соответствии с расширением посевных площадей. Сказывались хорошие знания технологий и навыки выполнения технологических операций, а также фермерские заинтересованность и энергия.

В настоящее время многие фермеры уже не ограничиваются традиционными технологиями, а смело применяют инновации в растениеводстве и становятся консультантами для своих коллег фермеров по применению технологических новшеств. То есть, необходимо проводить на базе опытных в применении инноваций КФХ семинары фермерских хозяйств и специалистов сельскохозяйственных организаций по применению новейших технологий. Во многих регионах фермеры подают примеры применения ресурсосберегающих технологий выращивания зерновых.

Принятию решения о внедрении технологических инноваций предшествует анализ динамики изменения производственных и экономических показателей отрасли, комплексная оценка, влияющая на эффективность реализации инновации. Оценка экономической эффективности инновационной технологии является ключевым аспектом в развитии инновационной деятельности отрасли растениеводства. От того, насколько она будет адекватной прогнозируемым условиям, зависит эффективность инноваций [6].

На уровень объема производства и реализации продукции в фермерском секторе влияют многочисленные факторы: площадь сельскохозяйственных угодий, обеспеченность основными средствами (сельскохозяйственная техника и животные, помещения), степень их износа, наличие собственных финансовых ресурсов, возможность привлечения заемных средств, состав кадрового потенциала, инновационность процессов производства, состояние конъюнктуры рынка, поведение потребителей. Задача модернизации производства на основе технологических инноваций в нашем сельском хозяйстве оказалась более сложной, чем подобная задача в других отраслях экономики.

В современных условиях инновационный путь развития сельского хозяйства имеет три взаимосвязанных и взаимообусловленных направления. Во-первых, это бережное и рациональное отношение к имеющимся ресурсам; во-вторых, развитие сельскохозяйственного производства с сохранением его многоукладности, эффективный рост производства за счет крупных предприятий, сопровождающийся поддержкой малого предпринимательства на селе; в-третьих, — формирование

сельским жителям благоприятных условий жизни и комфортного социального окружения. Реализация этих направлений поможет сделать конкурентоспособной продукцию отечественного АПК на внутреннем и внешнем рынках.

В условиях рынка необходимо разработка конкретного механизма управления развитием К(Ф)Х и увеличения экономической эффективности их деятельности. Это возможно при комплексной организации использования земельных, трудовых, материальных ресурсов. Для наглядности проведем SWOT-анализ малых форм хозяйствования (табл. 3), Этот метод используется для анализа маркетинговой информации, объясняется это тем, что главная задача ситуационного анализа – описать внутреннюю и внешнюю среду предприятия [8].

Таблица 3 – SWOT-анализ малых форм сельскохозяйственного производства

Сильные стороны	Слабые стороны
Внутренняя сторона	
- сохранение сельских территорий и сельского уклада жизни - укрепление семейных связей - преемственность поколений - требуют меньших капиталовложений на одного человека - высокий уровень мотивации - функционирование на локальном рынке - традиции производства продукции - экологичность и эксклюзивность продукции	- высокий уровень риска - ошибки в управлении бизнесом, неумение вести бизнес (организация, производство, управление, контроль) - трудности в дополнительных финансовых источниках - практически непрерывный рабочий день - низкий уровень защиты от кризисных явлений в экономике - медленный оборот капитала - неразвитая производственная база
Возможности	Угрозы (риски)
Внешняя среда	
- обратная связь с потребителем продукции - получение товарного кредита - повышение социальных мер на селе - создание дополнительных рабочих мест - государственная поддержка в больших объемах - повышение статуса фермера, жителя сельской местности	- с ростом производства увеличение налоговых сборов - не возмещение ущербов - уничтожение фермерства

Маркетинговые мероприятия в работе К(Ф)Х: ведение ежедневной оперативной информации по производству и реализации продукции, ходу проведения полевых работ, ремонту техники и других специальных вопросов; заключение договоров между товаропроизводителями и заготовителями на поставку сельскохозяйственной продукции; осуществление контроля за исполнением договорных обязательств с контрагентами; мониторинг реализации продукции в малых формах хозяйствования; контроль за статистической отчетностью К(Ф)Х.

Установление стабильных каналов сбыта выращенной продукции крайне важно для успешного ведения фермерского хозяйства. Для поиска каналов предварительно должен быть произведен анализ ситуации на местном рынке сельскохозяйственной продукции. В ходе анализа оценивается развитие бизнеса в данном регионе, определяется уровень конкуренции и проводится анализ спроса на продукцию.

При этом важно определить направления поиска каналов реализации продукции: организации и места общественного питания при учебных и прочих учреждениях. Следует помнить, что одним из важнейших условий успешного поиска каналов сбыта, является конкурентоспособность продукции фермы, а также соответствующий уровень качества при умеренных ценах на нее. В этом случае, ее реализацию можно осуществлять и путем самостоятельной продажи на продовольственных рынках (как розничных, так и оптовых).

Для достижения поставленных целей в развитии инновационного фермерского хозяйства необходимо выполнять определенные условия. Это надежная государственная поддержка, учет конкурентоспособности производства продукции, значительное повышение качества продукции, модернизация производства, квалифицированный персонал и др. Также немаловажное значение имеет выявление

конкурентных преимуществ, определение их роли в формировании модернизации, изучения их влияния на повышение эффективности и конкурентоспособности в свете конкретного опыта государственной поддержки отрасли [3].

Перечисленные выше условия важно необходимы для развития агропромышленного комплекса в целом. Следовательно, инновационное развитие крестьянские (фермерские) хозяйства в аграрном секторе экономики представляет собой процесс постоянного изучения всех научно - теоретических аспектов и отечественного и зарубежного практического опыта для повышения эффективности производства продукции. Функционирование малого бизнеса и фермерства ведет к улучшению состояния региона и страны в целом. При этом идет полное обеспечение продовольственной безопасности страны. И в тоже время фермеры в стране не просто развиваются динамично, но их объемы производства с каждым годом растут, что свидетельствует о перспективности данного рода деятельности. Здесь естественно и нет ничего удивительного, ведь спрос на продукты питания всегда есть и будет высоким. Необходимо заметить, что обеспечить развитие региональных экономических систем можно только при масштабном притоке инвестиций, как отечественных, так и иностранных [11]. Таким образом, предпосылкой для обеспечения конкурентоспособности сельхозтоваропроизводителей может стать не столько рост их государственной поддержки, а ее избирательность в направлении стимулирования высокой производительности и низких удельных расходов на производство аграрной продукции [16]. Современные К(Ф)Х способны обладать огромным инновационным потенциалом своего развития, для этого необходимо решать выявленные проблемы, препятствующие повышению производительности в хозяйстве и цельности расходования инвестиционных средств.

БИБЛИОГРАФИЯ

1. Бураева Е.В. Анализ факторов роста производства сельскохозяйственной продукции в контексте инновационного развития отрасли (на примере Орловской области) // Экономический анализ: теория и практика. 2013. №14 (317). С. 20-30.
2. Грудкина Т.И. Формирование субъектами агробизнеса конкурентных преимуществ на основе инновации: региональный опыт, стратегия // Креативная экономика. 2014. №10 (94). С. 22-31.
3. Грудкина Т.И. Эффективность и конкурентоспособность молочных комплексов на основе модернизации: сравнительный анализ // Вестник Саратовского государственного технического университета. 2013. Т. 2. №1 (70). С. 242-250.
4. Ефремова Н.А. Формирование доходов от собственности работников интегрированных формирований // В сборнике: Проблемы экономической динамики и роста в АПК: региональный аспект 2004. С. 61-64.
5. Кравченко Т.С. Перспективные направления развития К(Ф)Х в АПК региона // Никоновские чтения. 2013. №18. С. 381-383
6. Кравченко Т.С. Стратегические направления развития инновационной деятельности в отрасли растениеводства // Региональная экономика: теория и практика. 2014. №21. С. 46-57.
7. Кравченко Т.С., Суровцева Е.С. К(Ф)Х и ЛПХ как гарант продовольственной безопасности России в сегменте производства молока // Вестник Российского государственного аграрного заочного университета. 2017. №23 (28). С. 61-69
8. Кравченко Т.С., Сухочева Н.А., Суровцева Е.С. Учебно-методическое пособие по разработке бизнес-планов в отраслях сельского хозяйства / учебно-методическое пособие / Орел, 2015. – 270 с.
9. Ловчикова Е.И., Зверева Г.П. Роль малого предпринимательства в решении проблемы занятости сельского населения // Экономика и предпринимательство. 2014. №4-1 (45-1). С. 769-772.
10. Михалева А.Ю. Перспективные тенденции развития малых форм хозяйствования в АПК // В сборнике: Проблемы развития современной экономики в условиях

глобальных вызовов и трансформации экономического пространства: материалы международной научно-практической конференции студентов, аспирантов и молодых ученых: в 4-х томах. Главный редактор А.И. Клименко. 2015. С. 92-94.
11. Осипов А.Э., Сухачева Н.А. Механизм формирования взаимоотношений субъектов региональных экономических систем и инвесторов // Инновационный Вестник Регион. 2011. №4. С. 26-32.
12. Рыбалко Т.С. Эффективные инновационные технологии производства продукции растениеводства в Орловской области // Современные проблемы науки и образования. 2007. №4. С. 13.
13. Суровцева Е.С., Кравченко Т.С. Оценка современного состояния и тенденции развития крестьянских (фермерских) хозяйств Орловской области в условиях формирования инновационного сельского хозяйства // Экономический анализ: теория и практика. 2017. Т. 16. №4 (463). С. 622-636.
14. Суровцева Е.С., Кравченко Т.С. Выявление критериальных показателей эффективной деятельности крестьянских (фермерских) хозяйств: кластерный подход // Инновации в АПК: проблемы и перспективы. 2017. №1 (13). С. 62-74.
15. Суровцева Е.С., Сухочева Н.А. Бизнес-планирование развития К(Ф)Х на грантовой основе // Экономика сельского хозяйства России. 2017. №7. С. 12-19.
16. Сухочева Н.А., Грудкина Т.И., Ловчикова Е.И. Экономическая эффективность инновационно-альтернативной продукции субъектов агробизнеса: проблемы, тенденции, стратегии повышения // Экономика и предпринимательство. 2016. №6 (71). С. 773-781.
17. Сухочева Н.А., Ловчикова Е.И. Проблемы и перспективы подготовки кадров как стратегического направления обеспечения эффективности и конкурентоспособности субъектов агробизнеса // Конкурентоспособность в глобальном мире: экономика, наука, технологии. 2016. №4. С. 107-111.
18. Kravchenko T.S., Volchyonkova A.S., Esina Y.V. Small business development as a factor of higher competitiveness of agricultural production // Вестник Орловского государственного аграрного университета. 2014. Т. 49. №4. С. 74-82.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.29

MARKETING DYNAMICS MODEL OF HIGHLAND VEGETABLE COMMODITIES IN EFFORTS TO INCREASE FARMERS' INCOME

Darmawan Dwi Putra*, **Arisena Gede Mekse Korri**, **Utami Ni Wayan Febriana**
Faculty of Agriculture, Udayana University, Bali, Indonesia

Baskara I Gde Kajeng
Faculty of Economics and Business, Udayana University, Bali, Indonesia

*E-mail: dwiputradarmawan@yahoo.com

ABSTRACT
Most of the highland vegetable farming sites are located in areas with mountain topography, transportation and limited economic resources. There is a considerable spatial distance between the location of the farm and the consumer, causing a growing complexity of marketing problems and the growing number of marketing institutions that participate in the created marketing channels. Farmers' efforts to increase vegetable production will not be useful if the marketing aspect is not taken seriously. Marketing is part of a vulnerable point in the agribusiness system, because the marketing problem is closely related to the farmers price level. The method used for this research is a stepwise method that ultimately is used to create the model. The final result in this research is the dynamics model of highland marketing vegetable commodities.

KEY WORDS
Dynamics model, marketing institution, marketing communication, farmer's welfare.

Most of the highland vegetable farming sites are located in areas with mountain topographic forms where transportation and economic resources are generally limited. Besides, the size of highland vegetable farming is generally small and the quality is not standard yet, thus causing the marketing process to provide opportunities for the emergence of intermediaries or marketing agencies that carry out marketing functions.

The spatially distant spacing between the location of the farm (Bedugul highland) and the consumer (Denpasar City) caused the complexity of marketing problems and the growing number of marketing institutions that participate in the marketing channels created. The growing number of marketing agencies involved in the vegetable marketing channel can lead to informal cooperation relationships between intermediary traders and farmers.

Vegetable farmers tend to choose traditional marketing channels through middleman, although they receive a smaller share of prices compared to formal channels. This institutional option is often associated with strong ties between vegetable traders and historically-formed farmers with emphasis on familial elements. Inequality in the mastery of science and technology, land, capital, and market access among agribusiness actors led to institutional structures of business partnerships on fragile vegetable commodities.

Farmers as producers do not have the power to determine the selling price in accordance with the quality, thus they are in a weak position at the time of pricing. This happens because of an imbalance between productivity and marketing. Farmers' efforts to increase vegetable production will not be useful if the marketing aspect is not taken seriously. Marketing is part of a vulnerable point in the agribusiness system, because the marketing problem is closely related to the price level received by farmers.

METHODS OF RESEARCH

The research's population were all vegetable farmers who work on the agricultural sector of horticulture in Buleleng Regency. The number of samples are 50 farmers. Roscoe

(1975) who gave a statement in a book by Sekaran (2006) about the general reference for determining sample sizes over 30 and less than 500 is appropriate for most studies. Data collection is conducted in Sukasada sub-district by using accidental sampling method. In addition, beside the farmers, vegetable marketing institutions also involved, using snowballs sampling. In this case the initial sample is farmers and the other sample is the marketing agency selected by the sample farmers.

The analysis is conducted gradually on the data that has been obtained. In this research, there are six stages, so in the end there is a model of marketing dynamics of highland vegetable commodity marketing. Stages of analysis in more detail can be explained as follows.

The first stage is spatial analysis in the form of mapping of highland vegetable farming area. The mapping use the image map sourced from Google Earth and land cover in the form of vegetable garden done with ground truth check in the field. Then will be generated map of vegetable commodity distribution which is in region Buleleng Regency. The second stage is to analyze the factors that affect farmers in marketing highland vegetable commodities. The second objective is analyzed by the analysis of frequency tabulation and cross tabulation, through the scoring of qualitative descriptions from respondents in-depth interviews.

The third stage analyzes farmer’s communication network in marketing highland vegetable commodity in Buleleng Regency. The fourth stage analyzes the institutional economy of highland vegetable commodities in Buleleng Regency. The fourth objective is analyzed by using qualitative descriptive institutional analysis. Institutional analysis is focused on patterns, rules of the game and interaction patterns between partner institutions. The fifth stage analyzes the marketing channels of highland vegetable commodities in Buleleng Regency. The sixth stage is to build a model of marketing dynamics of highland vegetable commodities. The six objectives were analyzed descriptively qualitative based on the results of first, second, third, fourth and fifth stage analysis.

RESULTS AND DISCUSSION

Most of the highland vegetable farmers in Buleleng Regency market the vegetable products to the collecting traders. Marketing to the collecting traders is due to the low cost of transportation to transport the trade from farmers to traders. Farmers charge marketing fees to the collecting traders, because they pick up the farmers' harvests. The collecting traders in the payment system use the cash payment system, while the suppliers pay in installments. In the case of payment systems farmers expect a response from buyers to immediately provide some money as a means of exchanging the vegetables they produce. The low cost of transportation for farmers was due to the sale and purchase transactions conducted in the garden or in the farmer's house.

Farmers market vegetables developed only to collecting traders and suppliers, then in the pricing system can be seen which party is dominant (price determinant) and the recipient price. In the marketing system of vegetables, farmers prefer to market their products through the means of mobile phone communication, because farmers want to release the social ties that occur with traders who make transactions directly. In other words, farmers prefer communication patterns in transacting with traders, where social status does not play as an important role.

The communication network of vegetable marketing is important to describe. This is because the marketing of vegetables is very diverse. One way to understand the communication network of highland vegetable marketing is to observe the social relations that occur as a result of interpersonal communication process. Interaction certainly begins with contacts that lead to the tendency to share information with other individuals and the realization of interaction will lead to whom it relates to whom. Farmers will establish a communication network in sharing information about vegetable marketing.

Farmers sold their vegetables to collecting traders, middlemen and some who sold directly to consumers. Occurs the spread of information flow on all individual vegetable

farmers in a marketing system. Sometimes farmers' communications with one another are not connected, this illustrates that the level of individuality of vegetable farmers selling vegetables is still very high.Vegetable sales are still dominated by the presence of collecting traders or middlemen.

Farmers as individuals certainly have differences between each other in terms of involvement in communication networks. Internal and external factors are associated with communication networks consisting of degrees of connectedness,degree of integration and degree of openness. This means the younger the farmers then the participation in communication networks tend to be higher.

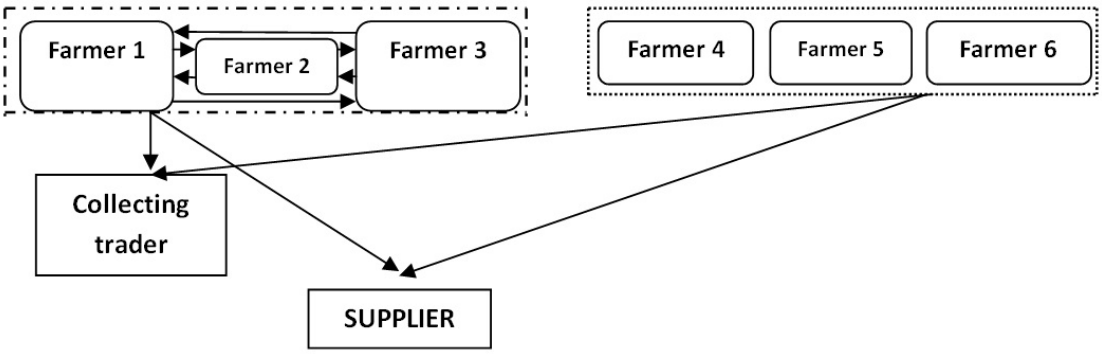


Figure 1 – Communication Network Pattern of Vegetables' farmer

The higher the education that the vegetable farmer has ever taken, the more knowledge about technology and science is expected to increase in terms of affective and cognitive. If the level of education pursued by vegetable farmers is high then the tendency to participate in communication networks is also high. The smaller the vegetable farming land the more integrated the farmers, because the smaller the land the intensity of land processing is more intensive. They will try their best to use existing land to get maximum results by more actively communicating with other farmers. The more experience the farmers the more open the farmers are to provide experience to other farmers and more open to get information. Characteristics of farmers have an influence on the communication network in the process of adoption of innovation.

The more farmers receive the exposure of information from the mass media the more likely they are to communicate and participate in the communication network. This is because the information they receive from the mass media they will talk about to get the same point of view. The greater the ownership of mass media means the greater the connectivity with other individuals, because the information obtained from the mass media will be discussed by fellow farmers.

The effect of farmers' participation in communication networks can increase farmers' knowledge of price, quality and purchase, but does not change farmers' actions in marketing. Farmers lack communications in terms of marketing because there are certain things that are not discussed with other farmers, especially in terms of sales. Competition to get a buyer or an opportunity for the product to be received by the collecting trader/supplier. As the main purpose of sales cause them less communicate with each other. Another cause is the weakness of farmers in bargaining position. They can only accept the price offered by the buyer and generally they are less active in finding new market shares.

In the case of informal institutional economy, informal institutions are not found that enter into the marketing system of highland vegetables in Buleleng Regency. To conduct the marketing of vegetables, some farmers establish good partnerships with collecting traders/suppliers. Partnerships between the two parties are relatively more institutionalized because they need each other. The rules governing the partnership mechanism are also formed based on their interests.In partnership relationship between farmer and collecting traders/supplier there is difference of range between small, medium/large, and big collectors. In small collecting traders, the scope of the partnership is within the immediate area of the

hamlets, whereas in medium-sized collecting traders, the reach of partnerships with producer farmers can reach the nearest villages, and in large collectors, the reach of the partnership can reach the nearest sub-district. Collateral partnership with producer farmers is trust. Profits for partners/traders within this partnership network are continuity of supply. While the benefits for producer farmers is the guarantee of marketing and ease to get a loan both for household economic purposes and for the purposes of vegetable cultivation.

Vegetable marketing chosen by highland vegetable farmers in Buleleng Regency is an indirect marketing pattern or through a collecting traders, and there are few farmers who sell directly to retailers or end consumers. This is due to a lack of working capital and no access to markets. The required working capital includes the transportation cost from the farm location to the market that needs supply, market tax charges, loading and unloading of vegetables, rental stalls, and the costs of non-formal, such as the payment of security in the market. The inability of highland vegetable farmers to access markets that require supply due to lack of market information can be obtained. Sometimes the price of vegetables from producers (farmers) is much lower than the actual selling price. This is due to the overproduction or delay in delivering the product to the market.

The prices of some vegetable products always fluctuate outside the farmers' control. Fluctuations in vegetable prices are generally higher than fruits and crops. In other words, the imbalance between supply volume and consumer needs is more common in vegetables. Vegetable prices are very fluctuating with a very wide price range, especially after being linked with futures trading. At certain times, such as the harvest and rain season, the price of vegetables can be very low but at other times it can be very high. A very volatile price, theoretically will complicate business predictions, both profit and loss calculations and risk management.

Vegetable marketing margins are often very large, if the greater the marketing margin, the price received by producers will be smaller. This indicates that the marketing system becomes inefficient or does not occur market integration and the low rate of remuneration or part of the price received by the farmers. The cause of inefficient vegetable marketing is due to the low rate of return received by the farmer or the price part received by the farmer. In addition, the weak bargaining position is low due to over-supply which often occurs in vegetable harvest, resulting in low prices received by vegetable farmers in Buleleng Regency.

The essence of a communication network is a homofili relationship, that is, the tendency of farmers to establish relationships or social contacts with people who share the same attributes (farmers) or a little higher than their position (collecting trader). These conditions also happen between people who have unequal attributes (farmers - the main market /tourism market).

Communication is an important part of vegetable marketing. With communication, products that exist in an area can be delivered to other areasor with communication, producers (vegetable farmers) can relate to their customers.Communication also plays an important role in connecting between one farmer and another.In doing the farming there is an interaction between one farmer and another farmer.

As members of the community often involve the process of sharing information about an object between farmers who are invited to interact, among them is to share information about marketing as well as establish a communication network among vegetable farmers. Communication network is important to be developed in farming and marketing of vegetables, because it can provide information to farmers about the selling price, qualityand the shape of the product consumers want and the more profitable marketing goals.

To improve the bargaining position of farmers, cooperatives or farmer groups are expected to increase their role. Due to transportation cost factor is the consideration of majority of farmers in marketing their vegetable products, the cooperative / farmer group should improve the transportation service to transport the vegetable products produced. To improve the bargaining position of farmers also required the development of locally charged institutions. This effort can be initiated by identifying potential institutions in each village or region.

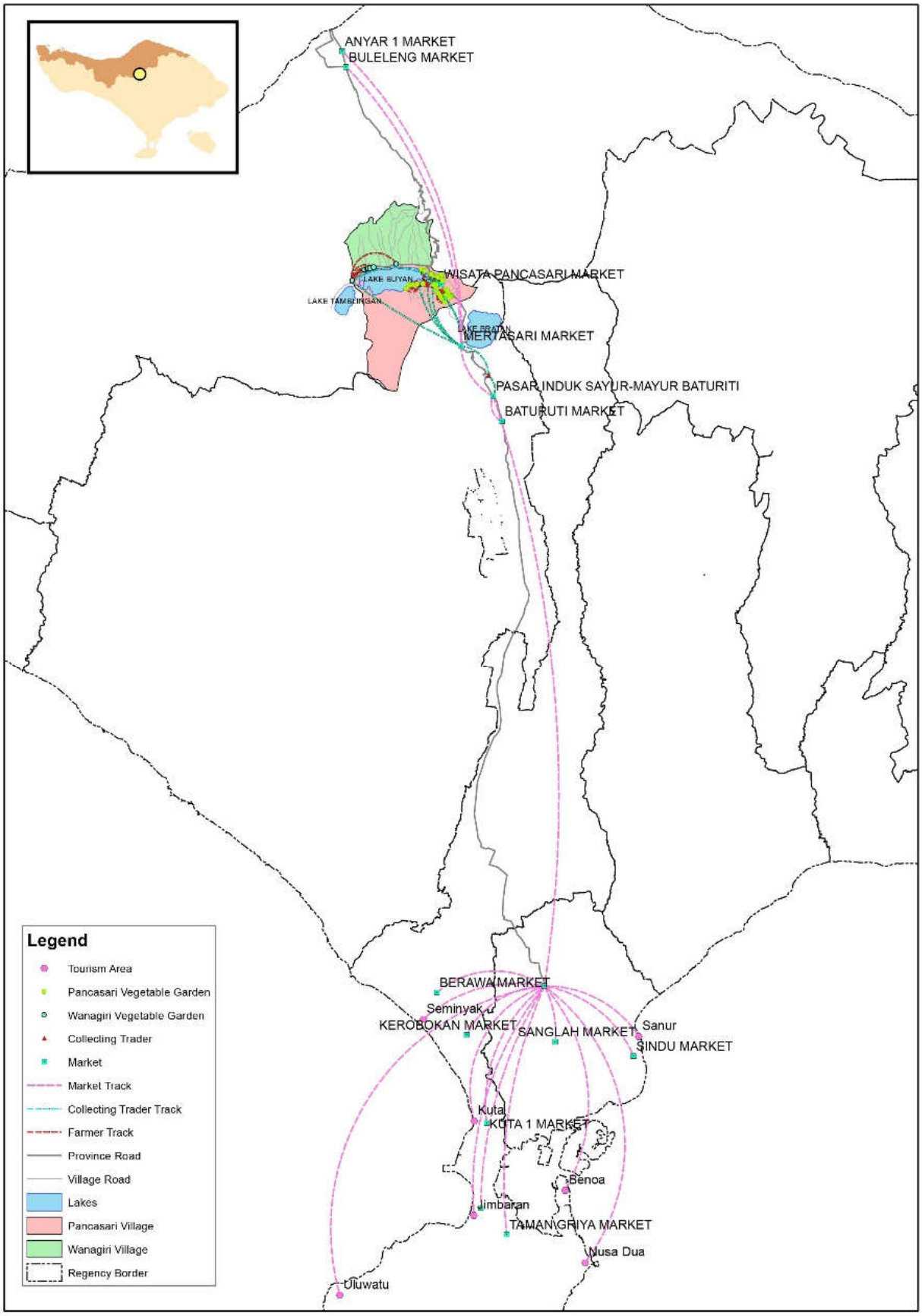


Figure 2 – Marketing of Highland Vegetables Production in Buleleng Regency

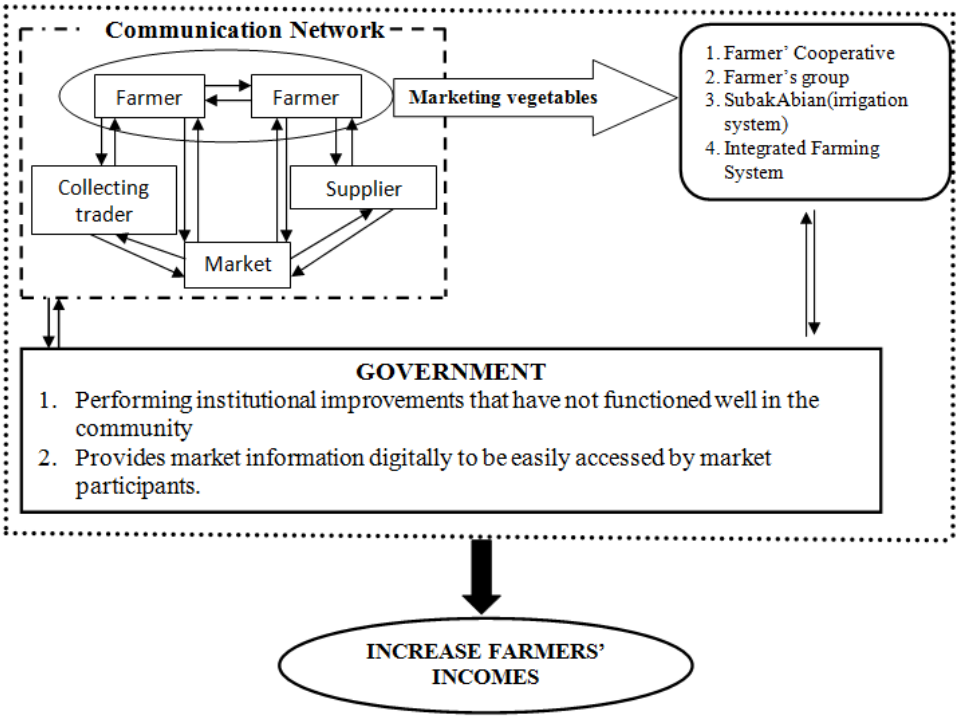


Figure 3 – Marketing Dynamics Model of Highland Vegetable Commodity

Based on the condition of marketing of highland vegetables in Buleleng Regency, there are two linkages that must be built in order to encourage the creation of vegetable commodity marketing system, including functional linkages or vertical hierarchical linkages between agribusiness actors, such as farmers, institutional and output traders. To encourage the creation of such functional linkages, the government does not have to make changes or introduce new institutional forms, but the government can make institutional improvements that are not functioning well in the community. This is because in general the institute has taken into account the issue of equity and business sustainability aspects for the parties that partner.

Governments should provide digital market information for easy access by farmers. Information about the market is a factor determining what kind of vegetables are produced, where, why, how and for whom vegetables are sold at their best. Therefore, appropriate vegetable market information can reduce business risk, thus traders can operate with low marketing margins and provide benefits for traders themselves, and farmers as producers.

Market information also includes marketing channels, with the objectives of producers and traders involved in the vegetable marketing channel and where the activity takes place can be known. In addition, the government should also digitally inform the applicable rules of the vegetable marketing channel system. Thus it is expected that the production of vegetables produced does not experience barriers in terms of network marketing expansion.

CONCLUSION

Sometimes the communications of one farmer with other farmers are not connected, this illustrates that the level of individuality of farmers in selling vegetables is still very high. Vegetable sales are also dominated by collecting trader or middleman. In a partnership relationship between farmers and collecting trader/suppliers there is a difference in the range between small collecting traders, medium collecting traders, and big collecting traders. In small wholesalers, the reach of partnerships within the areas of the nearest hamlets, whereas in medium-sized wholesalers of partnership with farmers can reach the nearest villages, while in large collecting traders the reach of the partnership can reach the nearest sub-district.

The vegetable marketing margin is often very large, the bigger the marketing margin, the lower the price the producer receives. And indicate that inefficient marketing system or does not occur market unity. It also indicates low repayment or a price share received by farmers. To improve farmers bargaining position, farmers cooperatives or farmers group are expected to enhance their role. Due to transportation cost factor is the main problem consider by farmers to marketing their vegetable products, the cooperative/farmer group must improve the transportation service to deliver the products. Governments should provide digital market information for easy access by farmers. Information about the market is a factor determining what kind of vegetables are produced, where, why, how and for whom vegetables are sold at their best.

REFERENCES

1. Ansori, M. 2004. Jaringan Pemasaran Sayur-Mayur (Kasus Pemasaran Sayur-Mayur di Pasar Cibinong, Bogor). Makalah Individu Pengantar ke Falsafah Sains (PPS 702) Program Pascasarjana/S3, Institut Pertanian Bogor
2. Boyd, Walter, Larreche 2000. Manajemen Pemasaran Suatu Pendekatan Strategis dengan Orientasi Global. Jakarta. Erlangga.
3. Bulkis.2015. Analisis Jaringan Komunikasi Petani Tanaman Sayuran (Kasus Petani Sayuran Di Desa Egon, Kecamatan Waigette, Kabupaten Sikka, Provinsi Nusa Tenggara Timur).Jurnal Matematika, Saint, dan Teknologi. Volume 16. Nomor 2. September 2015. 28-42.
4. Ellyta. 2017. Jaringan Komunikasi Petani Dalam Pemasaran Lidah Buaya Di Kalimantan Barat. Jurnal ZIRAA'AH. Volume 42 Nomor 1. Pebruari 2017.30-39
5. Harmoko and Erik, D. 2016. Akses Informasi Pertanian Melalui Media Komunikasi Pada Kelompok Tani Di Kabupaten Sambas Dan Kota Singkawang. Jurnal Komunikator. Vol 9.No1.Mei 2016.1-10
6. Mubyarto. 1977. Pengantar Ekonomi Pertanian. Yogyakarta: Lembaga Penelitian pendidikan dan Penerangan Ekonomi dan social.
7. Permana, A. S., Bintoro, M. H. and Harris, N. 2006. Analisis Jaringan Pemasaran Komoditas Sayuran (Kasus Petani Kecil Ciwidey, Bandung). Jurnal MPI Vol. 1 No. 2. September 2006. 71-83.
8. Prahasta, E. 2014. Sistem Informasi Geografis: Konsep-konsep Dasar (Perspektif Geodesi dan Geoinformatika). Penerbit Informatika. Bandung. Pg.760.
9. Rahim. A and Diah Retno Dwi Hastuti. 2007. Ekonomika Pertanian. Penebar Swadaya. Depok.
10. Riasning, N.P. 2007. Efisiensi Pemasaran Sayuran di Kecamatan Baturiti Kabupaten Tabanan (Thesis). Magister of Agribusiness Study Program. Program Pascasarjana Universitas Udayana, Denpasar.
11. Tukan, C.J.M., Yulianti, Roshetko, J.M., and D. Darusman. Pemasaran Kayu dari Lahan Petani di Provinsi Lampung.
12. Santoso, T. A. 2014. Efisiensi Pemasaran Beberapa Komoditas Sayuran Utama di Kabupaten Indramayu. Jurnal Agri Wiralodra. Volume 6 No. 2-September 2014.9-18.
13. Soekartawi. 2004. Agribisnis Teori dan Aplikasinya. Raja Grafindo Persada. Jakarta.
14. Swastha, B. Sudkodjo. I, 2001. Pengantar Bisnis Modern. Liberty Offset. Yogyakarta Pascasarjana Universitas Udayana, Denpasar.
15. Utami, D. 2013. Jaringan Komunikasi Informasi Harga dan Pemasaran Sayur. Minor Thesis. Departemen Sains Komunikasi dan Pengembangan Masyarakat Fakultas Ekologi Manusia. Institut Pertanian Bogor.
16. Wedastra, M.S. 1999. Analisis Efisiensi Pemasaran Bawang Merah di Kabupaten Lombok Barat NTB (Thesis). Program Pascasarjana Universitas Brawijaya, Malang.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.30

THE STUDY OF FARMERS' ECONOMIC ABILITIES IN PALM PLANTATION IN RURAL REGENCY OF MUARO JAMBI

Malik Adlaida*, **Fitri Yanuar**, **Nainggolan Saidin**
University of Faperta, Jambi, Indonesia
*E-mail: ida_adlaidamalik@yahoo.com

ABSTRACT
This research aims to Analyze household income capability to finance household needs and how to improve household income capability. The research was conducted in Muaro Jambi Regency in plasma farmers and self-help farmers. The research was conducted by survey where the sample was taken based on the representative representation of the phenomenon of the population. Sampling used is a multi stage sampling of sub-districts and villages. The sample size are 60 farmers consist of 30 Plasma Farmers and 30 Swadaya Farmers. The result of the research shows that 1) There is a significant difference between the average household income of Plasma Farmers with the average income of households of Swadaya Farmers, 2) There is a significant difference between the average cost of household needs of Plasma Farmers with the average home needs Ladder of Swadaya Farmers. 3) There is a significant difference between the level of household income capability of Plasma Farmers and Self-Helpers. Household income level of Plasma Farmers who are able to finance their household needs is about 95% relatively higher than Swadaya farmers about 87%, 4) The level of household income capability of Plasma Farmers and Self-Helpers who can not afford to finance their household needs can be improved through the application of crop pattern In-between palm-rice/corn-pineapple/banana-chili, and through the use of leisure time used for productive work each become 139.6 percent and 144.3 percent thus all farmers will be able to finance their household needs.

KEY WORDS
Income, economic ability, income, stage options.

Now Palm has become Indonesia's main export commodity and has been a major source of livelihood for millions of families. People's palm covers 83 percent of the total area of oil palm plantations in Indonesia with production volume reaching 68 percent of total palm production in Indonesia (DITJENBUN, 2016). Now Jambi Province is the third largest producer of palm oil after South Sumatra and North Sumatra. In terms of production of Cruide Palm Oil [CPO], 87 percent is sourced from people's palm with an average plantation area of 3.85 hectares per farmer. Oil palm plantations in this area are growing so that the remaining natural forests are getting smaller, people's palm oil estimated has reached about 11.5 percent from Jambi Province (Anonymous, 2009).

Oil palm plantations in Jambi Province have a very strategic role as the province is the main producer of natural palm oil in Indonesia with a total area of about 490,346 hectares in 2003 and total production of 423,752 tons or 21.78 percent of Indonesia's palm oil production, and in 2016 Increased to approximately 526,174 hectares and total production of 453,365 tons or 23.71% of Indonesia's palm production. Contribution of palm to Product of Gross Regional Domestic (PDRB) Jambi equal to Rp 1,347 million or 36,56 percent from total export of GRDP without oil and gas Jambi Region. The export volume of Jambi's palm oil is 427,37 thousand tons which gives the country's foreign exchange input amounting to US $ 18.2 million or 18.72 percent of the export of Jambi's plantation commodities. Besides oil palm plantations as a source of income and livelihood of about 260 thousand households and 20 thousand employees of plantation companies and processing industries of TBS is about 1.15 million people or 37.6 percent of the total population of Jambi Province (Central Bureau of Statistics Jambi Province, 2017).

The development of smallholder palm oil plantations in Jambi Province from various government projects namely the Nucleus Company (PIR) project, the Project Implementation Unit (UPP) and the partial relief project for 25 years (1977/1978 to 2016) was recorded to reach 224,712 ha or about 8,988 Ha per year. Since 1991 the government no longer develops plantations through PIR and UPP because there are other problems that some farmers cannot afford to pay off their credit and the quality of the oil palm is low but the palm oil development is still done by the government through the aid (Directorate General of Plantation Development, 2017).

In 2003-2017 the provincial and district governments in Jambi Province rejuvenated 1,248 hectares of community palm plantations through a state aid project, but in fact in 2017 the average palm oil productivity of 11.68 tons per year is relatively more Low compared to the productivity of oil palm plantations of the State of approximately 15.16 tons of TBS per hectare per year (Jambi Provincial Plantation Office, 2017).

One of the goals of rejuvenation of oil palm plantation is replacing old / damaged plants with superior clones of young who have high productivity. Rejuvenation of oil palm by farmers takes about six years to start producing. Therefore, farmers do not earn income from palm oil farming while the household needs continue so that there is a possibility of household income of farmers unable to finance their household needs. With this condition raises the question of how much is the level of income ability of households to finance their household needs before and during the reforestation of oil palm plantations and what are the options to increase farmers' household income?

From the fact that the condition of the palm oil plantation of low productivity of palm oil, the extent of the old / damaged plantation area and the hope of accelerating the rejuvenation of the people's palm oil plantation, it can be concluded that the main problem is "how to increase farmers' household income ability to finance their household needs with some basic questions as follows:

1. Is there a significant difference between household income, household expenses and household income capability to finance household needs Smallholders with self-help Farmers?
2. What is the option to increase the level of income ability of households of oil palm farmers?

In general, research aims to:

1. Analyze the difference between household income, household expenses and household income capability to finance household needs Smallholders with self-help farmers;
2. Analyze the option to increase the income level of household income of Palm farmers.

FRAMEWORK OF STUDY

Theoretical basis. Increase in farmers' income in the short term can be done through the use of gawangan between the palm by planting intercrops. Upgrading of oil palm growers can be achieved through palm oil reforestation along with land use among palm crops through integrated farming patterns (Tjasadihardja et al., 1995). The basic concept of the household economy is that the decisions for the production and consumption of farm households are related to each other (Becker, 1965, Chayanov, 1966 and Ellis, 1998). This study looks at the economic behavior of farm households to finance their household needs independently.

Efforts to improve household income levels can be done by increasing household income of farmers or reducing the cost of farmers' household needs. Increase in household income of farmers can be done on the pattern of oil palm crops through increased production of palm oil and increased productivity while the expansion of palm oil is relatively difficult to implement due to limited land owned by farmers. Increased income of other farming can be done on the land of yard business. Increased income outside the farm through the use of leisure time to work on other farmers' farming land, trading, or as employers or civil servants.

Household economic theory with respect to time allocation, leisure time usage, production and consumption are household decisions, while the allocation of spare time into working time in business activities will increase income. Activities in households for final (final) final goods that do not provide income and are known as Z - good. In addition, households have the opportunity to sell time to the labor market. Therefore, households should be able to allocate time optimally for production, work and leisure activities with time constraints, income, and certain production functions (Becker, 1965).

The concept of time allocation is also put forward by Becker (1965) which states that in a household the allocation of time is divided into three: (1) time to produce Z goods, (2) time to work as wage or wage; Leisure time in the family. Maximum utility in a household is limited by three constraints: (1) production function, (2) minimum required level of income, and (3) maximum amount of available working time.

Spare time (WI) is part of the available time that is not used for productive activities in farming or outside farming. Spare time is used to seek additional income for a household or to sell it in the labor market, or to consume the free time to relax (Bakri, 2003 in Zahri, 2003). The view on leisure leisure is found to vary, between work at home or other activities often difficult to distinguish by leisure, and this is one of criticisms of Becker's time allocation theory (Granon, 1997 in Hardi, 1990).

METHODS OF RESEARCH

Approach Method. The foundation of the research philosophy of 'Farmers Income Ability Analysis in Meeting the Cost of Household Rural Needs in Muaro Jambi District is a philosophy of positivism. According to Ethridge (1995), the philosophy of positivism (logical positivism) developed from physical science, and in economics involves the study of community values that stress the positive knowledge with measurement and quantification of data, and tends to make facts and theories as the source of the hypothesis. The approach method used in this research is developed by deductive and inductive approach method. The sequence of approaches is identifying problems, analyzing data and information, and explaining data and drawing conclusions.

Sampling Techniques and Data Collection. The research was conducted by survey where the sample was taken based on the consideration of the representation of the characteristics of population phenomenon. In analyzing field research data supported by quantitative and qualitative data, to control information that is qualitative required quantitative data information while to clarify quantitative data required qualitative data. Sampling used is a multi stage sampling of sub-districts and villages.

From each village a random sample of 60 samples of farmers from selected sample villages was collected. The samples of plasma farmers and self-help farmers were determined based on the proportional framework of the sample of farmers, so there were 30 plasma farmers and 30 self-help farmers, thus the total sample was 60 farmers. Data analysis used is descriptive analysis and multiple linear regression analysis.

RESULTS AND DISCUSSION

Farmer's Characteristics. The plasma farmers had an average age of 47.6 years, the number of family members of 3 - 4 people, the experience of the palm oil cultivation of 22.8 years of land ownership of 4.6 Ha. While self-employed farmers have an average age of 43.1 years, the number of family members 4 - 5 people, experience of palm oil 21.4 years, land area of 3.15 Ha. Adoption of palm cultivation technology as recommended. The plasma farmers have a value for rejuvenation of Rp. 26.269.666 or 61.02%. The cost of seedlings is 48.98%, 95.49% outside of family labor costs, 29.58% for palm oil maintenance. While self-help farmers rejuvenation costs of Rp. 16.783.222 or 39.98%. The cost of seedlings is 51.02%, the labor cost of the family is 4.51%, the maintenance cost is 70.42%.

Household Income. The household income of the farmers is sourced from palm oil, other farm income and income from outside farming. The income of farm households from the source of income of palm oil, other farming and outside farming can be seen in Table 1.

Table 1 – Average Revenue of Oil Palm Farmers, Year 2017

No	Revenue Source	Household Income					
		Smallholders	%	Self-help farmers	%	Average	%
1	Palm Farming	46.967.583	93,36	37.589.364	91,77	42.278.474	92,65
2	Other farms	454.646	0,90	499.883	1,22	477.265	1,05
3	Outside farm	2.888.000	5,74	2.869.000	7,00	2.878.500	6,31
	Amount	50.310.229	100	40.958.247	100	45.634.239	100

Table 1 shows that the average household income of smallholders is around Rp. 50,310,229 per year and self-help Farmers around Rp. 40,958,247 per year, the majority of household income is obtained from oil palm farming, plasma farmers around 93.36% and self-employed farmers around 91.77%. The result of statistical analysis of test of middle value of significance at 95% confidence level. This means that household income of smallholders is significantly different from household income. Self-employed farmers or average household incomes Smallholders are 158.31% above the average household incomes.

In line with the Lestari Eka research, E. (2015) which states that the average income of oil palm farmers is higher than the average income of oil palm farmers self-help. The result of independent sample test shows that the income of plasma farmers is Rp.40.735.794 per hectare per year while the average income of self-farmers is 26.312.996 per two hectare per year.

Cost of Farmers Household Needs. The cost of the household needs of farmers consists of the cost of food consumption and other costs. The cost of food consumption includes the cost to buy rice, side dishes, salt, sugar, coffee / tea, edible oil, kerosene and fruits. Other cost needs include fees for children's education, health, clothing, soap / toothpaste, home improvement, purchase of household furniture, arisan / recreation, social / religious and building taxes. The details of the average cost of household needs of oil palm farmers can be seen Table 2.

Table 2 shows that the average household needs of smallholders is around Rp 43,430,648 per year with the composition for food consumption (49.35%) and other needs 51.41%. Average household needs Self-help farmers around Rp. 42,460,826 per year with the composition for the cost of food consumption (50.65%) and other necessities (48.59%). The result of statistical analysis of the mean value test is significant at 95% confidence level. This means that the average household needs of smallholders is significantly different from the average household needs. Self-farmers or in other words the average cost of household needs Plastic farmers are 112% above the average cost of household needs Self-help farmers.

Jaenuri's research, H (2016) household consumption, especially for food, will continue to increase food consumption in line with increasing income, but to some extent the addition of income no longer causes the increase in the amount of food consumed. If the quantity of needs has been met, then people will usually attach importance to quality or switch to the fulfillment of non-food needs.

Ability of Household Income. The ability of household income is the level of farmers' household income ability to finance their household needs. The level of income ability of households to finance household needs can be seen Table 3.

Table 3 shows that the level of household income capability of smallholders who are able to finance household needs is about 20%, while the income earning rate of self-farming Farmers can afford 0% or the overall income level of household income is about 10%. From the results of statistical analysis of the mean value of middle test at 95% confidence level. This means that the level of household income capability Smallholders are significantly different from households' income earning capacity Self-help farmers, or household income

earning capacity Plastic farmers to finance their household needs is relatively higher than the self-employed Farmer's level of ability.

Table 2 – Average Cost of Palm Oil Households by 2017

No	Cost Description		Cost of Living Needs (Rp)		
			Smallholders	Self-help farmers	Average (Rp)
1	Food Consumption Needs				
	a.	Rice	4.791.110	5.051.747	4.921.428
	b.	Side dishes	7.152.117	7.586.517	7.369.317
	c.	Vegetables	469.017	453.700	461.358
	d.	Sugar / salt	610.697	572.607	591.652
	e.	Coffee / tea / milk	1.208.900	1.034.323	1.121.612
	f.	Vegetable oil	607.200	612.133	609.667
	g.	Kerosene	559.187	485.700	528.527
	h.	Fruits	551.400	570.600	561.000
	i.	Nuts	112.771	99.938	106.354
	j.	Tubers	127.967	143.550	135.758
	k.	Spices	1.258.500	1.294.717	1.276.608
	Amount		17.448.866 (49,35%)	17.905.532 (50.65%)	17.683.281 (50,02%)
2	Other Needs				
	a.	Child education	3.423.867	3.618.333	3.521.100
	b.	Health	997.967	952.333	975.150
	c.	Clothes	3.105.667	3.179.000	3.142.333
	d.	Soap / toothpaste	691.233	591.633	641.433
	e.	Home improvement	666.667	633.333	650.000
	f.	Home furnishings	986.425	930.941	958.683
	g.	Social / religious events	7.196.460	5.824.508	6.510.484
	h.	Property taxes	49.496	35.380	42.438
	i.	Transportation	8.864.000	8.789.833	8.826.917
	Amount		25.981.782 (51,41%)	24.555.294 (48,59%)	25.268.538 (50%)
	Amount		43.430.648	42.460.826	42.951.819

Table 3 – Farmers Household Income Rate Ability by 2017

No	Level of Household Income Capability	Smallholders		Self-help farmers		Total	
		Household	%	Household	%	Household	%
1	Capable of Kr ≥ 1	6	20	0	0	6	10
2	Not able to <1	24	80	30	100	54	90
Amount		30	100	30	100	60	100

Note:
Kr = (Yt: KB) X 100%
Kr = Ability to pay for living needs (%)
Yt = Household income (Rp / year)
KB = Cost of household needs (Rp / year)

Household income level Farmers who are unable to finance their household needs are around 80% and self-help farmers are 100%, all farmers who are unable to finance their household needs are farmers who are currently reforesting about 11.2%. Farmers who are unable to finance their household needs are farmers who have unprofitable crops whereas, income from intercropping pattern cropping pattern and out-of-farm income is relatively low so it is not enough to finance household needs. Lack of farm household income to finance household needs by saving last year or borrowing money from families, village palm oil collectors or other farmers who will be paid from work outside the farm or after the start of palm oil production.

In contrast to Malik A's research, Murdy S, Nainggolan S (2015), the level of household income earning capacity of households that can afford households is 92.0%, while the income earning rate of farmers is not yet advanced which can afford the household needs of about 74, 29% or the overall level of farmers' household income capability is about 81.67%. From the results of statistical analysis of the mean value of middle test at 95% confidence

level. This means that the income level of farm household income is significantly different from the level of income ability of the farmer's household is not yet developed, or the level of income ability of the farmer's household to finance the household's need is relatively higher than the level of the farmer's ability not yet developed.

Option to Increase Household Income Capability

1. Application of Palm Selective Crop Patterns.

The effort to increase farmers' household income ability can be done through the implementation of the pattern of palm oil crops with food crops and horticulture as recommended by extension workers. Implementation of palm oil cropping pattern Smallholders and self-help farmers can still be improved by planting palm-rice / corn-banana / pineapple-chili pattern as Table 4.

Table 4 – Production and Production Potential of Palm Sela Plant

No	Types of Plants	Smallholders			Self-help farmers		
		Current Production	Production Potential	% Of potential	Current Production	Production Potential	% Of potential
1	Rice	825	1.800	45.83	850	1.600	53.13
2	Corn	320	900	35.56	360	1.000	36.00
3	Vegetables	300	650	46.15	325	700	46.43
4	Turmeric	150	450	33.34	150	650	23.08
5	Ginger	142	300	47.33	160	325	49.23
Amount			41.64			41.57	

In Table 4 it can be explained that the average application of intercropping pattern of new plasma farmers reaches about 41.64% of the potential production pattern of recommended palm crops and self-help Farmers about 41.57% of the potential production pattern of palm oil plantations recommended that it can still increase revenue Households Smallholders are around 58.36% and self-employed farmers are 58.43% of the current farmers' current production. In contrast to research by Lestari Eka, E. (2015) stated that the percentage of agricultural income source outside of palm oil pattern is 13.36% and self-farmer is 14.11% so it can still increase household income of plasma farmers around 86.64 and Self-help farmers around 85.89%.

The potential increase in income and income capability of households of oil palm farmers through the implementation of the pattern of palm oil plant in 2017 can be seen in Table 5.

Table 5 – Potential of Increasing Revenue and Income Capability of Household of Palm Farmer Through Application of Palm Selective Crop Pattern

No	Average Household Income	Smallholders (Rp thousand)	Self-help farmers (Rp thousand)	Average (Rp thousand)
1	Original revenue	16.142	25.554	20.848
2	Potential increase	7.635	9.477	8.556
3	Household income	23.777	35.031	29.404
4	Increased revenue (%)	43.30	37.09	42.20
5	Income capability (%)	51.64	43.14	94.78

In Table 5 it can be explained that the application of good intermediate palm-rice / pineapple / banana-chili pattern will increase household income of 47.30% and farmers around 37.30%, while palm oil intercropping -good / vegetable-turmeric-ginger-kernel will increase household income capability Smallholders about 51.64% is relatively higher than the increase in household income capacity Self-employed farmers around 43.14% or overall will increase household income capability Farmers around 47.39%.

2. Utilization of Spare Time to Work Productive.

The limited source of household income of farmers from on farm, off farm and nonfarm can be overcome by farmers with the utilization of spare time. The allocation of available household working time, working time for households, rest time, working time used for oil

palm business activities, other farming, outside the farmers' farming and household livelihoods can be seen Table 6.

Table 6 – Allocation of Palm Oil Farming Working Time of 2017

No	Description	Allocation of Working Time					
		Smallholders		Self-help farmers		Average	
		Men's Day	%	Men's Day	%	Men's Day	%
1	Time available	948	100	962	100	955	100
2	Time for RT	239	25.21	247	25.68	243	25.45
3	Time off	280	29.54	296	30.77	288	30.16
4	Productive time	265	27.95	301	31.29	283	29.63
5	Free time	164	17.30	118	12.26	241	14.76

In Table 6 it can be seen that the average working time available of smallholders and self-employed farmers is about 955 man-days (HKO) per household per year. Time allocation used for household and rest activities Self-help farmers are relatively more than plasma farmers. Time spent on productive activities Farmers are around 301 HKOs or 31.29% while smallholders are around 265 HKO or 27.95%. The result of statistical analysis of the mean value test is significant at 95% confidence level. This means productive working time allocation Self-help farmers are significantly different from the productive working time allocation Smallholders or productive working time Self-farming farmers are relatively higher than the productive working time allocation of smallholders.

The untapped leisure time for this large productive activity can actually be used to increase the income of farm households. Left untapped for productive activities Smallholders are around 164 HKOs and self-employed Farmers are around HK $ 118 per year. When the spare time plasma farmers and self-help farmers are used to work productively with a certain wage rate will be obtained potential household income. Working opportunities that are available outside the most farming are for the activities of factory workers, candied traders / daily necessities of self-employed wood and stone crafts. The potential increase in income and income capability of households of oil palm farmers through the utilization of leisure time for productive activities in 2017 seen Table 7.

Table 7 – Potential Increase in Income and Profitability of Household Revenue by Oil Palm Farmers through 2015 Leisure Utilization

No	Average Revenue Household	Smallholders (Rp thousand)	Self-help farmers (Rp thousand)	Average (Rp thousand)
1	Original revenue	16.142	25.554	20.848
2	Potential increase	6.330	7.836	7.083
3	Household income	22.472	33.390	27.931
4	Increased revenue (%)	39.21	30.66	34.94
5	Income capability (%)	41.74	36.17	38.96

Table 7 shows that the utilization of leisure time for productive activities will increase household income Smallholders of around 39.21% and self-employed farmers around 30.66% while the use of leisure time productive activities will increase household income capability of smallholders about 41.74% relative Higher than the increase in household income ability Self-employed farmers around 39.17% or overall average will increase farmers' household income capability by about 38.96%.

Average level of household income ability Farmers who can not afford to pay for their living need about 25.71%, with the increase of economic ability through the application of oil palm intercropping pattern around 43.30% and through the utilization of spare time about 39.21%. If done by plasma farmers together, it will increase the household income capability of plasma farmers to about 142.5%, with this increase means that plasma farmers will be able to finance their life needs because the household capability level of farmers is more than 100%.

Average household income earning capacity Self-help farmers who can not afford the cost of living are around 8.0%, with an increase in household income through applying the

pattern of intercropping crops around 37.09% and through the utilization of spare time around 30.66%. If undertaken by self-help farmers collectively, it will increase the household income capacity of self-farmers to about 137.4%, with this increase means household income Farmers are more than 100%.

CONCLUSION AND RECOMMENDATIONS

From the analysis of farmers' household income capability in financing their household needs, the following conclusions can be drawn:

There is a significant difference between the average household income of smallholders and the average household income of self-employed farmers;

There is a significant difference between the average cost of household needs Smallholders with average household needs Self-help farmers. Being 112.5 percent above the average cost of household needs Self-help farmers;

There is a significant difference between the level of household income capability of smallholders and non-farmers. Household income level Plastic farmers who are able to finance their household needs are about 95% relatively higher than self-employed farmers about 87%;

The level of household income capability Smallholders and non-farmers who can not afford to finance their household needs can be improved through the implementation of the pattern of oil palm-rice / pineapple / banana-chili plants, and through the utilization of leisure time used for productive work, Respectively to about 139.6 percent and 144.3 percent thus all farmers will be able to finance their household needs.

In order to empower the household economics of sustainable palm oil farmers, it is suggested to need a policy on guidance and counseling from related institutions with efforts to improve the technical capability of oil palm farmers and the provision of financial aid and credit funds to motivate farmers to rejuvenate their oil palm using superior clones.

REFERENCES

1. Anonymous, 2009. Profile of Commodity Unngulan Plantation of Jambi Province.
2. Regional Plantation Office of Jambi Province, Jambi.
3. Central Bureau of Statistics, 2017. Jambi in Figures. BPS First Level Region of Jambi.
4. Provincial Plantation Office of Jambi Province, 2016. Plantation Statistics. Disbun Jambi.
5. Regional Plantation Office of Jambi Province, 2017. Annual Report. Disbun Jambi.
6. Directorate General of Plantation Development, 2017. Indonesian Plantation Statistics Data. Ministry of Agriculture, Jakarta.
7. Ellis. F, 1998. Peasant Economics, Farm Households and Agrarian Development. Cambridge University Press.
8. Jaenuri, Habib. 2016. Analysis of Expenditure Allocation of Household Consumption of Oil Palm Farmers in Muara Tabir Sub-district of Tebo District. Thesis, University of Jambi.
9. Lestari Eka, E. 2015. Comparative Study of Smallholder Plasma Palm Oil Plantations and Self-Supporting Patterns in Facing RSPO Certification (Case Study of Bukit Lembuh Village Subur Pelalawan Regency of Riau Province). Thesis, University of Riau.
10. Malik Adlaida. 2015. Assessment of Farmers Economic Capacity in Rubber Garden Rejuvenation in Muaro Jambi Regency. University of Jambi. Jambi.
11. Tjasadihardja. A., 1995. Effort to Increase Farmer's Income through Rejuvenation of Palm Self-supporting. Warta Pusat Penelitian Sawit. Vol. 14 (3): 147-158.
12. Authority. G., 1997. Alternative Study of Inland Crops and Oil Palm Plantations. Proceeding Appreciation of Technology for Increasing Productivity of Land of Palm Plantation Medan.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.31

ENHANCING PRODUCTION AND SALAK SUWARU FARMING INCOME

Sudaryono Tri, Researcher
Agricultural Technology Assessment Institute of East Java, Malang, Indonesia
E-mail: tri_sdr@yahoo.com

ABSTRACT
Salak is an Indonesian indigenous fruit crop and in various areas, Salak is acknowledged as beneficial fruit that has enormous both national and international market opportunities. One of the areas in East Java which is the center of Salak production is Malang Regency known as Salak Suwaru. Salak Suwaru as one of East Java's superior fruit has been released as a superior variety; it has thick flesh meat, masir, sweet, sharp-flavored and its weight between 70-120 g. The efforts to increase production and Salak Suwaru farm income need to be done as perceiving its economic value. This research aims to discover the effect of water supply and ZA fertilization on production and increase Salak Suwaru farm's Income that has been conducted in Suwaru Village, Pagelaran Sub-district, Malang Regency from April 2012 until August 2013. The result shows that the increase of production and Salak Suwaru farm Income can be achieved through water supervision and ZA fertilization. Water supply and ZA fertilization can increase the production of Salak Suwaru up to multiple. Through the water supervision and ZA fertilization, Salak Suwaru farm Income can be increased up to three times.

KEY WORDS
Fertilizer, production, income, salak, water.

Salak is an Indonesian native fruit crop (Mogea, 1984) and in some areas, Salak is acknowledged as beneficial fruit that has enormous both national and international market opportunities (Sumarno, 2004). Salak plants included palm family, first cultivated in Java and fruit marketed in Singapore (Ridley, 1925). Some various areas in Java areas known as the main production center of Salak, therefore Java is known as the center of Salak cultivation. One of the areas in East Java which is the main production center of Salak is Malang Regency known as Salak Suwaru center.

Salak Suwaru as one of East Java's superior fruit has been released as a superior variety through Ministry of Agriculture Decree No: 120/KPTS/TP/240/3/1991. The superiorities of Salak Suwaru are thick meat, ripe, sweet, sharp-flavored and weight per fruit is between 70 -120 g (Widyastuti and Paiman, 1993; Food Crop Agriculture Department Level II Malang Regency, 1997). Currently Salak Suwaru by farmers has been used as well as processed raw materials, namely dodol or jenang and syrup. This fact has instigated the Gondanglegi sub-district to be nominated as the Center for Agribusiness Development of Prime Commodity (SPAKU) with one of its objectives is to grow the Salak agro industry in the area (Regional Office of the Department of Agriculture of the First Level Region of East Java Province, 1999). The growth of agroindustry in SPAKU area is expected to increase the demand of Salak fruit.

Salak plants are diverse from other tropical fruit crops that are generally only once harvest in a year with almost the same time. Salak fruit harvest can occur at least twice a year, once a harvest and once gadu or apitan harvest. The harvest season generally occurs in December until February, while gadu harvest is generally in June to August (Sudaryono et al., 1993).

At certain times, especially in the dry season of Salak plants do not produce flowers, because in the dry season there is no addition of sprout. The absence of new sprout addition instigated due to lack of water and lack of nitrogen and sulfur nutrient input. To support growth and production, Salak plants require sufficient water throughout the year (Schuiling and Mogea, 1992). Nitrogen and sulfur are essential macro nutrients for palm family plants.

The lack of both nutrients will interpose plant's growth and development (Nethsinghe, 1962, Felizardo, 1983). In order to obtain the production's improvement, especially off-season production, in the dry season of Salak plants required to be irrigated and fertilized with nutrients containing nutrients N and S. This research aims to discover the effect of water supply and ZA fertilization on the production and Salak Suwaru farmers' improvement Income.

METHODS OF RESEARCH

The research was conducted in Suwaru Village, Pagelaran Sub-district, Malang Regency from April 2012 until August 2013. This research used a split plot design that was repeated three times. The main plot treatment is water delivery, consisting of no irrigation and irrigation at 20 days intervals. Water delivery is done by leb or 20 liters per tree (Soleh et al., 1995); Wijadi et al., 2000). Irrigation started from April to October 2012, because these months are the dry season. The treatment of subplot is ZA fertilizer dosage consisting of 0 g, 100 g, 200 g and 300 g ZA per tree. The experiment was conducted in farmer's farm with plant age about 20 years and spacing 2 m x 2 m. Each treatment consists of 10 trees. In addition to fertilized ZA in accordance with the treatment, Salak plants are also fertilized with 37.5 g Urea + 175 g KCl + 200 g Dolomite + 3.75 g Borax + 3.75 g Zinc Sulfate per tree as a base fertilizer. Basic fertilizer is given after harvest time and one month after basic fertilizer application, fertilization is completed with ZA according to treatment.

Data collected by the number of flower clusters, the number of fruit clusters, the number of fruits per cluster, the weight per fruit clusters, as well as the production and farmers' income during apitan harvest, and off-season harvest.

RESULTS AND DISCUSSION

The Effect of Water Distribution and ZA Fertilization on the Number of Flower Clusters and Fruit Weight per Cluster. Water supply and ZA fertilization affect the number of Salak Suwaru flower clusters. The steadiness of Salak Suwaru flower appears to be highly dependent on soil moisture content. It is indicated that 20 days interval given increases the number of flower clusters two to three times (Table 1).

Table 1 – The Effect of water supply on the number of Salak Suwaru flower clusters per tree

Treatment	the number of flower clusters per tree			
	2 month after water application	3 month after water application	4 month after water application	5 month after water application
Without irrigation	0,60 a	0,60 a	0,40 a	0,50 a
20 days interval-irrigation	1,30 b	1,10 b	1,20 b	1,40 b

Note: The figures in the same column completed by different letters show an obvious difference based on the BNT test at the 5%.

Table 2 – The Effect of ZA fertilization on the number of Salak Suwaru clusters per tree

ZA fertilizer dosage (g/tree)	Jumlah tandan bunga per pohon			
	2 months after fertilizer application	3 months after fertilizer application	4 months after fertilizer application	5 months after fertilizer application
0	0,42 a	0,50 a	0,60 a	0,60 a
100	0,88 b	0,80 ab	0,90 b	1,00 b
200	1,23 b	1,10 b	1,00 b	1,00 b
300	1,27 b	1,00 b	0,90 b	1,20 b

Note: The figures in the same column completed by different letters show an obvious difference based on the BNT test at the 5%.

Besides influenced by water content, it seems that the continuity of Salak Suwaru is also influenced by the availability of N and S elements. It is shown that the application of ZA fertilizer has an effect on the number of bunches of Salak Suwaru. Suwaru ZA fertilizer plants produce more bunches of flowers than plants that are not fostered ZA (Table 2).

Water is one of the basic needs for plants, including Salak plants. Chapman and Carter (1976) suggested that in living plant tissues containing water 85 to 95%. Salak is a class of plants that required water in large quantities. The amount of water required by Salak is different for each growth phase, where the flowering and fertilization phases of water demand more than the other growth phases (Lestari and Ebert, 2002). Therefore, if the soil is lack of water, especially in the dry season, irrigation is absolutely necessary. This fact indicates that the emergence of Salak Suwaru flowers is obviously due to the availability of water supply at 20-day interval aimed at maintaining the available groundwater content of 85%.

Fertilizers and water are two associated components and are critical to growth and crop yield. The role of water is essential as water serves as a solvent of organic and inorganic substances in the soil (Barber, 1984), photosynthetic feedstock and hydrolysis process (Gardner et al., 1985). Fertilizer application is beneficial for plants when there is sufficient water, therefore the fertilizer can be dissolved (decomposed) into ions and cation that can be absorbed by plants. Soleh et al. (1995) suggested that urea fertilization, ammonia nitrogen, potassium chloride, dolomite, borax and zinc sulfate in Salak plants followed by water supply, in addition to increase yield also increased N absorbent. Increased of N absorbent elements and the fulfillment of water availability in root areas, instigating vegetative growth of Salak plants indicated by the increase of new midrib will take place optimally and continuously. The continuous growth of new midrib continues to instigate the growth of the flower, remembering that the emergence of Salak spray along with the emergence of new midrib. Kaat et al. (1999) reported that N fertilization in urea form dose of 0.5 kg - 1.5 kg per tree in Khina-1 hybrid coconut plant, in addition to increase vegetative growth, stem height, midrib and midrib leaves and fruit.

The interaction between water supply and ZA fertilization has an effect on the result of Salak Suwaru, therefore fruit weight per cluster. The interaction between 20 days water interval and ZA fertilization on 300 g dosage per tree resulted in the greatest fruit weight per cluster of 2.70 kg (Table 3).

Table 3 – The Interaction effect between water delivery and ZA fertilization on Salak suwaru fruit weight per cluster

Treatment	Fruit weight per cluster (kg)			
	ZA fertilizer dose (g/tree) 0	ZA fertilizer dose (g/tree) 100	ZA fertilizer dose (g/tree) 200	ZA fertilizer dose (g/tree) 300
Without water supply	1,11 a	1,56 b	1,69 c	1,85 d
20 days interval water provision	1,81 d	2,04 e	2,36 f	2,70 g

Note: Numbers on the same columns and rows completed by different letters show a marked difference based on the BNT test at the 5%.

In Table 3 shows that Salak Suwaru plants without water supply, the production (fruit weight per cluster) is constantly lower compared to the irrigated Salak plant's production. The higher ZA fertilizer doses, the better fruit weight per cluster, for both irrigated and non-irrigated Salak plants. These results are in line with Neilsen et al. (1989) which stated that irrigation in young apple crops increases production and the number of fruits per tree is 12% and 39%, respectively. Kaat et al. (1999) reported that increasing the doses of N 0,5 kg per tree also increases the yield of Khina-1 hybrid coconut by 25%.

Environmental factors grow, especially ground water conditions and soil fertility (availability of elements of N and S) is fairly influential on Salak plant's generative growth. This indicates that water supply and ZA fertilization in Salak Suwaru plants in addition to increase the number of flowers also increase improves the fruit weight production per cluster.

This fact is in line with Sudaryono et al. (2000) who reported that fertilization of 300 g ZA fertilization followed by 37.5 g Urea + 175 g Potassium Chloride + 200 g Dolomite + 3.75 g Borax + 3.75 g Zinc Sulfate per tree and 20 days interval irrigation (during the dry season) increased the number of flower clusters, the number of fruit clusters and the production of Salak gradually 74%, 81% and 84%.

The increased production of Salak Suwaru seems instigated also by the increasing of nutrient absorbent S by Salak plants, given ZA contains nutrient S by 22%. If prior to ZA fertilization S levels in leaves only 0.82%; after ZA fertilization dose of 100 g, 200 g and 300 g per tree, S levels grew to 0.94%, 1.15% and 1.28%, respectively.

The Influence of Water Delivery and ZA Fertilization on Salak Suwaru farmers' Income. The Efforts to increase Salak Suwaru off-season production needs to be done. Salak Suwaru off-season production will increase farmers' income, because the selling price can reach 3 times compared to the common selling price during the harvest period (Kasijadi, 1994). Water supply and ZA fertilization in addition to increase Salak Suwaru production also increased the harvest season (off season) which occurred in April - May, which in additional harvest season is obtained additional Income of Rp 6,020, - per tree (Table 4). This fact is in line with Sudaryono et al. (1999) which suggested that Suwaru seasonal harvest season in the external season can occur in March - May or August - October. Assuming that each hectare consists of 1600 Salak trees, water supply and ZA fertilization will generate Salak Suwaru farm income by Rp 30.160.000, - / ha / year. This income is almost three times greater than without water supply and ZA fertilization in which only reached Rp 11.680.000, - / ha / year. The increase of Salak Suwaru farming income due to water supply and ZA fertilization, besides due to the increase of production in every harvest season both at harvest and apitan, also caused by the harvest in the off-season which gives additional income of farming Rp 9.632.000, -.

Table 4 – The Effect of water supply and ZA fertilization on the production, output, input and income of Salak Suwaru farm at highway harvest, apitan and off-season harvest

Treatment	Highway Harvest (December-January)				Apitan Harvest (July-August)				Off-season Harvest (April-May)			
	Prod (kg)	Out-put[1] (Rp)	Input (Rp)	Income (Rp)	Prod (kg)	Out-put[2] (Rp)	Input (Rp)	Income (Rp)	Prod (kg)	Out-put[3] (Rp)	Input (Rp)	Income (Rp)
Control	1,10	3.300	0	3.300	0,80	4.000	0	4.000	0	0	0	0
Irrigation + ZA fertilizer	2,23	6.690	1.180	5.510	1,70	8.500	1.180	7.320	1,20	7.200	1.180	6.020

Note:

1) Fruit price per kg Rp 3.000,-
2) Fruit price per kg Rp 5.000,-
3) Fruit price per kg Rp 7.000,-

Input = Input= Fertilizer and water price
Output = Production x fruit price
Income = Output-Input

CONCLUSION

Increasing the production and income of Salak Suwaru farming can be obtained through water supply and ZA fertilization. Water provision and ZA fertilization can increase Salak Suwaru production up to two-fold and farming income up to three times.

REFERENCES

1. Chapman, S. R and L. P. Carter. 1976. Crop production, principles and practices. W. H. Freeman and Company, San Fransisco.
2. Department of Agriculture Food Crops Level II Region Malang Regency. 1997. Salak Suwaru.
3. Felizardo, B. C. 1983. Coconut research improvement in Indonesia. Report of consultan on Fertility. Ins/31/015.

4. Gardner, F., P. Pearce and R. L. Michele. 1985. Physiology of crop plant. The Iowa State University Press.
5. Kaat, H., R. Rachman dan D. Allorerung. 1999. Pengaruh pemupukan terhadap pertumbuhan dan produksi kelapa hibrida Khina-1 pada tanah podzolik. Buletin Palma No. 25 : 46-54.
6. Regional Office of the Department of Agriculture of the First Level Region of East Java Province. 1999. Laporan pertemuan pembinaan manajemen Kopaku/Kuba di Kabupaten Malang.
7. Kasijadi, F. 1994. Analisis efisiensi usahatani salak kultivar Suwaru di Jawa Timur. Penel. Hort. 6(3) : 83-89.
8. Lestari, R and G. Ebert. 2002. Salak-the Indonesian snake fruit. Hamboldt Uiversity Berlin, Departement of fruit production. Berlin, Germany.
9. Mogea, J. P. 1984. Three new species of genus salacca (Palmae) from the Malay Peninsula. Museum J. 29 : 1-22.
10. Neilsen, G. H., D. S. Stevenson, J. J. Fitzpatrick and C. H. Brownlee. 1989. Nutrition and yield of young apple tree irigated with muncipal waste water. J. Amer. Soc. Hort. Sci. 114 (3) : 377-383.
11. Neithsinghe, D. A. 1962. Coconut nutrition and fertilizer requirement the soil approach. Indian Coconut J.
12. Ridley, H. N. 1925. The flora of Malay Peninsula. Vol. V. L. Reeve & Co, Ltd. London
13. Schuiling, D. L and J. P. Mogea. 1992. Salacca zalacca (Gaertner) Voss. p. 281-284. In: Verheij, E. W. M and R. E. Coronel (eds.). Plant resources of South Esat 2 : Edible Fruit and nuts. Pudoc/Prosea, Wageningen.
14. Soleh, M, Suhardjo dan A. Suryadi. 1995. Pengaruh pemberian air dan masukan hara makro serta mikro terhadap produksi salak. Sub Balai Penelitian Hortikultura, Malang.
15. Sudaryono, T, S. Purnomo dan M. Soleh. 1993. Distribusi varietas dan perkiraan wilayah pengembangan salak. Penel. Hort. 5(2) : 1-4.
16. Sudaryono, T., L. Rosmahani, A. Suryadi, Q. D. Ernawanto dan E. Srihastuti. 1999. Perakitan teknologi peningkatan frekuensi panen salak unggulan Jawa Timur. p. 122-128. In: Roesmiyanto, Komarudin-Maksum, P. Santoso, M. E. Dwiastuti dan H. Sembiring (eds.). Prosiding Seminar Hasil Penelitian/Pengkajian. BPTP Karangploso, Malang.
17. Sudaryono, T., A. Suryadi dan L. Rosmahani. 2000. Teknologi peningkatan frukuensi panen salak unggulan Jawa Timur. p. 211 - 214. In : Musofie, A., N. K. Wardhani, D. Shiddieq, Suharto, R. Mudjisihono, Aliudin, B. Hutabarat (eds.). Prosiding Seminar Teknologi Pertanian Spesifik Lokasi dalam Upaya Peningkatan Kesejahteraan Petani Dan Pelestarian Lingkungan. Pusat Penelitian Sosial Ekonomi Pertanian, Bogor.
18. Sumarno. 2004. Potensi dan peluang usaha agribisnis buah tropika dalam era pasar bebas. p. 1-14 In : Roesmijanto, A. Djauhari, S. Yuniastuti, R. Hardianto, P. E. R. Prahardini (eds.). Prosiding Seminar Prospek Sub-Sektor Pertanian Menghadapi Era AFTA Tahun 2003. Badang Litbang Pertanian, Puslitbang Sosial Ekonomi Pertanian, Bogor.
19. Widyastuti, Y. E. Dan F. R. Paiman. 1993. Mengenal buah unggul Indonesia. PT Penebar Swadaya, Jakarta.
20. Wijadi, R. D., E. Sugiharti dan Martono. 2000. Pengkajian teknologi pengelolaan tanaman induk salak. p. 326-331. In : Soetjipto, P. H., M. C. Mahfud, M. A. Yusron (eds.). Prosiding Seminar Hasil Penelitian/Pengkajian Teknologi Pertanian Mendukung Ketahanan Pangan Berwawasan Agribisnis. Badan Litbang Pertanian, Puslitbang Sosial Ekonomi Pertanian, Bogor.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.32

EFFECT OF NUTMEG (MYRISTICA FRANGRANS HOUTT) LEAVES AND CLOVE (SYZYGIUM AROMATICUM L.) LEAVES TREATMENT TO PHYSICAL AND CHEMICAL CHARACTERISTICS OF KACANG GOAT (CAPRA HIRCUS)

Yusri S.*, **Salim M.A.**, **Ryadin A.R.**
Faculty of Agriculture, University of Khairun, Ternate, Indonesia
*E-mail: yus_ara01@yahoo.co.id

ABSTRACT
Nutmeg (*Myristica frangrans* Houtt) and clove (*Syzygium aromaticum* L) is an herb plants that contain essential oils. The research objective was to determine the physical quality (pH, shrinkage cooking, and water holding capacity) and chemical quality (moisture content, protein content and fat content) of Kacang goat (*Capra hircus*) by rationing of nutmeg and clove leaves treatment. There are four treatments that consisted of the percentage of R0 = ration basal (without the addition of nutmeg and clove leaves), R1 = basal diet + 5% of nutmeg leaves, R2 = basal diet + 5% of clove leaves, R3 = basal diet + 5% of nutmeg leaves +5 % of clove leaves, while each treatment was replicated four times. The results showed that the use of nutmeg and cloves leaves in a ration of 5% does not affect the physical and chemical quality of the Kacang goat in terms of pH, cooking shrinkage, water holding capacity, moisture content, protein content and fat content.

KEY WORDS
Nutmeg leaves, clove leaves, goat, physical quality, chemical quality.

In Indonesia, Kacang goat has an important economic value, favorable by the people and is widespread in the land of farmers. This fact shows the crucial role of goats to the farmers. Contributions from goats of total farm income for small ruminants is very substantial, where its production also plays an important role to foster the income activity of many small farmers in addition to being a source of animal protein that support national food security.

Goat meat consumption in Indonesia increased along with population growth and development, as well as increasing public awareness of eating meat. One commodity meat that contribute substantially to public nutrition is mutton.

Goat meat is one favored by the public. The most important thing in the choice of meat is the meat quality, meat quality circulating in the community is often not secured properly. The quality of the meat can be viewed from two factors, namely physical and chemical qualities of meat.

The physical quality of the meat include pH, water holding capacity, cooking losses and texture, while the chemical quality of the meat can be determined based on changes in its chemical components such as moisture, protein, fat and ash. Physical and chemical qualities of goat meat affected by the process before and after cutting. Factors before cutting that can affect the quality of the meat is genetic, species, race, type of animal, sex, age, including feed additives (hormones, antibiotics, and minerals) and the state of stress. After cutting factors affecting meat quality include among others the pH of the meat, storage methods, types and locations of muscle meat in a meat muscle (Soeparno, 2009).

Nutmeg (*Myristica frangrans* Houtt) and clove (*Syzygium aromaticum* L) is an Indonesian herb plants that are rich in anti-bacterial agents, because they contain essential oils. According to Dorman et al. in Nurdjannah (2007), the main components of essential oils are terpenes, terpene phenolic alcohol and ether. Components monoterpenes hydrocarbons is the main component of essential oil composed of β-pinene (23.9%), α-pinene (17.2%) and limonene (7.5%). While the phenolic components primarily myristicin ether (16.2%), followed by safrole (3.9%) and methyl eugenol (1.8%). Essential oils of nutmeg and clove consists of several components including the active compound and monoterpan myristicin. Myristicin contained in the fruit flesh of nutmeg can be used to soothe the pain (analgesia), improving

blood circulation, sedatives and anti-depressants (Anonymous, 2008). Furthermore, Mancha and Fuentes (2008) stated that recent developments of utilization of oil nutmeg and cloves are as a raw material that is stress relieving aromatherapy for their myristicin component. Critical components such as myristicin contained in nutmeg and cloves are expected to improve physical and chemical properties of Kacang goats.

METHODS OF RESEARCH

Research Sites. This research was conducted in the Cage Ranch IbIKK Khairun University Studies Program. Test physical and chemical qualities of meat carried out in the Laboratory of Animal Husbandry Animal Husbandry University Studies Program Khairun.

Research Materials. Animals used in this study were Kacang male goat as much as 16 tails, about 1 year old with an average initial weight of 11.02 ± 0.53 kg.

Cage and feeding the goats bean research carried out in an individual cage, measuring 100x200 cm in front is equipped with the feeding and drinking places.

Feed used in research are nutmeg leaves, clove leaves, grass field, jackfruit leaves and lamtoro leaves. Nutmeg and clove leaves obtainable around the study site, the site of the garden of nutmeg and clove. Grass, jackfruit leaves and lamtoro leaves obtained from the land surrounding the research site.

Research Method. Goats as many as 12 heads randomly placed in individual cages. Maintenance time for 12 weeks. Goats were divided into 4 groups, each group consisting of three goats as replication. The division of the group are:

R0 (control) = 10% leaf lamtoro + 15% + 75% jackfruit leaves natural grass;

R1 = 5% nutmeg leaves, leaf lamtoro 5% + 15% + 75% jackfruit leaves natural grass;

R2 = 5% leaf clovers, leaf lamtoro 5% + 15% + 75% jackfruit leaves natural grass;

R3 = 5% leaves nutmeg, clove leaves 5%, 5% leaves lamtoro + 10% + 75% jackfruit leaves natural grass.

Feeding both leaf nutmeg, clove, jackfruit and natural grass is given in the form of fresh and administration based on the calculation of 3.5% of body weight in the form of dry ingredients.

Frequency of feeding twice a day morning and evening ad libitum, provision separately done between nutmeg leaves, clove leaves and grass. Drinking water provided ad libitum. After 12 weeks of carried out the slaughter of the experimental material.

Variables observed. Variables observed and measured in this study are the physical and chemical qualities of meat. The physical quality include pH value of meat (ultimate), the value of the meat cooking shrinkage and water holding capacity of meat. The pH of fresh meat, determined by using a pH meter. Cooking shrinkage (SM) or loss is determined by a modified cooking method Bouton et al, (1971) which is cited by Soeparno (2009). Water holding capacity (DIA) is determined by the method of Hamm (1972), quoted from Soeparno (2009).

Variables observed for chemical quality are the water content of the meat, the protein content of meat and fat content of the meat. Cutting or sampling was done at the end of 12 week after the study, carried out on cattle slaughter experiment as much as 3 heads each treatment. Once the cuts was made, separation parts of carcass and non carcass was required to taken samples to test the quality of the meat on the longissumus dorsi (LD). Future collection intended for the weighing of carcasses, but it also carried out the sample analysis to determine the chemical quality of meat which include water content, protein content and fat content.

Data analysis. Data obtained from observations were analyzed using analysis of variance models completely randomized design (CRD) unidirectional pattern. When the results of the analysis showed significantly different treatment responses, then continued with Duncan's multiple range test (Steel and Torrie, 1993).

RESULTS AND DISCUSSION

The physical quality of meal of Kacang goat. The average pH value of Kacang goats with the use of leaf nutmeg and cloves are R0 of 5.69, 5.67 R1, R2 and R3 5.63 5.64 (Table 1) had no significant (P> 0.05). This means giving 5% 5% leaves nutmeg and clove, and combinations thereof in the feed does not give a real impact on the pH value og Kacang goats. The pH value is relatively the same in every treatment (R0 - R3) showed that muscle glycogen reserves at relatively the same each treatment causes deposits of lactic acid are relatively the same. The final pH value of meat anatar study ranged from 5.63 to 5.69 while the ultimate meat pH range ranges (5.4 to 5.8). This fact shows that the use of leaves nutmeg and cloves in the feed they are in ultimate pH range.

The achievement of the ultimate pH of meat due to lactic acid heap during post mortem glycolysis, depending on the amount of muscle glycogen reserves during cutting. Lactic acid accumulation will stop after muscle glycogen reserves depleted, or after the condition is achieved ie pH low enough to stop the glycolytic enzymes in the process of anaerobic glycolysis (Judge et al., 1989).

The degree of muscle activity before the cuts will affect the amount of time livestock glycogen cut (Swatland, 1994). In cattle too many moves before it is cut, for example the cuts that are not stunned beforehand or not rested before cutting the supply of glycogen will be much reduced. Most of glycogen is used for activity, this would result in higher fixed pH or pH niali meat ultimate pH above. In general, ways to overcome the low muscle glycogen reserves are to be rested, rest periods ranged from 12 to 24 hours. Feeding taste with good characteristics and adequate rest can improve muscle glycogen reserves in order to obtain meat with a normal pH end. Cattle are stunned before slaughter is also able to overcome the loss of glycogen reserves as a result of stress stress. The pH value of the meat has close links with flesh color, aroma, taste and water holding capacity of meat.

Research Budiyanto and Usmiati (2009) obtained a pH value of 5.81 mutton. According to the Twelve (2008) the diversity of the pH value on the bacon can be caused by two factors: intrinsic and extrinsic. Intrinsic factors such as age, type of muscle, muscle glycogen and stress levels of livestock before slaughter.

Table 1 – Average values of pH, water holding capacity (WHC) and cook shrinkage of goat by nutmeg and clove leaves treatments

Variables	Feed treatments			
	R0 (Control)	R1 (nl 5%)	R2 (cl 5%)	R3 (nl and cl 5%)
pH	5,69	5,67	5,63	5,64
WHC (%)	31,64	31,47	31,21	31,23
Cook Shrinkage (%)	40,83	40,47	40,26	40,35

Note: nl = nutmeg leaves, cl = clove leaves.

Whereas, extrinsic factors include ambient temperature and treatment additives before cutting. The effect of stress before slaughter, such as climate, aggressive behavior among livestock or excessive movements have a major influence on the reduction or exhaustion of muscle glycogen can cause accumulation of lactic acid to produce meat with a high pH (> 5.9).

Water holding capacity is the ability of meat to bind water or water is added during no influence from outside forces, such as meat cutting, heating, grinding and pressure. In this study, the value of water holding capacity of meat R0 31.64, 31.47 R1, R2 and R3 31.21 31.23 (Table 1) had no significant (P> 0.05). This means giving 5% 5% leaves nutmeg and clove, and combinations thereof in the feed does not give a real impact on the water holding capacity of Kacang goats. The value of water holding capacity of meat is influenced by the pH value of the meat. Water holding capacity decreased from a high pH to the isoelectric pH / pH ultimate. In accordance with the opinion of Wismer-Pedersen (1971) in Suparman (1996) suggest that the accumulation of lactic acid during the process of postmortem glycolysis (immediately post) will lower water holding capacity.

The pH value is decreased resulting in low water holding capacity (Sunarlim and Usmiati, 2009). This is due to the low pH value of meat resulting in open flesh structure so that the lower water holding capacity and high pH meat meat resulting structure is closed so that a high water holding capacity. In this study, the pH of the meat produced is still in the range of ultimate meat pH means that the pH effect of meat on the water holding capacity of meat still in the stage of normal. Besides the factors pH value of the water holding capacity of meat is also affected by differences in the species, age and muscle function, feed, transport prior to cutting, health ernak, temperature, sex cattle, treatment before cutting and intra muscular fat content (Soeparno, 2009).

Cooking shrinkage is a function of temperature and duration of cooking. The results of this study showed no real difference among the four treatments. This means giving 5% 5% leaves nutmeg and clove leaves and kompinasinya not give a real impact on the value of shrinkage cook of Kacang goats. In general, meat susutmasak value varies between 1.5 to 54.5%. Value shrinkage. cooking is influenced by pH, sarcomere length of muscle fibers, long pieces of muscle fibers, myofibrils contraction status, size and weight of a cross-sectional sample of meat and meat (Bouton et al., in Soeparno, 2009). Other factors that influence the cooking shrinkage is water-holding capacity by the network's own flesh and fat content in the muscle or the surface of the meat, and the meat fat translocation. Muscles that have a high intramuscular fat has a high water holding capacity so small cooking shrinkage when cooked. Cooking meat with a lower shrinkage has a relatively better quality of meat by cooking shrinkage values larger, because the loss of nutrients during cooking would be less. The results showed that the use of nutmeg and clove leaves 5% and their combinations in feed perpengaruh not significantly affect the characteristics (pH, DIA and cooking shrinkage) og Kacang goats.

The average value of water content of Kacang goats with the use of leaf nutmeg and cloves are R0 72, 15 ± 0.97%, R1 71, 75 ± 0.82%, R2 71, 67 ± 0.73% and 72 R3, 01 ± 0.69% (Table 1) had no significant (P> 0.05). This means giving 5% 5% leaves nutmeg and clove, and combinations thereof in the feed does not give a real impact on the value of water content of Kacang goats. The average water content in this study masi in the normal range 60-80% (Lawrie and Ledward, 2006).

Table 2 – Average water content, protein content and fat content of goat meat by nutmeg and clove leaves treatment

Variable	Feed treatments			
	R0 (Control)	R1 (nl 5%)	R2 (cl 5%)	R3 (nl dan cl 5%)
Water content (%)	72, 15 ± 0,97	71, 75 ± 0,82	71, 67 ± 0,73	72, 01 ± 0,69
Protein content (%)	19, 34 ± 0,18	19, 54 ± 0,23	19, 32 ± 0,25	19, 83 ± 0,46
Fat content (%)	6.54 ± 0,87	6.35 ± 0,90	6.79 ± 0,93	6.82 ± 0,89

Note: nl = nutmeg leaves, cl = clove leaves.

The water content of the meat can be influenced by the fat content of meat, this is due to the levels of accumulation of high fat content can melunggarkan bond network structure of the meat so much water that is free. In this study, it appears that the fat content of meat is also not significant between the treatment so that the levels airpun not significant between treatments. Browning et al (1990) is on meat containing high levels of fat tended to have a low water content. The water content of the meat has a positive correlation with the pH of the meat, because meat ultimate pH effect on actin filament spacing density and mimosin (Huff-Lonergan and Lonergan, 2005).

Meat with high moisture content will look pale, watery and mushy texture because more water is bound to come out of the meat. The high water content in meat protein lead to slightly soluble in water so that the water holding capacity of meat proteins will decline. According Soeparno (2009) the water content of the meat is affected by the type of animal, age, sex, feed and the locations and functions of the parts of muscle in the body. High water levels caused by the age of the young cattle, due to the formation of protein and fat meat is not perfect (Rosyidi, Ardhana and Santoso, 2000).

CONCLUSION

Based on this research can be concluded that provision of nutmeg and clove leaves 5% 5% as well as combinations in the feed does not give a significant effect on the physical and chemical quality of the Kacang goats.

REFERENCES

1. 2008. Herbal Indonesia Efficacious Scientific Evidence and How to make formula: Nutmeg. p. 387-388. Trubus. Vol. 08. Jakarta.
2. Babiker SA, El Khider IA, Shafie SA. 1990. Chemical composition and quality attributes of goat meat and lamb. Meat Sci. 28: 273-277.
3. Browning, M.A., D. Lhuffman, W.R. Egbert and S.B. Jungs.1990. Physical and compositional characteristic of beef carcass selected for leanness. J. Food Sci. 55: 9-14.
4. Budiyanto, A and S. Usmiati. 2009. Effect of Enzyme Papain Against Goat Meat Quality During Storage. Indonesian Center for Agricultural Postharvest Research and Development. Bogor.
5. Fernandez, D. M, Duenas, A. J. Myers, S. M. Scramlin, C. W. Parks, S. N. Carr, J. Killefer and F. K. Mc. Keithonline. 2008. Carcass, Meat Quality and Sensory Characteristics of Heavy Body Weight Pigs Fed. J.Anim.Sci. 86: 3544-3550.
6. Huff-Lonergan, E. and S. M. Lonergan. 2005. Mechanisms of water holding capacity and meat: the role of postmortem biochemical and structural changes. Meat Sci. 71: 194-204
7. Jugde, M.D., E.D. Aberle, J.C. Forrest, H.B. Hendrick, and R.A. Merkel. 1989. Principles of Meat Science. 2nd ed. Kendall Hunt Publishing Co., Dubuque, Iowa.
8. Lawrie, R. A. 2003. Meat Science. Fifth Edition. Translation Aminudin Parakasi. UI Press. Jakarta.
9. Lawrie, R. A. and D. A. Ledward. 2006. Lawrie's Meat Science 7th ed. Woodheat Publishing Limited. Abington Combridge, England.
10. Mancha A. and J. Fuentes. 2008. Evaluation of the health beneficial properties of the aromatic ether Myristicin - Nov9 - 330PM. Ppt-USA.
11. Murphy TA, Loerch SC, Mc Clure KE, Solomon MB. 1994. Effects of restricted feeding on growth performance and carcass composition of lambs subjected to different nutritional treatments. J Anim Sci. 72: 3131-3137.
12. Nurdjannah, N. 2007. Processing Technology of Nutmeg. Agency for Agricultural Research and Development. Great Hall Postharvest Research and Development of Agriculture.
13. Rosyidi, D., Ardhana, M and Santoso, R.D. 2000. Quality Meat Fat Tailed Sheep (DEG) Wean off Period Females with Docking and Treatment Concentrate Giving Levels in terms of Moisture, fat content and protein content. Journal of Animal Husbandry Sciences. Vol.11 No. 3: 39-44.
14. Soeparno. 2009. Meat Science and Technology. Fifth printing. Gadjah Mada University Press. Yogyakarta.
15. Steel, R. G. D. and J. H. Torrie. 1993. Principles and Procedures of Statistics. An Approach Biometrics. Translators: Sumantri, B. General Gramedia Pustaka, Jakarta.
16. Sunarlim, R and Usmiati, S. 2009. Characteristics of Goat Meat with Soaking Enzyme Papain (The Characteristic of Goat Meat Soaked In Papain). National Seminar on Animal Husbandry and Veterinary Technology, 2009. Research and Development of Agricultural Postharvest. Bogor.
17. Suparman, P. 1996. Effects of Long Fattening And Fasting Before Cut Production Of Carcass and Physical Characteristics Beef Brahman Cross. Thesis. Faculty of Animal Husbandry Universitas Gadjah Mada.
18. Swatland, H.J. 1994. Structure and Development of Animals and Poultry Meat. Technomic Publishing Company, Inc., Lanchaster Pennsylvania.
19. Twelve, C. 2008. Sheep and Goat Meat Characteristics and Quality. Ethiopia Sheep and Goat Productivity Improvement Program. USA.

20. USDA (United State Department of Agriculture). 2001. Nutrient data base for standard reference, release 14. Agricultural Research Service United States Department of Agriculture. Maryland.
21. Uyun, N. 2008. Quality Chemicals Goat Meat Peranakan Etawah (PE) Males And Boer Goats Peranakan (PB) Castration. Journal of Animal Science and Technology Results. Poor. Vol. 4 No. 2: 9-16.
22. Van Niekerk WA, Casey NH. 1988. The Boer goat. II. Growth, nutrient requirements, carcass and meat quality. Res Small Rumin. 1: 355-368.
23. Williams PG. 2007. Nutritional composition of red meat. Nutr Dietetics. 64: S113-S119.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.33

ИСПЫТАНИЕ БИОПРЕПАРАТОВ И ХИМИЧЕСКИХ ФУНГИЦИДОВ НА ЯРОВОЙ ПШЕНИЦЕ В УСЛОВИЯХ ТУЛЬСКОЙ ОБЛАСТИ

TESTING OF BIOLOGIC PREPARATIONS AND CHEMICAL FUNGICIDES ON SPRING WHEAT IN THE CONDITIONS OF THE TULA REGION

Дятлова Н.А, старший научный сотрудник
Dyatlova N.A., Senior Researcher
Тульский научно исследовательский институт сельского хозяйства, Тульская область, Россия
Tula Research Institute of Agriculture, Tula Region, Russia
E-mail: tniisx@mail.ru

АННОТАЦИЯ
В статье рассматриваются результаты опыта совместного применения иммуномодуляторов и химических фунгицидов против основных листостебельных болезней новых сортов яровой пшеницы отечественной селекции Агата и Лиза в условиях лесостепной зоны Тульской области в 2015-2016 годах, применявшихся для предпосевной обработки семян и опрыскивания растений в фазе выхода в трубку - начала колошения в рекомендованных дозах.

ABSTRACT
The article discusses the results of the experience of joint application of immunomodulators and chemical fungicides against the basic leaf-and-leaf diseases of new varieties of spring wheat of native selection Agata and Lisa in the conditions of the forest-steppe zone of the Tula region in 2015-2016, used for presowing seed treatment and spraying of plants in the phase of entering the tube - beginning of ear infection in recommended doses.

КЛЮЧЕВЫЕ СЛОВА
Яровая пшеница, биопрепараты, фунгициды, листостебельные заболевания, агроклиматические условия, урожайность.

KEY WORDS
Spring wheat, biological preparations, fungicides, leaf-stem diseases, agro-climatic conditions, productivity.

Пшеница является основной продовольственной хлебной культурой нашей страны. Её посевные площади занимают более 25 млн. га [1]. Однако из-за болезней, вызываемых фитопатогенными грибами, в стране ежегодно теряется не менее 20% урожая, а в экстремальных ситуациях они способны полностью его уничтожить. Повсеместно и ежегодно посевы яровой пшеницы подвергаются негативному влиянию со стороны комплекса возбудителей болезней, а они, как правило, не обладают комплексной устойчивостью к листовым болезням. На посевах отмечается септориоз (Septoria tritici), бурая ржавчина (Puccinia triticina), мучнистая роса (Erysiphe graminis), жёлтая пятнистость (пиренофороз) (Drechslera tritici – repentis) [6-8,11]. Кроме снижения урожайности значительно ухудшается качество зерна, получаемого с больных растений.

Одним из направлений, призванных снизить пестицидную нагрузку на окружающую среду, является использование биопрепаратов и регуляторов роста [3,9,12]. Биологические препараты содержат живые клетки грибов, бактерий, споровые структуры, а также продукты их жизнедеятельности – фитогормоны, фунгицидные и иммунизирующие компоненты, которые активно подавляют широкий спектр возбудителей болезней, а также вредителей. Главная их задача – повышение иммунитета и урожайности зерновых культур, а в условиях эпифитотии – более

длительное сохранение флагового листа зелёным и частичное стимулирование физиологических процессов [10].

Будущий урожай во многом определяют семена, являющиеся источником инфекции многих болезней, протравливание – единственный и наиболее надёжный способ уничтожения семенной инфекции [4,5,13]. Это наиболее целенаправленное, эффективное, экономически целесообразное и экологически малоопасное мероприятие. Но даже если семена были протравлены, ряд фитопатогенов инфицирует растения в период вегетации и предотвратить или снизить ущерб от поражения можно только за счёт своевременных химических обработок посевов фунгицидами.

МАТЕРИАЛЫ И МЕТОДЫ ИССЛЕДОВАНИЙ

В условиях лесостепи Тульской области на базе отдела первичного семеноводства ФГБНУ «Тульский НИИСХ» проводилось испытание совместного применения иммуномодуляторов и химических фунгицидов против листостебельных болезней новых сортов яровой пшеницы Агата и Лиза.

Сорт Агата создан в ГНУ Московский НИИСХ «Немчиновка» совместно с Рязанским НИИСХ. Разновидность лютесценс. Сорт среднеспелый, созревает за 77-98 дней. Устойчив к полеганию. Слабо поражается бурой ржавчиной и мучнистой росой. Средняя урожайность 3,2 т/га. В благоприятных метеоусловиях потенциал урожайности превышает 6,0 т/га. Агата имеет хорошие и стабильные по годам хлебопекарные качества зерна. Внесён в Госреестр в 2014 г. по Центральному району.

Линия 271 (сорт Лиза) так же создан в ГНУ Московский НИИСХ «Немчиновка». Разновидность лютесценс. Сорт среднеспелый, с потенциалом продуктивности до 8,0-8,5 т/га, имеет укороченную соломину (max. 80 см). Устойчив к полеганию. Значительно слабее стандартного сорта поражается твёрдой и пыльной головнёй. Сравнительно устойчив к мучнистой росе и септориозу колоса. Устойчив к осыпанию. Обладает стабильно высоким качеством зерна. Зерно выровненное, с высоким выходом концентрированных семян.

Таблица 1 – Схема опыта с биопрепаратами

Вариант	Норма расхода биопрепаратов
Контроль	чистая вода , 10л/т
Фитоспорин	предпосевное протравливание 1,5 л/т; опрыскивание 1,5 л/га
Иммуноцитофит (таблетки)	предпосевное протравливание 1 таб./т; опрыскивание 1 таб./т
Циркон	предпосевное протравливание 1 мл/т; опрыскивание 20 мл/га
Эпин экстра	предпосевное протравливание 200 мл/т; опрыскивание 50 мл/га
Альбит	предпосевное протравливание 200 мл/т; опрыскивание 50 мл/га
Дивиден Стар + Альто Супер (2015 г.)	предпосевное протравливание1,5 л/т; опрыскивание 0,4 л/га, расход рабочей жидкости 300 л/га
Колфуго Супер, Альто Супер (2016 г.)	предпосевное протравливание1,5 л/т; опрыскивание 0,4 л/га, расход рабочей жидкости 300 л/га

Полевой опыт закладывался на хорошо окультуренном выщелоченном среднесуглинистом чернозёме в 2014-2016 годах. Предшественником являлся картофель. Площадь делянки – 50 м^2, повторность опыта – четырёхкратная. Норма высева 6 млн. всхожих семян на гектар. Срок сева – первая декада мая. Оценивали влияние таких биопрепаратов и химических фунгицидов как: Фитоспорин, Иммуноцитофит, Циркон, Эпин экстра, Альбит, Дивиден Стар, Колфуго супер, Альто супер. Они применялись для предпосевной обработки семян и опрыскивания растений в фазе выхода в трубку - начала колошения в рекомендованных дозах (табл. 1).

Статистическую обработку урожайных данных проводили методами дисперсионного и корреляционного анализов по Б.А. Доспехову [2].

РЕЗУЛЬТАТЫ И ИХ ОБСУЖДЕНИЕ

Агрометеорологические условия вегетационного периода существенно повлияли на рост и развитие яровой пшеницы, появление грибных болезней. Средняя температура воздуха вегетационного периода бала незначительно выше среднемноголетней (15,2^{0}С) на +1,5^{0}С в 2015 г. и +1,2^{0}С в 2016 г. Однако в период активной вегетации 2016 года на территории Тульской области сложились крайне неблагоприятные погодные условия из-за аномально большого количества выпавших осадков. За последние 22 года наблюдений (с 1994 г.) , 2016 г. – оказался самым влажным, сумма осадков составила 163 % от нормы. Дожди имели ливневый характер, сопровождались градом, сильным ветром, Что привело к полеганию культур, изменению фитометеорологических условий, явилось причиной масштабного распространения грибных заболеваний. Это, в свою очередь, повлекло снижение урожайности, ухудшение качества семян.

Таблица 2 – Влияние биопрепаратов и химических фунгицидов на длину проростков и корней яровой пшеницы сорта Агата, 2016 г.

Вариант	Длина проростка, мм	Отклонение от контроля, (%)	Длина корней, мм	Отклонение от контроля (%)
Контроль	107	-	126	-
Фитоспорин	111	+3,7	132	+4,8
Иммуноцитофит	127	+18,7	164	+30,1
Циркон	141	+31,7	187	+48,4
Эпин экстра	141	+31,7	175	+38,9
Альбит	140	+30,8	171	+35,7
Колфуго Супер	137	+28,0	200	+58,7

Обработанные биопрепаратами семена были проверены на всхожесть в лабораторных условиях. Лабораторная всхожесть показала близкие значения на всех вариантах по сравнению с контролем на обоих сортах яровой пшеницы: Агата – 95-97%, Лиза – 98-100%. Полевая всхожесть была близка к лабораторной (94-98%), в то время как для яровой пшеницы характерна относительно невысокая полевая всхожесть (70-75%). На 8 день после посева на сорте Агата были проведены измерения длины проростков и корней (табл. 2).

Биопрепараты и химические фунгициды показали положительное влияние на развитие органов растений. Отклонение от контроля составляло от +3,7% до +31,7% на ростках, и от +4,8% до +58,7% на корнях. Максимальная длина проростка отмечена на двух вариантах: Циркон и Эпин экстра – 141 мм; вариант, обработанный Колфуго супер, показал максимальную длину корней – 200 мм. На варианте с Фитоспорином отмечены самые низкие показатели: 111 мм и 132 мм соответственно.

Применение биопрепаратов оказало влияние и на высоту растений (табл.3). В агроклиматических условиях 2015 года на всех вариантах наблюдалась увеличение высоты растений. Лучшие результаты получены на вариантах с обработкой Эпин Экстра, Альбит, Дивиденд Стар + Альто Супер. Отклонения от контроля составило от +7,7% до +18,5%. В 2016 году, неблагоприятном по погодным условиям, положительного эффекта от применения биопрепаратов на увеличение высоты растений не отмечено. В целом повышенное содержание продуктивной влаги в почве за счёт интенсивных дождей дало увеличение высоты растений на всех вариантах обоих сортов яровой пшеницы: на Агате в среднем на 13,7 см, на Лизе – на 18,2 см.

Учёт развития болезней проводился по шкале Джеймса (септориоз) и Петерсона (бурая ржавчина в фазу молочной спелости). В 2015 году яровая пшеница была поражена только септориозом. Листовой аппарат обоих сортов пшеницы имел

практически одинаковые показатели развития септориоза. На сорте Агата выделился вариант, обработанный Дивиденд Стар (протравливание) + Альто Супер (опрыскивание). Он показал самое минимальное значение, в 2 раза меньше, относительно контроля (табл.4, 5). Интенсивность развития заболевания на колосе у яровой пшеницы Агата составила 0,5 – 1,8%, в то время как у Лизы этот показатель варьирует от 0,9 до 8,7%. Сорт Агата оказался более устойчивым к листостебельным заболеваниям. Интенсивность развития болезни 1-го, флаг-листа, на сорте Агата в 2,5 раза меньше, чем на сорте Лиза; на колосе, 0,2 – 1,0% (Агата) и 0,5 – 3,8% (Лиза).

Таблица 3 – Влияние биопрепаратов на высоту растений яровой пшеницы, 2015-2016 гг.

Вариант	Сорт Агата				Сорт Лиза			
	Высота, см		Отклонение от контроля, +/-		Высота, См		Отклонение от контроля, +/-	
	2015	2016	2015	2016	2015	2016	2015	2016
Контроль	73,8	98,7	-	-	44,3	66,3	-	-
Фитоспорин	76,4	90,6	+3,5	-2,3	45,1	66,8	+1,8	+0,7
Иммуноцитофит	76,6	89,1	+3,8	-3,9	44,5	68,4	+1,3	+3,2
Циркон	76,0	91,7	+2,5	-1,1	49,1	66,1	+10,8	-0,3
Эпин экстра	79,5	89,8	+7,7	-3,1	52,5	65,1	+18,5	-1,8
Альбит	78,6	93,0	+6,5	+0,3	51,5	66,0	+16,9	-0,5
Дивиден Стар + Альто Супер (2015г.)	79,7		+8,0		50,5		+14,0	
Колфуго Супер + Альто Супер (2016г.)		89,4		-3,6		66,9		+0,9

Таблица 4 – Влияние биопрепаратов на интенсивность развития септориоза на яровой пшенице сорт Агата (%), 2015-2016 гг.

Вариант	Сорт Агата							
	1й лист		2й лист		стебель		колос	
	2015	2016	2015	2016	2015	2016	2015	2016
Контроль	6,6	5,6	17,8	53,5	0,9	0,8	1,8	0,5
Фитоспорин	4,7	5,7	17,3	53,0	0,6	0,7	0,9	0,5
Иммуноцитофит	4,1	5,6	10,7	44,0	0,7	0,1	1,2	0,2
Циркон	6,4	5,6	19,8	47,0	0,7	-	0,5	0,6
Эпин экстра	5,8	6,3	11,4	67,0	0,5	-	0,6	1,0
Альбит	6,0	5,8	14,7	61,0	0,8	-	0,7	1,5
Дивиден Стар + Альто Супер (2015г.)	3,1		7,8		-	-	1,6	
Колфуго Супер + Альто Супер (2016г.)		2,0		20,7				0,2

Таблица 5 – Влияние биопрепаратов на интенсивность развития септориоза на яровой пшенице сорт Лиза (%), 2015-2016 гг.

Вариант	Сорт Лиза							
	1й лист		2й лист		стебель		колос	
	2015	2016	2015	2016	2015	2016	2015	2016
Контроль	6,3	15,5	16,4	60	0,1	-	8,9	3,4
Фитоспорин	4,8	15,3	14,0	62	0,1	-	0,9	3,5
Иммуноцитофит	4,6	14	16,0	51	-	-	4,5	2,6
Циркон	6,3	14,3	20,6	64	-	3	7,2	2,4
Эпин экстра	5,9	16	16,6	70	0,1	5	6,0	3,4
Альбит	6,3	15	14,8	75	-	5	8,0	3,8
Дивиден Стар + Альто Супер (2015г.)	6,9		14,5		-	-	8,2	
Колфуго Супер + Альто Супер(2016г.)		2,5		5				0,5

В условиях 2016 года применение биопрепаратов и фунгицидов химического происхождения на яровой пшенице обоих сортов не дало значительных отклонений от контроля. Исключение составил вариант, обработанный Колфуго Супер (протравливание) + Альто Супер (опрыскивание). И на сорте Агата, и на сорте Лиза на нём были отмечены самые минимальные показатели развития септориоза листового аппарата и колоса (0,5-2,5%). В 2016 году яровая пшеница Лиза была поражена бурой ржавчиной (табл. 6).

Таблица 6 – Влияние биопрепаратов на интенсивность развития бурой ржавчины на яровой пшенице сорта Лиза (%), 2016 г.

Вариант	1й лист	2й лист	стебель	колос
Контроль	14,5	5,9	2,5	-
Фитоспорин	15	10	5,0	-
Иммуноцитофит	12	8	0,4	-
Циркон	16	10	-	-
Эпин экстра	23	15	-	-
Альбит	30	18	-	-
Колфуго Супер + Альто Супер	-	-	-	-

Интенсивность развития бурой ржавчины на первом, флаговом листе была сильнее, чем на втором. Два варианта: Эпин Экстра и Альбит, имели пораженность листового аппарата в 1,5 – 2 раза выше, чем на контроле. На варианте, обработанном Колфуго Супер + Альто Супер, поражения бурой ржавчиной не отмечено.

В фазу кущения-выхода в трубку отмечены единичные случаи появления мучнистой росы (Erysiphe graminis) у основания растений (1-5% по шкале Джеймса) на всех вариантах, кроме варианта, обработанного Колфуго Супер + Альто Супер. Во второй декаде июня проведена первая обработка (опрыскивание) растений. В дальнейшем развития и распространения мучнистая роса не получила.

Таблица 7 – Влияние биопрепаратов на урожайность пшеницы сорта Агата (т/га), 2015-2016 гг.

Вариант	Урожайность, т/га		Отклонение от контроля ±, т/га		Масса 1000 семян, (г)	
	2015	2016	2015	2016	2015	2016
Контроль	3,72	3,32	-		38,4	39,2
Фитоспорин	3,87	3,22	+0,15	-0,10	38,4	27,9
Иммуноцитофит	3,92	3,33	+0,20	+0,01	38,2	29,4
Циркон	3,77	3,34	+0,05	+0,02	38,1	30,1
Эпин экстра	3,87	3,32	+0,15	0	38,2	29,2
Альбит	3,73	3,26	+0,01	-0,06	38,3	27,6
Диведент Стар + Альто Супер (2015 г.)	3,94		+0,22		38,9	
Колфуго Супер + Альто Супер (2016г.)		3,61		+0,29		31,9
$НСР_{0,05}$	0,01	0,07				

Устойчивость яровой пшеницы сорта Агата к листостебельным болезням отразилась и на урожайности (табл. 7). В 2015 г. все варианты опыта по урожайности достоверно превосходили контроль. Наибольший урожай яровой пшеницы обоих сортов был получен на варианте, с применением химических фунгицидов Дивиденд Стар (протравливание) + Альто Супер (опрыскивание).

На сорте Агата увеличение урожайности по отношению к контролю варьировало от +0,01 т/га до +0,22 т/га. По массе 1000 семян все варианты имели близкие показатели 38,1 – 38,9 г. Сорт яровой пшеницы Лиза по отношению к контролю также дал увеличение урожайности от применения биопрепаратов и химических фунгицидов от +0,03 т/га до + 0,39 т/га (табл.8). Масса 1000 семян всех вариантов находилась в пределах 34,7 – 35,9 г.

Таблица 8 – Влияние биопрепаратов на урожайность пшеницы сорта Лиза (т/га), 2015-2016 гг.

Вариант	Урожайность, т/га		Отклонение от контроля +, т/га		Масса 1000 семян, (г)	
	2015 г.	2016 г.	2015 г.	2016 г.	2015 г.	2016 г.
Контроль	2,46	2,20		-	35,1	27,8
Фитоспорин	2,84	2,09	+0,38	-0,11	35,3	29,8
Иммуноцитофит	2,49	2,17	+0,03	-0,03	35,8	27,4
Циркон	2,83	2,04	+0,37	-0,16	34,7	22,0
Эпин экстра	2,65	1,91	+0,19	-0,29	34,7	25,5
Альбит	2,73	1,97	+0,27	-0,23	35,6	24,9
Диведент Стар + Альто Супер (2015 г.)	2,83		+0,39		35,7	
Колфуго Супер + Альто Супер (2016 г.)		2,59		+0,39		32,9
$НСР_{0,05}$	0,01	0,06				

Урожайность яровой пшеницы в 2016 году была ниже по сорту Агата на 13% , по сорту Лиза на 20%. Причиной тому послужили неблагоприятные агрометеорологические условия и более интенсивное развитие листостебельных заболеваний всего вегетационного периода 2016 года.

Следует отметить, что в 2016 году выделился вариант, обработанный Колфуго Супер (протравливание) + Альто Супер (опрыскивание). Он дал наибольшую прибавку урожая относительно контроля: на Агате +0,29 т/га, на Лизе +0,39 т/га. По массе 1000 семян на этом же варианте также был наибольший показатель. На других вариантах урожайность была ниже контрольного либо приближалась к нему.

ВЫВОДЫ

Отмечено положительное влияние биопрепаратов на полевую всхожесть семян и на развитие органов растений. Максимальная длина проростка отмечена на двух вариантах: Циркон и Эпин экстра 141 мм. Вариант, обработанный Колфуго Супер, показал максимальную длину корней – 200 мм. Применение биопрепаратов способствовало увеличению высоты растений. Лучшие варианты – Эпин экстра, Альбит, Дивиденд стар + Альто Супер.

В сложившихся погодных условиях периода 2014-2016 годов, где 2016 год был самым неблагоприятным, при развивающихся грибных заболеваниях, лучшими вариантами отмечены препараты Колфуго Супер (протравливание) + Альто Супер (опрыскивание). Листовой аппарат растений на этом варианте имел более низкие показатели развития заболевания или его отсутствие. Самая высокая урожайность отмечена также на этом варианте. Прибавка урожая относительно контроля составила: на Агате +0,29 т/га, на Лизе +0,39 т/га.

БИБЛИОГРАФИЯ

1. Васютин А.С. Технология возделывания яровых зерновых культур в Центральном федеральном округе РФ / А.С. Васютин, П.М. Политыко, Е.Ф. Киселев и др. – М., 2014. – 94с.
2. Доспехов Б.А. Методика опытного дела / Б.А.Доспехов – М.: Агропромиздат, 1985. – 351с.
3. Дятлова Н.А. Испытание биопрепаратов и химических фунгицидов на яровой пшенице и овсе в условиях Тульской области / Н.А.Дятлова // Научный обозреватель. – 2016. – № 10. – С. 66-70.
4. Коваленко Е.Д. Стратегия селекции пшеницы на устойчивость к ржавчинным заболеваниям / Е.Д. Коваленко, А.И. Жемчужина, М.И. Киселёва и др. // Защита и карантин растений. – 2012. – №9. – С.19-22.

5. Левитин М.М. Грибковые болезни зерновых культур/ М.М. Левитин, С.Л. Тютерев // Защита и карантин растений. – 2003. – №11. – С. 5-28.
6. Назарова Л.Н. Фитосанитарная экспертиза зернового поля и принятие решений по опрыскиванию пшеницы фунгицидами / Л.Н. Назарова, А.А. Мотовилин, А.А. Санина и др. Теория и практические рекомендации // Приложение к журналу «Защита и карантин растений». – 2016. – №5. –36 с.
7. Неклеса Н.П. Мучнистая роса зерновых культур / Н.П. Неклеса // Защита и карантин растений. – 2002. – №4. – С.46-47.
8. Пахолкова Е.В.. Скорость развития листостебельных инфекций зерновых культур / Е.В. Пахолкова // Защита и карантин растений. – 2015. – №3. – С.39-40.
9. Попов Ю.В. Как сдержать развитие болезней / Ю.В. Попов // Защита и карантин растений. – 2004. – №4. – С. 20-21.
10. Прусакова Л.Д. Регуляторы роста растений с антистрессовыми и иммунопротекторными свойствами / Л.Д. Прусакова, Н.Н. Малеванная, С.Л. Белопухов и др. // Агрохимия. – 2005. – №11. –С.76-86.
11. Санин С.С. Болезни зерновых колосовых культур / С.С. Санин, Е.А. Соколова, В.И. Черкашин и др. Рекомендации по проведению фитосанитарного мониторинга – М.: ФГБНУ «Росинформагротех», 2010. – 138с.
12. Санин С.С. Фитосанитарные проблемы семеноводства зерновых культур / С.С. Санин // Защита и карантин растений. – 2010. –№5. – С.22-24.
13. Ульяненко Л.Н. Комплексная система защиты яровой пшеницы. Переработанная версия издания: Комплексная система защиты посевов зерновых культур от болезней, вредителей и сорных растений. Технологии Байер КропСайенс / Л.Н. Ульяненко, А.С. Фалипас, Л.Л. Дорофеева, В.Н. Орлов – М.: Печатный город, 2008. – 64с.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.34

INTERSTOCK EFFECT ON THE GROWTH OF MANDARIN CV BATU 55, TANGERINE CV PONTIANAK AND LIME CV NIMAS PROPAGATED BY GRAFTING

Sugiyatno Agus*, **Palupi Norry Eka**
Indonesian Citrus and Subtropical Fruits Research Institute, Indonesia
*E-mail: agus.sugiyatno@gmail.com

ABSTRACT
Japansche citroen (JC) rootstock is still the main choice for producing citrus seeds for its high availability and compatibility. Other rootstocks have been used in the production, yet they produce unsatisfying results. Based on the theory, there is an alternative to use rootstock as interstock in order to stimulate the growth of scion. The objective of this reseach is to understand the effect of interstock on the growth of *Mandarin cv. Batu 55*, *Tangerine cv. Pontianak* and *Lime cv. Nimas*. This research was conducted in the screen house of Tlekung Experimental Field of Indonesian Citrus and Subtropical Fruits Research Institute (ICSFRI) in Batu-East Java, located on 950 m asl, from January to April 2016. This research was arranged in a CRD design with 4 replications and 24 interstock-scion combination treatments. The interstocks used in this study were *Carizzo citrange, Citrumello, Poncirus trifoliata, Volkameriana, Rough lemon, Troyer citrange, Kanci* and control (JC) combined with 3 scions namely *Mandarin cv. Batu 55, Tangerine cv. Pontianak and Lime cv. Nimas* propagated by grafting. The result showed the percentage of successful grafting ranged between 37.5% to 100%, while the percentage of the shoot formed on grafted plants was 75%-100%. The use of *Poncirus trifoliata* as interstock has stimulated fastest bud break on *Tangerine cv. Pontianak* in just 24.75 days while the *Troyer citrange* has stimulated better shoot growth in *Lime cv. Nimas*, resulted to the highest shoot around 52.20 cm which was significantly different from other treatments. Meanwhile, *Carizzo citrange* has been found to have some influences to the plant diameter and the number of leave of *Lime cv. Nimas* but showed insignificant effect on the growth of its own diameter. The use of interstock showed that it can be used to promote the growth of scion which usually has slow growth when it is directly grafted on the rootstock.

KEY WORDS
Citrus, rootstock, interstock, grafting.

Propagation of citrus plants in Indonesia is generally performed by grafting method using rootstock and certain type of scion. The widely used rootstock by nursery and citrus growers are the *Japansche citroen* (JC) and small amount of *Rough lemon* (RL). Rootstock JC is more preferable since it has high adaptability and compatibility with any types of citrus in Indonesia, besides it is also resistant to drought and salinity. However, it is susceptible to diseases such as CVPD, CTV, CEV, root and stem rot (Supriyanto and Setiono, 2006). Since it is widely used, this rootstock is available in various regions in Indonesia such as East Java, Central Java, Bali, Sulawesi and Sumatra (Sugiyatno et al. 2013).

In Indonesia, a number of research related the use of rootstock for marginal land have been conducted related to various responses of the scions (Supriyanto and Setiono, 2006; Supriyanto and Setiono, 2008). Other rootstocks such as *Poncirus Trifoliata, Troyer Citrange, Carizzo Citrange, Cleopatra Mandarin, Volkameriana, Citrumello* and *Flying Dragon* have been introduced to nursery and citrus growers and their adaptabilities are being evaluated (Hardiyanto et al. 2010). Outside Indonesia, the use of tetraploid citrus rootstock such as *Carrizo, Troyer' Citranges, Swingle Citrumelo, Trifoliates Davis A* and *Flying Dragon* have been reported to stimulate higher yield in irrigated field of *Tahiti Lime* (Nunez et al. 2011).

In some cases, the potency of scion does not appear when it is grafted onto certain type of rootstock which show signs of incompatibility. However, its potency will appear when the rootstock is being used as an interstock. The length of interstock has no obvious effect

on the content of micro elements but it has significant impact on the content of Mn on citrus leaves of *'Kutdiken' Lemon* compared to *'Star Ruby'* grapefruit (Yilmaz et al. 2014). Insertion of interstock between rootstock and scion could improve growth, extend the plant life, increase productivity and quality, and also increase its tolerance to salinity (Aboutalebi and Hasanzadeh, 2014)

Other research on the use of interstock have proven that it could prolong life and improve the quality and production of lemon (Izquierdo et al. 2004). Vegetative growth and fruit production are influenced by the type of rootstock used when *Flying dragon* is used as interstock. In the rootstock *Catania 2 Volkamer lemon*, *Flying dragon* interstock reduced the size of the plant, while in *Davis A trifoliate* rootstock, *Flying dragon* interstock increased the size of the plant (Nunez et al. 2011). *Citrumello* interstock has the potential to encourage vegetative growth of the plants; *Rangpur lime, Flying dragon* and *Troyer* rootstocks potentially control the growth of plants, while *Flying dragon* interstock potentially stimulates flowering and fruiting in *Pumello cv. Nambangan* (Susanto et al. 2010). The combination of interstock *Citrus grandis* with rootstock *Citrus hystrix* and *Citrus hystrix* interstock with *Citrus grandis* rootstock could prevent the transmission of HLB disease on scion from occurring (Shokrollah et al. 2011).

The use of interstock is expected to provide solutions toward some problems such as the slow growth of plants and the low grafting success of certain scion. In Indonesia, research on the use of interstock has not been widely documented. For that purpose, this research was conducted in order to determine the effect of using various interstocks on the plant growth of *Mandarin cv. Batu 55, Tangerine cv. Pontianak and Lime cv. Nimas.*

MATERIALS AND METHODS OF RESEARCH

This study was conducted at the Tlekung Experimental Field, Indonesian Citrus and Subtropical Fruit Research Institute (Balitjestro), Batu - East Java with altitude of 950 m from January to May 2016. The study was done based on completely randomized design (CRD), with 4 times repetition and 24 combinations of treatments as follows:

1. I0V1 : *JC* Rootstock / Scion *Mandarin cv.Batu 55*
2. I0V2 : *JC* Rootstock / Scion *Tangerine cv. Pontianak*
3. I0V3 : *JC* Rootstock / Scion *Lime cv. Nimas*
4. I1V1 : Interstock *Carizzo Citrange* / Scion *Batu 55*
5. I1V2 : Interstock *Carizzo Citrange* / Scion *Tangerine cv. Pontianak*
6. I1V3 : Interstock *Carizzo Citrange* / Scion *Lime cv. Nimas*
7. I2V1 : Interstock *Citrumello* / Scion *Mandarin cv.Batu 55*
8. I2V2 : Interstock *Citrumello* / Scion *Tangerine cv. Pontianak*
9. I2V3 : Interstock *Citrumello* / Scion *Lime cv. Nimas*
10. I3V1 : Interstock *Poncirus Trifoliata* / Scion *Mandarin cv.Batu 55*
11. I3V2 : Interstock *Poncirus Trifoliata* / Scion *Tangerine cv. Pontianak*
12. I3V3 : Interstock *Poncirus Trifoliata* / Scion *Lime cv. Nimas*
13. I4V1 : Interstock *Volkameriana* / Scion *Mandarin cv.Batu 55*
14. I4V2 : Interstock *Volkameriana* / Scion *Tangerine cv. Pontianak*
15. I4V3 : Interstock *Volkameriana* / Scion *Lime cv. Nimas*
16. I5V1 : Interstock *Rough Lemon* / Scion *Mandarin cv.Batu 55*
17. I5V2 : Interstock *Rough Lemon* / Scion *Tangerine cv. Pontianak*
18. I5V3 : Interstock *Rough Lemon* / Scion *Lime cv. Nimas*
19. I6V1 : Interstock *Troyer Citrange* / Scion *Mandarin cv.Batu 55*
20. I6V2 : Interstock *Troyer Citrange* / Scion *Tangerine cv. Pontianak*
21. I6V3 : Interstock *Troyer Citrange* / Scion *Lime cv. Nimas*
22. I7V1 : Interstock *Kanci* / Scion *Mandarin cv.Batu 55*
23. I7V2 : Interstock *Kanci* / Scion *Tangerine cv. Pontianak*
24. I7V3 : Interstock *Kanci* / Scion *Lime cv. Nimas*

Procedure. Eight month old of interstock plants including *Carizzo citrange, Citrumello, Poncirus trifoliata, Volkameriana*, *Rough lemon, Troyer citrange, Kanci* and *Japansche citroen* were optimally cultivated in polybag. A month prior to the grafting, interstock plants

were fertilized with N to achieve active growth since in this phase, grafting is easier to do and it offers high rate of success.

Disease free budwoods of scions were taken from Budwood Multiplication Block based on the disease free citrus seed production and distribution standard that has been imposed by the government. Scions of *Mandarin cv Batu 55* were taken from Tlekung Experimental Field while *Tangerine cv Pontianak and Lime cv Nimas* scions were taken from Punten Experimental Field. Grafting was conducted in the screen house in the morning, at the temperature of around 25°C and 70% relative humidity. The plant maintenance was done based on the recommendation of citrus seed maintainance.

Figure 1 – Grafting process on interstock

Variables of the observations. Observations were conducted to find out the percentage of successful grafting (6 week after grafting), the percentage of growing grafting (at final observation), bud break period (6 week after grafting), shoots height (per two-month), interstock diameter (per two-month), shoot diameter (per two-month , and the number of leaves (per two-month).

Data analysis. Data were analyzed using analysis of variance (F test) at 5% level to see if there was any significant effect (F count> F table 5%), followed by DMRT at 5% level.

RESULTS AND DISCUSSION

The percentage of successful grafting and growing grafting. The results of the observations and measurement on the success of grafting and growing grafting are presented in Table 1. Successful grafting in all treatments showed percentage between 37.5% -100%. The lowest percentage was found in the treatment I4/V2 (interstock *Volkameriana* with scion *Tangerine cv. Pontianak*) at 37.5%. The response of the interstocks toward different scions resulted in different percentage of successful grafting. Seven interstocks was grafted by *Mandarin cv. Batu 55* (V1), *Tangerine cv. Pontianak* (V2) and *Lime cv. Nimas* (V3) which showed percentage successful grafting percentage of 100%, 71.43%, and 82.14%, in average respectively. This means that *Tangerine cv. Pontianak* has the lowest response. Observation on the growing grafting showed percentage between 75% - 100%. Seventeen combined treatment resulted in an average of growing grafting value at 100%, while the other seven treatments resulted percentage values between 75% and 87.5%.

Bud break period and shoot height. Buds took 24.75 – 38 days to break (Table 2). I0V1 treatment (*JC* Rootstock/Scion *Mandarin cv.Batu 55*) took the longest time to break the dormancy in 38 days, which was significantly different from the I1V2 (Interstock *Carizzo citrange*/Scion *Tangerine cv. Pontianak*), I4V1 (Interstock *Volkameriana*/Scion *Mandarin cv. Batu 55*), I3V3 (Interstock *Poncirus trifoliata*/Scion *Lime cv. Nimas*), dan I3V2 (*Interstock Poncirus trifoliata*/Scion *Tangerine cv. Pontianak*). The fastest bud break was found in

treatment I3V2 (Interstock *Poncirus trifoliata*/Scion *Tangerine cv. Pontianak*) for about 24.75 days.

Table 1 – Percentage of successful grafting and growing grafting of several interstocks

Treatment	Successful grafting (%)	Growing grafting (%)
I0V1 (*JC* Rootstock/Scion *Mandarin cv. Batu 55*)	100	100
I0V2 (*JC* Rootstock /Scion *Tangerine cv. Pontianak*)	87.5	100
I0V3 (*JC* Rootstock /Scion *Lime cv. Nimas*)	75	100
I1V1 (Interstock *Carizzo citrange* / Scion *Mandarin cv. Batu 55*)	100	100
I1V2 (Interstock *Carizzo citrange* / Scion *Tangerine cv. Pontianak*)	87.5	100
I1V3 (Interstock *Carizzo citrange* / Scion *Lime cv. Nimas*)	100	100
I2V1 (Interstock *Citrumello* / Scion *Mandarin cv. Batu 55*)	100	100
I2V2 (Interstock *Citrumello* / Scion *Tangerine cv. Pontianak*)	87.5	100
I2V3 (Interstock *Citrumello* / Scion *Lime cv. Nimas*)	62.5	75
I3V1 (Interstock *Poncirus trifoliata* / Scion *Mandarin cv. Batu 55)*	100	100
I3V2 (Interstock *Poncirus trifoliata* / Scion *Tangerine cv. Pontianak*)	62.5	100
I3V3 (Interstock *Poncirus trifoliata* / Scion *Lime cv. Nimas*)	87.5	75
I4V1 (Interstock *Volkameriana* / Scion *Mandarin cv. Batu 55*)	100	100
I4V2 (Interstock *Volkameriana* / Scion *Tangerine cv. Pontianak*)	37.5	87.5
I4V3 (Interstock *Volkameriana* / Scion *Lime cv. Nimas*)	75	100
I5V1 (Interstock *Rough lemon* / Scion *Mandarin cv. Batu 55*)	100	75
I5V2 (Interstock *Rough lemon* / Scion *Tangerine cv. Pontianak*)	75	87.5
I5V3 (Interstock *Rough lemon* / Scion *Lime cv. Nimas*)	87.5	87.5
I6V1 (Interstock *Troyer citrange* / Scion *Mandarin cv. Batu 55*)	100	100
I6V2 (Interstock *Troyer citrange* / Scion *Tangerine cv. Pontianak*)	100	100
I6V3 (Interstock *Troyer citrange* / Scion *Lime cv. Nimas*)	100	87.5
I7V1 (Interstock *Kanci* / Scion *Mandarin cv. Batu 55*)	100	100
I7V2 (Interstock *Kanci* / Scion *Tangerine cv. Pontianak*)	50	100
I7V3 (Interstock *Kanci* / Scion *Lime cv. Nimas*)	62.5	100

Observation on the shoot height resulted to a range value of growth between 25.66 cm – 52.2 cm (Table 2). The lowest growth value was found in the treatment I7V2 (Interstock *Kanci*/Scion *Tangerine cv. Pontianak*), which was significantly different from I6V3 (Interstock *Troyer citrange*/Scion *Lime cv. Nimas*).

Scion and interstock diameter. The result of the observations on the growth of scion and interstock diameter is shown in Table 3. The largest scion diameter was obtained in the treatment I1V3 (*Interstock Carizzo citrange* / Scion *Lime cv. Nimas*) at 7.09 mm, which was significantly different from the scion diameter found in the treatment I7V2 (Interstock *Kanci* / Scion *Tangerine cv. Pontianak*), about 3.61 mm. The largest diameter of interstock was obtained in the treatment I0V1 (*JC* Rootstock / Scion *Mandarin cv.Batu 55*) at 14.81 cm, which was significantly different from the result of treatment I7V3 (Interstock *Kanci* / Scion *Lime cv. Nimas)*, 7.52 mm.

Number of leaves. The number of leaves observed in this research were around 15.16 – 43.87 (Tabel 4) which highest value was found in the treatment I1V3 (Interstock *Carizzo citrange* / Scion *Lime cv. Nimas*) treatment (43.87), while the lowest value was found in the I7V2 (Interstock *Kanci* / Scion *Tangerine cv. Pontianak)* treatment (15.16).

The percentage of successful grafting and growing grafting. Interstock treatment in *Mandarin cv. Batu 55* (V1), Tangerine cv. Pontianak (V2), and *Lime cv. Nimas* (V3) showed that each produced an average percentage of successful grafting of 100%, 71.43% and 82.14% respectively. The success of grafting of *Lime cv. Nimas* in several interstocks is found higher than the one in the *JC* (I0V3) at 75%. Based on the result of the experiment in the field, *Lime cv. Nimas* seed production using *JC* rootstock showed percentage of successful grafting about 50-70% (Andayani, 2016, personal communication). This result was considered as the lowest one compared to the percentages of growing grafting of other scions than *Lime cv. Nimas* which averagely reached greater than 90%. This result indicated that the use of the seven interstocks was able to increase successful grafting on *Lime cv. Nimas*, especially on interstock *Carizzo citrange* (I1) and *Troyer citrange* (I6) which reached perfect percentage of 100%. The opposite phenomena occured in *Tangerine cv. Pontianak*,

which showed that being grafted on seven interstocks, it only produced an average percentage of successful grafting about 71.43%, lower than the one of *JC* (I0V2) ie 87.5%. This means that the use of those interstocks for *Tangerine cv. Pontianak* tends to decrease the number of successful grafting and inhibits the growth of the plants. In a research using apple, Karlidag et al, (2014) stated that the use of interstock on vigor rootstock of apple would inhibit the growth of the scion, apple cv. *Granny smith and Golden delicious.*

Table 2 – Bud break period and shoot height of grafted plants in several interstocks

Treatment	Bud break period (day)	Shoot height (cm)
I0V1 (*JC* Rootstock/Scion *Mandarin cv. Batu 55*)	38.00 a	26.96 cd
I0V2 (*JC* Rootstock /Scion *Tangerine cv. Pontianak*)	32.37 abc	35.12 abcd
I0V3 (*JC* Rootstock /Scion *Lime cv. Nimas*)	33.87 ab	34.05 abcd
I1V1 (Interstock *Carizzo citrange* / Scion *Mandarin cv. Batu 55*)	29.37 abc	42.41 abcd
I1V2 (Interstock *Carizzo citrange* / Scion *Tangerine cv. Pontianak*)	28.25 bc	42.88 abcd
I1V3 (Interstock *Carizzo citrange* / Scion *Lime cv. Nimas*)	31.87 abc	45.45 abcd
I2V1 (Interstock *Citrumello* / Scion *Mandarin cv. Batu 55*)	32.62 abc	41.82 abcd
I2V2 (Interstock *Citrumello* / Scion *Tangerine cv. Pontianak*)	29.75 abc	41.56 abcd
I2V3 (Interstock *Citrumello* / Scion *Lime cv. Nimas*)	34.16 ab	45.56 abc
I3V1 (Interstock *Poncirus trifoliata* / Scion *Mandarin cv. Batu 55*)	30.37 abc	31.93 bcd
I3V2 (Interstock *Poncirus trifoliata* / Scion *Tangerine cv. Pontianak*)	24.75 c	28.72 cd
I3V3 (Interstock *Poncirus trifoliata* / Scion *Lime cv. Nimas*)	24.83 c	39.48 abcd
I4V1 (Interstock *Volkameriana* / Scion *Mandarin cv. Batu 55*)	28.00 bc	46.02 abc
I4V2 (Interstock *Volkameriana* / Scion *Tangerine cv. Pontianak*)	33.00 abc	45.35 abcd
I4V3 (Interstock *Volkameriana* / Scion *Lime cv. Nimas*)	32.75 abc	37.71 abcd
I5V1 (Interstock *Rough lemon* / Scion *Mandarin cv. Batu 55*)	30.16 abc	34.88 abcd
I5V2 (Interstock *Rough lemon* / Scion *Tangerine cv. Pontianak*)	34.50 ab	29.70 cd
I5V3 (Interstock *Rough lemon* / Scion *Lime cv. Nimas*)	33.33 abc	44.56 abcd
I6V1 (Interstock *Troyer citrange* / Scion *Mandarin cv. Batu 55*)	31.87 abc	39.26 abcd
I6V2 (Interstock *Troyer citrange* / Scion *Tangerine cv. Pontianak*)	30.50 abc	46.17 abc
I6V3 (Interstock *Troyer citrange* / Scion *Lime cv. Nimas*)	30.12 abc	52.20 a
I7V1 (Interstock *Kanci* / Scion *Mandarin cv. Batu 55*)	34.25 ab	29.57 cd
I7V2 (Interstock *Kanci* / Scion *Tangerine cv. Pontianak*)	31.33 abc	25.66 d
I7V3 (Interstock *Kanci* / Scion *Lime cv. Nimas*)	30.00 abc	50.80 ab

Note: mean values followed by the same letters in the same column show insignificantly different result by DMRT at 5% level.

Table 3 – Scion and interstock diameter of grafted plants in several interstocks

Treatment	Scion diameter (mm)	Interstock diameter (mm)
I0V1 (*JC* Rootstock/Scion *Mandarin cv. Batu 55*)	4.36 def	14.81 a
I0V2 (*JC* Rootstock /Scion *Tangerine cv. Pontianak*)	4.65 bcdef	11.46 b
I0V3 (*JC* Rootstock /Scion *Lime cv. Nimas*)	4.89 bcdef	10.99 bc
I1V1 (Interstock *Carizzo citrange* / Scion *Mandarin cv. Batu 55*)	5.12 bcdef	10.96 bc
I1V2 (Interstock *Carizzo citrange* / Scion *Tangerine cv. Pontianak*)	4.80 bcdef	10.86 bc
I1V3 (Interstock *Carizzo citrange* / Scion *Lime cv. Nimas*)	7.09 a	10.71 bc
I2V1 (Interstock *Citrumello* / Scion *Mandarin cv. Batu 55*)	5.81 abcd	10.36 bc
I2V2 (Interstock *Citrumello* / Scion *Tangerine cv. Pontianak*)	5.35 bcde	10.09 bc
I2V3 (Interstock *Citrumello* / Scion *Lime cv. Nimas*)	6.22 ab	9.99 bc
I3V1 (Interstock *Poncirus trifoliata* / Scion *Mandarin cv. Batu 55*)	3.88 ef	9.91 bc
I3V2 (Interstock *Poncirus trifoliata* / Scion *Tangerine cv. Pontianak*)	4.89 bcdef	9.65 bc
I3V3 (Interstock *Poncirus trifoliata* / Scion *Lime cv. Nimas*)	5.51 bcde	9.55 bc
I4V1 (Interstock *Volkameriana* / Scion *Mandarin cv. Batu 55*)	6.04 abc	9.54 bc
I4V2 (Interstock *Volkameriana* / Scion *Tangerine cv. Pontianak*)	5.89 abcd	9.46 bc
I4V3 (Interstock *Volkameriana* / Scion *Lime cv. Nimas*)	5.84 abcd	9.36 bc
I5V1 (Interstock *Rough lemon* / Scion *Mandarin cv. Batu 55*)	5.11 bcdef	9.28 bc
I5V2 (Interstock *Rough lemon* / Scion *Tangerine cv. Pontian*ak)	4.55 cdef	9.20 bc
I5V3 (Interstock *Rough lemon* / Scion *Lime cv. Nimas*)	5.59 abcd	9.19 bc
I6V1 (Interstock *Troyer citrange* / Scion *Mandarin cv. Batu 55*)	5.12 bcdef	8.30 bc
I6V2 (Interstock *Troyer citrange* / Scion *Tangerine cv. Pontianak*)	5.10 bcdef	8.28 bc
I6V3 (Interstock *Troyer citrange* / Scion *Lime cv. Nimas*)	6.15 abc	8.19 bc
I7V1 (Interstock *Kanci* / Scion *Mandarin cv. Batu 55*)	4.35 def	8.14 bc
I7V2 (Interstock *Kanci* / Scion *Tangerine cv. Pontianak*)	3.61 f	8.05 bc
I7V3 (Interstock *Kanci* / Scion *Lime cv. Nimas*)	5.42 bcde	7.52 c

Note: mean values followed by the same letters in the same column shows insignificant difference of DMRT at 5% level.

Table 4 – The number of leaves of grafted plants on several interstocks

Treatment	Number of leaves
I1V3 (Interstock *Carizzo citrange* / Scion *Lime cv. Nimas*)	43.87 a
I3V3 (Interstock *Poncirus trifoliata* / Scion *Lime cv. Nimas*)	36.50 ab
I7V3 (Interstock *Kanci* / Scion *Lime cv. Nimas*)	36.12 ab
I1V1 (Interstock *Carizzo citrange* / Scion *Mandarin cv.Batu 55*)	34.25 abc
I6V3 (Interstock *Troyer citrange* / Scion *Lime cv. Nimas*)	33.87 abc
I6V2 (Interstock *Troyer citrange* / Scion *Tangerine cv. Pontianak*)	33.87 abc
I1V2 (Interstock *Carizzo citrange* / Scion *Tangerine cv. Pontianak*)	33.25 abc
I4V1 (Interstock *Volkameriana* / Scion *Mandarin cv.Batu 55*)	32.25 abcd
I2V3 (Interstock *Citrumello* / Scion *Lime cv. Nimas*)	30.66 abcd
I2V2 (Interstock *Citrumello* / Scion *Tangerine cv. Pontianak*)	30.12 abcd
I0V3 (*JC* Rootstock / Scion *Lime cv. Nimas*)	28.00 abcd
I6V1 (Interstock *Troyer citrange* / Scion *Mandarin cv.Batu 55*)	28.00 abcd
I5V3 (Interstock *Rough lemon* / Scion *Lime cv. Nimas*)	26.83 bcd
I2V1 (Interstock *Citrumello* / Scion *Mandarin cv.Batu 55*)	26.50 bcd
I4V3 (Interstock *Volkameriana* / Scion *Lime cv. Nimas*)	25.12 bcd
I4V2 (Interstock *Volkameriana* / Siam *Pontianak*)	25.00 bcd
I3V2 (Interstock *Poncirus trifoliata* / Scion *Tangerine cv. Pontianak*)	24.62 bcd
I3V1 (Interstock *Poncirus trifoliata* / Scion *Mandarin cv.Batu 55*)	23.37 bcd
I0V2 (*JC* Rootstock / Scion *Tangerine cv. Pontianak*)	21.62 bcd
I5V2 (Interstock *Rough lemon* / Scion *Tangerine cv. Pontianak*)	20.16 bcd
I0V1 (*JC* Rootstock/ Scion *Mandarin cv.Batu 55*)	18.25 cd
I5V1 (Interstock *Rough lemon* / Scion *Mandarin cv.Batu 55*)	18.16 cd
I7V1 (Interstock *Kanci* / Scion *Mandarin cv.Batu 55*)	17.37 cd
I7V2 (Interstock *Kanci* / Scion *Tangerine cv. Pontianak*)	15.16 d

Note: mean values followed by the same letters in the same column shows insignificant difference of DMRT at 5% level.

The percentage of the growing grafting of interstocks at *Mandarin cv. Batu 55, Tangerine cv. Pontianak and Lime cv. Nimas* reached 94.04%, which means that only 15.96% of the plants that failed to grow. Growing grafting is characterized by the emergence and development of buds into new shoots from the successful grafting plants. In some cases, successful grafting do not show any further development, which condition is called dormant. Dormancy can be caused by external and internal factors of the plant itself (Sugiyatno and Anggraini, 2014). Dormancy in bud can be "broken" by administering natural or synthetic growth regulators (Trisnawan, 2015).

Bud break period. The obtained data on the bud break period showed significant differences among treatments given. Treatment I0V1 (rootstock JC/ Scion *Mandarin cv.Batu* 55) takes the longest time period to induce the break of the buds, which is significantly different from the result of the treatment I1V2 (Interstock *Carizzo citrange*/ Scion *Tangerine cv. Pontianak*), I4V1 (Interstock *Volkameriana* / Scion *Mandarin cv.Batu 55*), I3V3 (Interstock *Poncirus trifoliata* / Scion *Lime cv. Nimas*), and I3V2 (Interstock *Poncirus trifoliata* / Scion *Tangerine cv. Pontianak*). The most rapid treatment to induce bud break is the treatment I3V2 (Interstock *Poncirus trifoliata* / Scion *Tangerine cv. Pontianak*). This means that the use interstock encourages the break of buds. Hormonal factors in plants also have effects on the appearance of the buds, especially in relation to the balance between the abscisic and cytokines hormone (Wardaningsih et al, 2004). In durian, the use of younger rootstock is able to stimulate the break of the buds faster (Bansir, 2011).

Shoot height. The results of the observations on the shoot height showed highest shoot length of 52.2 cm in treatment I6V3 (Interstock *Troyer citrange* / Scion *Lime cv. Nimas*), which is significantly different from the result of the treatment I7V2 (Interstock *Kanci* / Scion *Tangerine cv. Pontianak*), of around 25.66 cm. The response of shoot growth is varied depending on the interstocks used in the treatment. The results go consistently with the result of a research conducted by Susanto et al, (2010), in which it was stated that the use of different interstocks would affect the shoot growth of *pumello cv. Nambangan*. The use of interstock *Tangerine* shows best result in stimulating the shoot growth of *Mandarin cv. Batu 55* resulted from top working by grafting (Sugiyatno et al, 2013). Kosihita et al. (2007) stated that the use of dwarf rootstock or interstocks effectively control the growth of fruit trees, while Das et al. (2011) stated that top performance of apple using through chip budding using

Oregon Spur interstock significantly affected the number and length of branches in the fourth year.

Scion and interstock diameter. The results showed that the use interstock *Carizzo citrange* gave significantly different results from the use of interstock *Kanci* on scion diameter, while the use of rootstock *JC* showed significantly different results from the use of interstock on interstock diameter. These results are contradictory to the result of a research conducted by Susanto et al. (2010) in which it was which stated that the use interstock *Citrumello, Troyer, Flying dragon*, and *Rangpur lime* did not affect the growth of scion diameter of *pumello cv. Nambangan*, but they significantly affected the growth of interstock diameter.

Number of leaves. Treatment of I1V3 (Interstock *Carizzo citrange* / Scion *Lime cv. Nimas*) showed highest number of leave (43.87), which was significantly different from the resut of the treatment of I7V2 (Interstock *Kanci* / Scion *Tangerine cv. Pontianak*), which showed value of around 15.16. This result is in line with the result of a study found by Sugiyatno et al. (2013) in which it is stated that interstock *Tangerine* produces the most number of leaves and it is significantly different from the other treatments in top working of *Mandarin cv. Batu 55*. Another research on the use of interstock on *pumello cv. Nambangan* showed that interstock affects the number of leaves growing in the plant (Susanto et al, 2010). Research on top working by grafting in apple also showed significant effect on the number of leaves (Das et al, 2011).

CONCLUSION

Based on the results of this study, it can be concluded that the use of different interstocks is able to stimulate the plant growth of *Mandarin cv. Batu 55, Tangerine cv. Pontianak*, and *Lime cv. Nimas*. Interstock *Carizzo citrange* also has the ability to replace the use of *JC* rootstock to boost the growth of *Lime cv. Nimas.*

REFERENCES

1. Aboutalebi A., Hamed H. 2014. Salinity and Citrus Rootstocks and Interstocks. International Journal of Plant, Animal and Enviromental Sciences vol. 20 (2014) 654-672.
2. Bansir L. 2011, 'Potential Development of Durian (Durio zibethinus L.) Locale: Exploration, Identification, Crosses and Vegetative Propagation', Dissertation, Graduate Program of Brawijaya University, Malang.
3. Das B, Ahmad N, Srivastava KK, and Ranjan P. 2011. 'Top Working Method and Bloom Density of Pollinizers as Productive Determinant for Spur Type Apple (Malus x domsetica Borkh.) Cultivars', Scientia Horticulturae, vol. 129, pp. 642-48.
4. Hardiyanto, Supriyanto, A, Sugiyatno, A, Setiono dan Mulyanto, H 2010, 'Technical Guidelines for Free Diseas Citrus Seed Production Technology. Indonesian Citrus and Subtropical Fruits Research Institute. 62 p.
5. Izquierdo AG , Riquelme MT , Porras I , and Ferreres F. 2004. "Effect of the Rootstock and Interstock Grafted in Lemon Tree (Citrus limon (L.) Burm.) on the Flavonoid Content of Lemon Juice". J. Agric. Food Chem., 2004, 52 (2), pp 324–331.
6. Karlidag H, Rafet A, and Ahmet E. 2014. Effects of Interstock (M9) Length Grafted onto MM 106 Rootstock on Sylleptic Shoot Formation, Growth and Yield in Some Apple Cultivars. Journal of Agricultutral Sciences 20 (2014) 331-336.
7. Koshita Y, Kunihisa M, Yasuhisa T, Toshikazu A, Hiroshi Y, and Akifumi A. 2007. Selection of Interstocks for Dwarfing Japanese Persimmon (Diospyros kaki Thunb.) Trees. J. Japan. Soc. Hort. Sci. 76 (4): 288–293. 2007.
8. Nunez EE, Filho F de AA, Stuchi MES, Avilés TC and dos Santos-Diasa CT. 2011, 'Performance of Tahiti lime on Twelve Rrootstocks under Irrigated and Non-irrigated Conditions', Scientia Horticulturae, vol.129, pp. 227–231.

9. Shokrollah H, Abdullah TL, Sijam K, and Abdullah SNA. 2011, “Potensial Use of Selected Citrus Rootstock and Interstock against HLB Disease in Malaysia”. J. Crop Protection 30 (2011): 521-525.
10. Supriyanto A dan Setiono. 2006. ‘Evaluation the Performance of the Vegetative Growth of 10 Commercial Citrus Varieties in 4 Varieties of Rootstock in Sambas, West Kalimantan '. Proceedings of The National Seminar on Citrus Tropika Indonesia, Horticulture Research and Development Center, Agency for Agricultural Research and Development, p. 212-220.
11. 2008. ‘Growth Performance of Tangerine cv Banjar on 11 Varieties Rootstock at Tidal Land '. Proceedings of the National Seminar on Citrus 2007. p. 228-234.
12. Susanto S, Sugeru H dan Minten S. 2010. ‘Vegetative and Generative Growth of Pumello cv. Nambangan on Four Types Interstock', J. Hort. Indonesia., Vol.1, no.2, pp. 53-58.
13. Sugiyatno A, Setyobudi L, Maghfoer M.D dan Supriyanto A. 2013. ‘Growth Rresponse of Mandarin cv Batu 55 on Some Interstock Through Top Working Methods ‘ J. Hort., vol. 23, no.4, p. 329-338.
14. Anggraini A. 2014. “Seed dormancy Breaking of Tumpang Longan with Mechanical Treatment". Proceedings of the National Seminar on Tropical Fruits Nusantara II, Horticulture Research and Development Center, Agency for Agricultural Research and Development, pp. 853-860.
15. Trisnawan AS. 2015. “The Effect of Plant Growth Regulator of Bud Dormancy Breaking Through Grafting" Thesis, Faculty of Agriculture, University of Brawijaya, Malang.
16. Wardaningsih DP, Supriyanto A, Suwasono HYB dan Sitawati. 2004. Effect of Cold Storage of Budwood and Rootstock Thinning Treatment on The Grafting Success of Pummelo (Citrus grandis L. Osbeck). Proceedings of the National Citrus Seminar 2004. P. 241-248
17. Yilmaz B., 2014. ‘Different Interstock Lenghts Effect on ‘Star Ruby’ Grapefruit and ‘Kutdiken’ Lemon for Some Plant Nutrient Elements’, Turkish Journal of Agricultural and Natural Sciences, Spesial Issue: 2, 2014: 1460-1463.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.35

HOUSEHOLD ECONOMIC MODEL TO IMPROVE SMALL-SCALE FISHERMAN INCOME AT RURAL MINAPADI (RICE-FISH SYSTEM) DEVELOPMENT PROGRAM IN DONGGALA, CENTRAL SULAWESI

Mardjudo Ahsan*
Faculty of Fisheries, University of Alkhairaat, Palu, Indonesia

Yasin Muhammad
Faculty of Economic, University of Alkhairaat, Palu, Indonesia

*E-mail: ahsan.mardjudo@gmail.com

ABSTRACT
The general purpose of the study is to find information about and analyze model of Rural Minapadi (Rice-Fish System) Development Program to improve household income of small-scale fishermen. The specific purpose of the study is to develop economic model and household economic behavior of small-scale fisherman through Rural Minapadi (Rice-Fish System) Development Program in Donggala, Central Sulawesi. The population is small-scale fishermen in Donggala who participate in Rural Minapadi (Rice-Fish System) Development Program. Multi-stage sampling is the sampling method. Model of household economy for small-scale fishermen is developed from 17 (seventeen) equations or endogenous variables that consists of 8 (eight) behavioral equations and 9 (nine) identity equations. Two Stage Least Squares (2SLS) and simulation analysis are used to give estimation towards parameters in simultaneous equation. Data analysis uses Statistical Analysis System (SAS). The findings show that household economic model of small-scale fisherman can be described based on the amount of marine commodity they are able to catch, the amount of work they do, household food and non-food spending that tends to increase when there is an increase in size of fishing boat, gasoline consumption and fishing frequency. Based on the analysis, the household economic model for small-scale fisherman is valid theoretically and it can provide accurate description. In order to get larger amount of marine commodity that eventually results in an increase of income and welfare, some household decisions are taken and some policy is established; they are increase in fishing frequency and workload as well as some allowance from the government in the form of fishing equipments and subsidy for gasoline.

KEY WORDS
Small-scale fisherman, household, economic model, fishing.

Fishing industry in Donggala, Central Sulawesi is dominated by conventional, small-scale fishermen and as the result level of productivity remains low. In order to improve fishermen's productivity, sufficient fishing equipment becomes the requirement so that marine commodity the fishermen catch can be sold in both local and regional market. Currently, small-scale fishermen have yet been able to increase their productivity and as the result, they have pretty low income.

In order to improve small-scale fisherman productivity and achieve the 2010-2014 Mission of the Ministry of Marine and Fishery, the government established Rural Minapadi (Rice-Fish System) Development Program. It is the continuation of the government allowance (*Bantuan Langsung Masyarakat*) during the 2009-2010 Independent Marine and Fishery PNPM. One of the goals of Rural Minapadi (Rice-Fish System) Development Program is to increase productivity and income of small-scale fisherman through business groups or *Kelompok Usaha Bersama*. *Kelompok Usaha Bersama* is a group of which member is fisherman; its foundation is concensus to increase member's income.

The business group is media to achieve the goal of Rural Minapadi (Rice-Fish System) Development Program. Establishemnt of business groups in village or regions is a breakthrough so that fisherman can achieve economic welfare. Business group has been established in Donggala since 2011. Attention should be paid to the fishermen in Donggala because they rely upon their fishing job. Due to lack of capital, the fishermen still use conventional fishing equipment and conventional fishing boats.

Establishment and development of fishing industry that was and has been going on currently focuses on increasing productivity of small-scale fishermen. Meanwhile, underlying obstacles in the establishment and development of the fishing industry are incompetent human resources, lacking access to capital and facilities, technology and market as well as socio-cultural factor; all of them result in the fishermen having low income. Careful analysis should be conducted to overcome the obstacles and improve the fishermen's welfare.

The government has taken some efforts to solve the issues for example (1) some policy to improve skills of the fishermen in the form of training of which purpose is to enable the fishermen getting higher amount of marine commodity; (2) some policy of which purpose is to facilitate the fishermen getting some capital through *PEMP* program which began in 2000 and was going on until 2010; (3) some policy that allows the fishermen getting motorized fishing boats; and (4) some policy related to the socio-cultural issue where the government works with religious institutions of which orientation is the local wisdom of Donggala, Central Sulawesi.

The government policy about fishing industry has been established and implemented all over Indonesia. However, the implementation has yet been optimum because the fishermen, more particularly small-scale fishermen, are still living in poverty. Therefore, studies of which purpose is to develop skills of human resources in order that they are able to achieve financial independence, without relying on the government allowance should be conducted.

Studies about small-scale fishing industry have been conducted previously; however there has yet been study focusing on household economic model for small-scale fishermen who use conventional rowing boat or lower than 12-PK motorized fishing boat and conventional equipment for fishing. Analysis in the study focuses on developing household economic model for small-scale fishermen emphasizing on fishing activities, workload, income and household spending of small-scale fishermen.

The general purpose of the study is to find information about and analyze model of Rural Minapadi (Rice-Fish System) Development Program to improve household income of small-scale fishermen. The specific purpose of the study is to develop economic model and household economic behavior of small-scale fisherman through Rural Minapadi (Rice-Fish System) Development Program in Donggala, Central Sulawesi. The population is small-scale fishermen in Donggala who participate in Rural Minapadi (Rice-Fish System) Development Program.

METHODS OF RESEARCH

Setting and Scope of the Study. The setting of the study is Makassar Street in Donggala, Central Sulawesi. The study is a survey that is a study of which aim is to give factual description of a current phenomenon and also describes correlation between phenomena, test hypotheses as well as making interpretation and obtain meaning from the phenomenon being analyzed (Nazir M, 2003). Survey refers to taking samples from population using questionnaire as instrument to get primary data from respondents. The scope of the study is to describe and analyze household economic model of small-scale fishermen who participate in Rural Minapadi (Rice-Fish System) Development Program. Analyzing household economic model of small-scale fishermen involves the analysis of production, workload, income and spending. The variables are analyzed using simultaneous equation that in general is dynamic and specific for household economic model. Two Stage Least Squares (2SLS) gives estimation towards parametersof the model while data analysis uses Statistical Analysis System (SAS).

Identification and Estimation of Model. Purpose of model identification is to find out whether estimation of parameter for structural equation can be conducted. When there is bias, the equation can be identified, but when it is not biased, the equation cannot be identified. Process of identification in the study use order condition as the requirement as follow: when (G-g)+(K-k) > G – 1 the equation isconsidered overidentified (over), where G = number of endogenous variable in the model, g = number of endogenous variable in the equation, K = number of exogenous variable in the model, k = number of exogenous variable in the equation.

RESULTS AND DISCUSSION

Validation. Purpose of validation is to find out how accurate endogenous variable is to predict the household economic model of small-scale fishermen in in Rural Minapadi (Rice-Fish System) Development Program. The result reveals that the model is able to describe accurate information, the actual information (score) is pretty similar to the predictive information (score).

The statistical analysis of predictive ability of the model presented in Table 1 shows that the endogenous variables in the household economic model of small-scale fishermen in in Rural Minapadi (Rice-Fish System) Development Program conveys predictive means that is similar to the actual mean; it means the model has good predictive ability. U^M score that is close to zero means the model does not have systematic bias. In addition, U^S that is also close to zero means the analysis of the simulation can follow the increase or decrease of the actual data. U^C that generally is close to one means error is not significant and able to follow certain pattern but spread out to all observations.

Table 1 – Predictive Ability Level of the Model

Variable	Actual Mean	Predictive Mean	(U^M)	(U^S)	(U^C)
Production (kg)	208.60	208.60	0.00	0.02	0.98
Husband's non-fishing workload (HOK)	17.90	17.74	0.02	0.01	0.98
Wife's non-fishing workload (HOK)	3.27	3.37	0.00	0.06	0.94
Income from fishing activities (Rp)	2,584,835.00	2,584,840.00	0.00	0.03	0.97
Reception from fishing activities (Rp)	5,213,918.00	5,213,922.00	0.00	0.02	0.98
Non-fixed fee / variabel fee(Rp)	2,629,082.00	2,629,082.00	.	.	.
Income from non-fishing activities (Rp)	1,627,938.00	1,618,917.00	0.00	0.01	0.99
Household income (Rp)	4,212,773.00	4,203,756.00	0.00	0.07	0.93
Food consumption (Rp)	2,452,062.00	2,446,322.00	0.00	0.16	0.84
Non-food consumption (Rp)	1,562,887.00	1,560,055.00	0.00	0.33	0.67
Household consumption (Rp)	4,014,948.00	4,006,378.00	0.00	0.12	0.88

Source: SAS Analysis (2015).

U^M score is biased proportion that becomes indicator of systematic error. U^S score is component of bias variance while U^C score is bias covariance. A model has good predictive ability when U^M and U^C score is close to zero and U^C score is close to one. Based on Pindyck and Rubinfeld (1991), a model has good predictive ability when U^M and U^C score is close to zero and U^C score is close to one. Based on the validation, the household economic model for small-scale fishermen in Rural Minapadi (Rice-Fish System) Development Program is considered as valid.

Small-Scale Fishermen's Household Economic Model and Behavior. Fishermen's household economic model is basically different from household economic model for agriculture. The difference lies in possesion of property. Household economic for agriculture relies heavily on possession of cultivation area known as private property, while fishermen's household depends on possession of fishing equipment and public resources or known as commen property.

Household model for fisherman is adopted from empirical model of agriculture household. Becker (1965) developed thoery of household through implementation of maximum satisfaction from good consumption into new household economics. There are 2

(two) processes in household behavior. The first is household production described in production function. The second is household consumption that refers to preference or selection towards consumption of goods; the analysis emphasizes on household time allotment that is categorized as productive time for work and leisure time.

Development of economic household model generally adopts Bagi and Singh (1974)'s theory of household economy. Decision-making in the model is divided into 6 (six) groups namely production, consumption, marketed surplus, human resource/ employment, investment and finance. Studies on economic household of fishermen have been conducted previously for example one conducted by Aryani (1994), Reniati (1998), Muhammad (2002), dan Sutoyo (2005). The models developed in the previous studies have involved some variables relevant to economic condition of fishermen's household in the beaches such as relationship between economic behavior in production, workload, income and spending.

The model of household economy for small-scale fishermen in the study is developed from 17 (seventeen) equations or endogenous variables that consists of 8 (eight) behavioral equations and 9 (nine) identity equations. Two Stage Least Squares (2SLS) is used to give estimation towards parameters in simultaneous equation. Data analysis uses Statistical Analysis System (SAS). Economic behavior of small-scale fishermen's household is elaborated as follows.

Equation for Production. Production of small-scale fishermen depends on fishing experience, fishing activities, husband's fishing workload, numbers of fishing equipment, size of fishing boats/ cold box and gasoline. The equation is as follow:

$$HT = ao + a1PM + a2FM + a3CTKsmp + a4JAT + a5Uprh + a6BSN + U1$$

The result of multiple regression analysis (Anova) conducted simultaneously using SAS version 9.1 is described in Table 2.

Table 2 – Anova of Factors Affecting Production of Small-Scale Fishermen

Variance	db	Total Square	Median	F-ratio	Pr > F
Regression	6	403,530.00	67,255.01	201.31	<.0001
Residual	90	30,067.90	334.09		
Total	96	433,597.90			

Source: SAS Analysis, 2015.

Table 2 shows F_{ratio} = 201.31 with probability 0.0001 < 0.01 (α = 1%) reject the null hypothesis; it means the independent variables fishing experience, fishing experience, husband's fishing workload, numbers of fishing equipment, size of fishing boats/ cold box and gasoline simultaneously influence production. T-test is used to find out the influence of independent variables towards dependent variable; the analysis is presented in Table 3.

Table 3 – Estimation of Production

Variable	Coefficient	Standard Error	t- ratio	Pr > |t|	Elastic Coefficient
Intercept	-18.25	13.53			
PM	1.57	0.63	2.48	0.015	0.08
FM	5.13	0.98	5.23	<.0001	0.38
CTKsmp	4.95	1.78	2.77	0.0068	0.24
JAT	14.77	5.87	2.52	0.0136	0.03
Uprh	13.57	4.46	3.04	0.0031	0.12
BSN	0.14	0.05	2.62	0.0102	0.23
Determinant coefficient (R^2) equals to 0.9260					

Source: SAS Analysis, 2015.

Determinant coefficient (R^2) equals to 0.9260 shows the following variables namely fishing experience, fishing experience, husband's fishing workload, numbers of fishing equipment, size of fishing boats/ cold box and gasoline have 92.60% influence towards production while the remaining 7.40% is affected by other factors.

Fishing experience has significant and positive influence towards production where t_{ratio} = 2.48 with probability 0.015 < 0.05 (α 5%) in two-way testing. Elasticity of 0.08 means each 1% increase in fishing experience increases production as much as 0.08% with the assumption that other factors are constant.

Equation for Husband's Non-Fishing Workload. The amount of husband's non-fishing workload is influenced by income from fishing activity and fee from non-fishing activity. The equation is as follow:

$$CTKsmnp = bo + b1PDp + b2UTKsmnp + U2$$

The result of multiple regression analysis (Anova) conducted simultaneously using SAS version 9.1 is described in Table 4.

Table 4 – Anova of Factors Affecting Husband's Non-Fishing Workload

Variance	db	Total Square	Median	F-ratio	Pr > F
Regression	2	1,164.857	582.4285	233.97	<.0001
Residual	94	234.002	2.489383		
Total	96	1,398.859			

Table 4 shows F_{ratio} = 233.97 with probability 0.0001 < 0.01 (α = 1%) reject the null hypothesis; it means the independent variables income from fishing activities and some money the husbands earn from non-fishing activities simultaneously influence husband's non-fishing workload. T-test is used to find out the influence of independent variables towards dependent variable; the analysis is presented in Table 5.

Table 5 – Estimation of Husband's Non-Fishing Activity (CTKsmnp)

Variable	Coefficient	Standard Error	t- ratio	Pr > |t|	Elastic Coefficient
Intercept	20.70518	1.195798	17.31	<.0001	
PDp	-2.55E-06	1.41E-07	-18.15	<.0001	-0.368
UTKsmnp	0.000045	0.000012	3.81	0.0003	0.210
Determinant coefficient (R^2) equals to 0.8292					

Determinant coefficient (R^2) equals to 0.8292 shows income from fishing activity and husband's fee from non-fishing activity have 82.92% influence towards husband's non-fishing workload and the remaining 17.18 % is affected by other factors.

Husband's fee from non-fishing activity has positive and significant influence towards husband's non-fishing workload where t_{ratio} = 3.81 with probability 0.003 < 0.05 (α 5%) in two-way testing. 0.21 elasticity means every 1% increase in husband's income from non-fishing activity will increase fishermen's household income as much as 0.21% with the assumption that other factors are constant.

Equation for Wife's Non-Fishing Workload. The amount of wife's non-fishing workload is influenced by income from fishing activity and fee from non-fishing activity. The equation is as follows:

$$CTKisnp = co + c1PDp + c2UTKisnp + U3$$

The result of multiple regression analysis (Anova) conducted simultaneously using SAS version 9.1 is described in Table 6.

Table 6 – Anova of Factors Affecting Wife's Non-Fishing Workload

Variance	db	Total Square	Median	F-ratio	Pr > F
Regression	2	2977.136	1488.568	216.83	<.0001
Residual	94	645.3288	6.8652		
Total	96	3622.4648			

Table 6 shows F_{ratio} = 216.83 with probability 0.0001 < 0.01 (α = 1%) rejects the null hypothesis. It means the independent variables (income from fishing activity and wife's fee from non-fishing activity) simultaneously affect the amount of wife's non-fishing workload. T-test is used to find out the influence of independent variables towards dependent variable; the analysis is presented in Table 7.

Table 7 – Estimation of Wife's Non-Fishing Activity(CTKisnp)

Variabel	Coefficient	Standard Error	t- ratio	Pr > |t|	Elastic Coefficient
Intercept	2.049964	0.745537	2.75	0.0072	
PDp	-5.38E-07	2.39E-07	-2.25	0.0269	-0.426
UTKisnp	0.000352	0.00002	17.63	<.0001	0.763
Determinant Coefficient (R^2) equals to 0.8181					

Determinant coefficient (R^2) equals to 0.8181 shows income from fishing activity and wife's fee from non-fishing activity have 81.81% influence towards wife's non-fishing workload and the remaining 18.19 % is affected by other factors.

Husband's fee from non-fishing activity has positive and significant influence towards wife's non-fishing workload where t_{ratio} = 17.63 with probability 0.001 < 0.05 (α 5%) in two-way testing. 0.76 elasticity means every 1% increase in wife's income from non-fishing activity will increase fishermen's household income as much as 0.76% with the assumption that other factors are constant.

Equation for Household Food Consumption. Small-scale fishermen's food consumption that consists of rice, protein (meat, fish and egg), frying oil, vegetables, beverage (coffee and tea), fruits, cigarettes and others is influenced by number of family members and household income. The equation is as follows:

$$KSpng = d0 + d1JART + d2PDRT + U4$$

The result of multiple regression analysis (Anova) conducted simultaneously using SAS version 9.1 is described in Table 8.

Table 8 – Anova of Factors Affecting Food Consumption of Small-Scale Fishermen's Household

Variance	db	Total Square	Median	F-ratio	Pr > F
Regression	2	5.09E+13	2.55E+13	50.59	<.0001
Residual	94	4.73E+13	5.03E+11		
Total	96	9.82E+13			

Table 8 shows F_{ratio} = 50.59 with probability 0.0001 < 0.01 (α = 1%) rejects the null hypothesis. It means the independent variables (number of family members and household income) simultaneously affect household food consumption. T-test is used to find out the influence of independent variables towards dependent variable; the analysis is presented in Table 9.

Table 9 – Estimation of Small-Scale Fisherman's Household Food Consumption

Variabel	Coefficient	Standard Error	t- ratio	Pr > |t|	Elastic Coefficient
Intercept	-1250309	399041.8	-3.13	0.0023	
JART	258410.6	37557.84	6.88	<.0001	0.416
PDRT	0.636647	0.085862	7.41	<.0001	1.094
Determinant Coefficient (R^2) equals to 0.5081					

Determinant coefficient (R^2) equals to 0.5081 shows that number of family members and household income have 50.81% influence towards household food consumption whereas the remaining 49.19 % is affected by other factors.

Number of family member has positive and significant influence towards household food consumption where t_{ratio} = 6.88 with probability 0.001 < 0.05 (α 5%) in two-way testing.

0.41 elasticity means every 1% increase in number of family member will household food consumption as much as 0.41% with the assumption that other factors are constant.

Equation for Household Non-Food Consumption. Non-food consumption of small-scale fishermen's household that involves clothing, education, health, electricity, communication, transportation, rent, social activity and other spending is influenced by number of family members, food consumption and household income. The equation is as follows:

$$KSnpng = e0 + e1JART + e2KSpng + e3PDRT + U5$$

The result of multiple regression analysis (Anova) conducted simultaneously using SAS version 9.1 is described in Table 10.

Table 10 – Anova of Factors Affecting Small-Scale Fishermen's Household Non-Food Consumption

Variance	db	Total Square	Median	F-ratio	Pr > F
Regression	3	2.34E+13	7.78E+12	40.48	<.0001
Residual	93	1.79E+13	1.92E+11		
Total	96	4.12E+13			

Table 10 shows F_{ratio} = 40.48 with probability 0.0001 < 0.01 (α = 1%) rejects the null hypothesis. It means the independent variables (number of family members, food consumption and household income) simultaneously affect household non-food consumption. T-test is used to find out the influence of independent variables towards dependent variable; the analysis is presented in Table 11.

Table 11 – Estimation of Small-Scale Fisherman's Household Non-Food Consumption

Variabel	Coefficient	Standard Error	t- ratio	Pr > |t|	Elastic Coefficient
Intercept	-238325	488657.6	-0.49	0.6269	
JART	60790.38	90218.65	0.67	0.5021	0.154
KSpng	-1.01821	0.337369	-3.02	0.0033	-1.598
PDRT	0.963239	0.221247	4.35	<.0001	2.596
Determinant coefficient (R^2) equals to 0.5523					

Determinant coefficient (R^2) equals to 0.55231 shows that number of family members food consumption and household income have 55.23% influence towards household non-food consmuption whereas the remaining 44.77 % is affected by other factors.

Household income has positive and significant influence towards household non-food consumption where t_{ratio} = 4.35 with probability 0.001 < 0.05 (α 5%) in two-way testing. 2.59 elasticity means every 1% increase in household income will household non-food consumption as much as 2.59% with the assumption that other factors are constant.

Income of family members affects how much a household spends on goods and service. Such economic behavior is household response as both producers and consumers towards change in market force. Household economic behavior aims at maximixing utility as the assumption of the economic principles.

Individual and household economic behavior has been analyzed systematically by economic experts. The experts analyze household as unit of analysis considering it as the smallest unit of producer as well as consumer; household economic behavior is affected by family member's ability, opportunity and expectation (quoted from various sources).

Chayanov is the pioneer in analyzing farmer's household behavior in 1966; Russian farmer's household became the subjects of the study. Cahayanov developed his theory using the following assumptions, namely: (a) in the farmer's household, there is a correlation between decision-making in production and consumption; (b) each household will work until subjective evaluation from marginal utility works, similar to marginal utility from the output being resulted; (c) there is not any job market which means there is not any income from outside the household; (d) all farmer's households are able to access cultivation area in flexible manner to use in agriculture production processs; (e) there is a public concensus about standard of minimum income an individual should make; dan (f) output from the

household becomes family consumption or is sold to the market and is valued based on market price.

According to Becker (1965), theory of household economic is production and consumption in a household that cannot be separated from the use of employees that come from the household itself. The theory consider household as the one making decision in both production and consumption as well as the relationship with time allotment and household income. Interaction between consumption and production in farmer's household causes decision-making activity which becomes the unit of various productions. There is some sort of competition in a household about how to spend household income for either production or consumption.

There is a strong interaction between fishing production and dynamic of fish supply and policy related to fishing activities and how to make use of the production (Tai and Heaps, 1996). Mumammad (2002) states that there are production behavior is indicated by three functional variables in integrating bio-economic and relationship between boat owners and employees on fishing vessel; they are fishing boats, fishing ground and productivity in each fishing trip. Productivity is influenced by some productioors namely fishing gears and general condition of the fishing ground.

Social-economic factor frequently found in fisherman's community that affects production and income is non-formal credit institution owned by fish monger. As the effect, fishermen should sell his catch to the fish monger and the fish monger decides the price. It affects the price of the fish the fishermen catch. In conclusion, there is a tendency to establish monopsony/oligopsony; it refers to a type of market with only one or very few buyers (Pindyck and Rubinfeld, 1995).

Economic phenomenon shows there are endogenous and exogenous variables that separate agriculture economic model and fisherman's economic model namely (1) possession of asset, (2) different fishing grounds, (3) system used to share fee from production, and (4) government policy. In line with the previous statement, fishermen's ability to maximixe production is affected by particular factors such as (1) working capital or investment (fishing boats and fishing equipment/ gear), (2) potential of the fishing grounds, (3) days for carrying out fishing activity, (4) access to sell the production with reasonable price, and (5) operational/ production fee (Smith, 1987).

CONCLUSION AND SUGGESTIONS

Some conclusions based on the findings of the study entitled Household Economic Model for Small-Scale Fishermen through Rural Minapadi (Rice-Fish System) Development Program in Donggala, Central Sulawesi are as follow:

Household economic model and behavior for small-scale fishermen developed in the study is econometric model with production, workload, income and household spending as the variables. The model has been proven as a valid model based on related theories and has accurate level of prediction.

The programs of which purpose is to develop and maintain fishermen's skils in terms of production, workload, income and spending for small-scale fishermen in Donggala are: subsidy for increasing size of the fishermen's rowing boats so that they can fish in productive fishing ground and increase their production; 25% discounts of gasoline price that has positive impact towards production.

Alternative policy of which goal is an increase in production for small-scale fishermen is 25% increase in fishing activity, workload and gasoline consumption.

Developing fishing industry more particularly one for small-scale fishermen should be supported by:

Government policy as the instrument to increase production for small-scale fishermen. Government should introduce more effective and productive fishing equipment, subsidy for reducing gasoline price and increasing size of rowing boat into one with at least a 13-PK engine.

Government policy to increase Fish Aggregating Device (FAD) to save operating fee because FAD attracts more fish when it is used on the fishing ground.

REFERENCES

1. Aryani, F. 1994. Analisis Curahan Kerja dan Kontribusi Penerimaan Keluarga Nelayan dalam Kegiatan Ekonomi di Desa Pantai. Unpublished Thesis. Graduate Program, Agriculture Institute of Bogor.
2. Bagi, F.S. and I.J. Singh, 1974. A Microeconomic Model of Farm Dicision in an LDC, A Simultanous Equation Approach. Dept. Ag. Ec. And Rural Sociology. The Ohio State University. Colombus-Ohio.
3. Beckers, G. 1965. A Theory of the Alocation of Time. Jour of Economics. Vol. LXXV No. 299, September 1965. Colombia.
4. Muhammad, S. 2002. Kajian Ekonomi Rumahtangga Nelayan: Analisis Simulasi Kebijakan Pengelolaan Sumberdaya Perikanan secara Berkelanjutan. Unpublished Dissertation. Graduate Program, Agriculture Institute of Bogor.
5. Nazir M. 2003. Metodologi Penelitian. Cetakan Kelima. Ghalia Indonesia Jakarat.
6. Parel, 1973. Sampling design and procedures. The Agriculture Devolement Council, New York.
7. Pindyck, R.S and D. Ribinfeld. 1995. Microeconomics. Third Edition Prentice Hall, Englewood Cliffs, New Jersey 07632.
8. Reniati. 1998. Faktor-Faktor yang mempengaruihi dan Keterkaitan Keputusan Kerja Produksi dan Pengeluaran Rumah Tangga nelayan. Unpublished Thesis. Graduate Program, Agriculture Institute of Bogor.
9. Smith, I.R. 1987. Peningkatan Pendapatan Perikanan pada Sumberdaya yang Lebih Tangkap. Ekonomi Perikanan. Yayasan Obor Indonesia dan Gramedia, Jakarta.
10. Sutoyo. 2005. Kajian Ekonomi Rumah tangga nelayan Kecil pada Program Pemberdayaan Pengelolaan Sumberdaya Berbasis Kominitas (PSBK) (Kasus di Muncar Banyuwangi). Unpublished Thesis. Graduate Program, Brawijaya University.
11. Tai, S.Y and T. Heaps, 1996. Effort Dynamic and Alternatives Management Policies for the Small Pelagic Fisheries of Nortwest Painsular Malaysia. Mar. res Economic, Vol II,p. 85-102.
12. Turban Efraim and Jaye Aronso. 1998. Decision Support System and Intellegent System, Fifth Edition. Prentice-Hall Inc.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.36

ЭФФЕКТИВНОСТЬ GALEGA ORIENTALIS LAM. КАК ПРЕДШЕСТВЕННИКА ОЗИМОЙ ПШЕНИЦЫ

EFFICIENCY OF GALÉGA ORIENTÁLIS LAM. AS A PRECURSOR OF WINTER WHEAT

Серёгин С.В., кандидат сельскохозяйственных наук
Seregin S.V., Candidate of Agricultural Sciences
Тульский научно исследовательский институт сельского хозяйства, Тульская область, Россия
Tula Research Institute of Agriculture, Tula Region, Russia
E-mail: tniisx@mail.ru

АННОТАЦИЯ
В статье приведены результаты опытов по изучению влияния последействия козлятника восточного как предшественника на биологическую активность, агрофизические свойства почвы и продуктивность озимой пшеницы. После заделки зелёной массы козлятника улучшилось структурное состояние почвы. После козлятника без внесения минеральных удобрений получено в среднем за два года 3,13 т/га зерна озимой пшеницы.

ABSTRACT
The article presents the results of experiments on the effect of the aftereffect of the eastern goatskin as a precursor on biological activity, the agrophysical properties of the soil and the productivity of winter wheat. After embedding the green goat's body, the structural condition of the soil improved. After goatskin without application of mineral fertilizers, an average of 3.13 t/ha of winter wheat grain was obtained in two years.

КЛЮЧЕВЫЕ СЛОВА
Козлятник восточный, биологическая активность, почва, сидерация.

KEY WORDS
Galéga Orientális Lam., biological activity, soil, green manuring.

В современном земледелии все шире разрабатываются и осваиваются биологические методы ведения сельского хозяйства. За счёт этой системы можно получать экологически чистую продукцию, стабилизировать и повышать плодородие почвы, сокращать материальные, трудовые и энергетические затраты [3]. Экономия получается за счёт уменьшения объёмов внесения минеральных удобрений, замены их путём расширения посевов бобовых и пожнивных сидеральных культур, без нарушения структуры посевных площадей и чередования культур.

Мировое и отечественное земледелие признаёт, что минеральные и органические удобрения являются мощным средством повышения продуктивности сельскохозяйственных культур и без них невозможно рационально и интенсивно вести сельскохозяйственное производство. Однако в последние десятилетия в агропромышленном комплексе резко сократились объёмы использования минеральных и органических удобрений. Причина кроется в отсутствии у многих хозяйств экономических и финансовых возможностей использования минеральных удобрений в необходимом количестве в силу, прежде всего, диспаритета цен на аграрную и промышленную продукцию [7]. Что касается органических удобрений, то их применение сведено практически к минимуму из-за значительного сокращения поголовья крупного рогатого скота и нехватки техники для их внесения. В этих условиях наиболее действенным и реальным способом сохранения и воспроизводства плодородия почв, повышения продуктивности пашни становится биологизация земледелия с вовлечением в продукционный процесс низкозатратных источников

энергии. Один из основных приёмов биологизации – максимальное накопление в почве органического вещества (растительных, пожнивных и корневых остатков культур, сидератов, поукосных посевов) с созданием из них мульчирующего слоя, способствующих активизации почвенной биоты [1, 9]. Один из вариантов – введение в севооборот многолетних бобовых трав (в нашем случае это козлятник восточный), которые обеспечивают долголетие посевов, высокое качество корма, высокую продуктивность травостоя, оказывая, вместе с тем значительное влияние на рост плодородия почвы и являются хорошими предшественниками для других сельскохозяйственных культур. При этом биологизация земледелия не требует полного отказа от минеральных удобрений, а предусматривает сочетание биологических ресурсов, в частности органических удобрений и растительных остатков, с агрохимическими средствами [5, 6].

Исследования, проведённые нами, в полевых опытах в 2012–2014 годах на базе Тульского НИИСХ, доказали эффективность козлятника в повышении плодородия почв. Полученные результаты показали, что в среднем за 3года он формирует не только значительный (более 8,0 т/га) урожай сухой биомассы, но и более 22,0 т/га органических остатков, богатых общим азотом.

С пожнивно-корневыми остатками в почву поступает от 208,7 до 372,5 кг/га азота, часть которого остаётся в почве, обогащая её. Причём всё это происходит без затрат на минеральные удобрения, которые вносятся только перед закладкой травостоя.

Возделывание многолетних бобовых трав в севообороте позволяет сократить долю азотных минеральных удобрений под основные культуры на 15-20 % без ущерба для их продуктивности, кроме того, благоприятное соотношение азота и углерода в пожнивных и корневых остатках бобовых культур способствует их активной мобилизации в процессе разложения и минерализации [10, 11].

Однако, несмотря на это, в литературе мало сведений о последействии козлятника на продуктивность последующих культур и агрофизические свойства почвы. Поэтому в 2015–2016 годах нами были проведены исследования, основной целью которых стало изучение влияния последействия козлятника восточного на продуктивность озимой пшеницы, а также на биологическую активность и агрофизические свойства почвы.

МАТЕРИАЛЫ И МЕТОДЫ ИССЛЕДОВАНИЙ

Исследования проводили на опытных полях отдела земледелия ФГБНУ «Тульский НИИСХ». Почва опытного участка – чернозём типичный, глубоковыщелоченный, тяжелосуглинистый с содержанием гумуса – 6%, рНсол – 4,9-5,3, фосфора – 15-20 мг/100г, калия – 20-25 мг/100г, гидролитическая кислотность – 7-9 мг. экв на 100г почвы. Повторность опыта – трехкратная, расположение вариантов последовательное.

Опыт представлен восьмипольным севооборотом с чередованием культур: 1) овёс на зелёную массу с подсевом козлятника восточного; 2-4) козлятник восточный 1, 2 и 3 годов пользования; 5) озимая пшеница; 6) ячмень яровой; 7) люпин узколистный; 8) яровая пшеница.

Схема опыта включает четыре варианта в трёхкратной повторности. Вариант первый: контрольный, без минеральных и органических удобрений. Вариант второй: без минеральных удобрений. Козлятник восточный на сидерат. Вариант третий: козлятник восточный на сидерат + $N_{30}P_{30}K_{30}$. Вариант четвёртый: внесение под озимую пшеницу $N_{60}P_{60}K_{60}$. Общая площадь делянки –175м^2, учётная площадь – 90 м^2.

Для определения агрегатного состава почвы под озимой пшеницей пробы отбирали из слоя почвы 0-30 см в период полных всходов культуры и перед уборкой. Почвенные пробы для анализа объемной массы почвы брали с помощью бура со съемными цилиндрами объемом 100 см$^{3.}$ Биологическую активность почвы определяли по степени распада льняной ткани – метод заложения льняных полотен по Е.Н.

Мишустину [2]. Статистическую обработку урожайных данных проводили методами дисперсионного и корреляционного анализов по Б.А. Доспехову [3].

РЕЗУЛЬТАТЫ И ИХ ОБСУЖДЕНИЕ

Исследование структурного состояния почвы под посевами озимой пшеницы показало, что наибольшее содержание агрономически ценных почвенных агрегатов (частицы почвы размером 0,25-10 мм) насчитывалось на вариантах с заделкой зелёной массы козлятника в почву – 70,8-71,0%. На контроле, без сидерации, этот показатель был на уровне 63,4%. Так же, отмечено снижение процента глыбистой фракции до 26,1%, против 32,4% на контроле. Коэффициент структурности на вариантах с сидерацией составил 2,43 и 2,44, на контроле и варианте с минеральными удобрениями 1,86 и 2,05 соответственно (табл. 1).

При определении плотности почвы, результаты наших исследований свидетельствуют о том, что самая высокая плотность почвы, как в слое 0-10 см, так и в слое 0-30 см в период появления всходов наблюдается на контрольном варианте и варианте с минеральными удобрениями (соответственно 1,13 и 1,15 г/см^3). Это можно объяснить только тем, что в этих вариантах ни каких видов органики, кроме корневой системы козлятника не вносили. Наиболее заметное снижение плотности почвы отмечено на вариантах внесения свежего органического вещества, т.е. на вариантах с сидерацией. На этих вариантах отмечалось снижение плотности почвы не только верхнего 0-10 см (1,04-1,05 г/см^3), но и всего 0-30 см (1,10 г/см^3) слоя почвы. С течением времени, т.е. в период вегетации озимой пшеницы до уборки урожая наблюдалось изменение плотности почвы в сторону её увеличения (самоуплотнение), оставаясь более низкой на вариантах с использованием козлятника восточного на сидерат. Значения плотности сложения верхнего корнеобитаемого слоя почвы не выходили за параметры оптимальных значений. На момент всходов озимой пшеницы по всем вариантам они варьировали в пределах – 1,04-1,15 г/см^3.

Таблица 1 – Влияние козлятника восточного на почвенные условия роста и продуктивность озимой пшеницы, 2015-2016 гг.

Варианты опыта	Структурно-агрегатный состав почвы в слое 0-30 см			Коэффициент структурности		Объёмная масса почвы (полные всходы)		Биологическая активность почвы, %	Урожайность, т/га
	Фракция, мм	Содержание агрегатов, %		всходы	перед уборкой	слой почвы	г/см^3		
		всходы	перед уборкой						
1	0,25-10	65,1	60,1	1,86	1,50	0-10	1,07	40,5	2,99
	>10	32,4	37,5			10-20	1,10		
	<0,25	2,5	2,6			20-30	1,13		
2	0,25-10	71,0	63,0	2,44	1,76	0-10	1,04	44,0	3,13
	>10	26,7	33,1			10-20	1,07		
	<0,25	2,4	2,6			20-30	1,10		
3	0,25-10	70,8	60,8	2,43	1,55	0-10	1,05	44,0	3,56
	>10	26,1	36,5			10-20	1,06		
	<0,25	3,0	2,7			20-30	1,10		
4	0,25-10	67,2	58,8	2,05	1,43	0-10	1,06	32,2	3,61
	>10	29,8	38,7			10-20	1,09		
	<0,25	2,6	2,5			20-30	1,15		
$НСР_{005}$									0,36

Наблюдения за распадом льняной ткани показали, что активность целлюлозоразлагающих микроорганизмов почвы под посевами озимой пшеницы, в зависимости от варианта опыта, была в пределах 32,2-44,0%. Насыщение почвы сидеральным субстратом вызвало активное разложение льняного полотна. На варианте озимой пшеницы, размещаемой после сидерации и варианте – сидерат+$N_{30}P_{30}K_{30}$, величина биологической активности почвы достигла 44,0%.

Наряду с этим можно предположить, что рост биологической активности почвы происходил, также, за счёт снижения плотности и увеличения аэрации почвы, на этих вариантах, посредством внесённого в почву органического вещества сидеральной культуры (козлятника восточного).

Повышенные дозы минеральных удобрений ($N_{60}P_{60}K_{60}$) снижали биологическую активность почвы до уровня 32,2%. Данный факт объясняется тем, что минеральные удобрения обычно обладают «физиологической кислотностью». При использовании их растениями накапливаются кислоты, подкисляющие почву. Вследствие этого биологические процессы в почве подавляются [8]. В.М. Чиканова (1988) отмечает – если в почве нет достаточного количества легкоразлагающихся органических соединений, то даже низкие дозы минерального азота, вносимые в почву, постепенно снижают численность микроорганизмов [12].

Таким образом, наибольшая биологическая активность почвы отмечена на фонах органического и органоминерального питания растений, что обусловлено более благоприятными условиями для питания, активной жизни и размножения микроорганизмов. В целом, результаты наших исследований свидетельствуют о том, что сидераты являются мощным фактором плодородия.

Интегральным показателем любых агротехнических приёмов служит урожайность сельскохозяйственных культур.

Использование только сидерата на озимой пшенице привело к увеличению её урожая, по отношению к контролю, на 4,6% или прибавку в 140 кг/га. При добавлении к сидерату $N_{30}P_{30}K_{30}$ урожайность озимой пшеницы возросла до 3,56 т/га или на 19% (+570 кг/га). Достоверная прибавка получена на варианте с применением полной нормы удобрений ($N_{60}P_{60}K_{60}$). Урожайность озимой пшеницы увеличилась 3,61 т/га, что обеспечило получение дополнительного урожая 0,62 т/га по отношению к контролю.

Однако данные прибавки урожая от минеральных удобрений не окупят потраченные на них средства. Поэтому на полях, высвобождаемых после козлятника, неплохие урожаи зерновых культур (от 3,13 т/га озимой пшеницы) можно получить без применения дорогостоящих минеральных удобрений.

ЗАКЛЮЧЕНИЕ

В складывающихся в последние десятилетия производственных условиях при острой нехватке материально-денежных ресурсов, основными приемами воспроизводства и повышения плодородия почв, а также рационального их использования становятся биологические факторы, одним из которых является выращивание многолетних бобовых трав, таких, как козлятник восточный, который позволяет получить не только высокие урожаи корма при минимальных затратах, но также является отличным предшественником для зерновых культур.

БИБЛИОГРАФИЯ

1. Беленков А.И. Биологизированные севообороты и плодородие каштановых почв Нижнего Поволжья // Известия Тимирязевской сельскохозяйственной академии Известия ТСХА. – 2008. – №2. – С. 18-24.
2. Ганжара Н.Ф. Практикум по почвоведению // М.: Агроконсалт, 2002. – 280с.
3. Голдштайн В. Ведение хозяйств на биологической основе в лесостепной зонах Молдовы, Украины и России // М.: ЭкоНива, 2000. – 272с.
4. Доспехов Б.А. Методика опытного дела // М.: Агропромиздат, 1985. – 351с.
5. Лифаненкова Т.П. Биологические приёмы воспроизводства плодородия орошаемого чернозёма степной зоны Центрального Предкавказья // Состояние и перспективы агрохимических исследований в Географической сети опытов с удобрениями: Материалы международной научно-методической конференции учреждений Геосети России и стран СНГ – Москва, 2010. – С. 99-102.

6. Лифаненкова Т.П. Свойства орошаемого чернозёма обыкновенного карбонатного при биологизации приёмов воспроизводства плодородия // – Земледелие. – 2012. – №6. – С. 24-26.
7. Мальцев В.Ф. Система биологизации земледелия Нечерноземной зоны России. Часть I // М.: ФГНУ «Росинформагротех», 2002. – 544с.
8. Мишустин Е.Н. Микроорганизмы и продуктивность земледелия // – М.: Урожай, 1972. – 342с.
9. Плекачёв Ю.Н. Полевые севообороты, обработка почвы и борьба с сорной растительностью в Нижнем Поволжье // М.: Вестник РАСХН, 2012. – 357с.
10. Парахин Н.В. Биологизация земледелия в России // Орёл: Орёл ГАУ,2000. –176с.
11. Серегин С.В. Влияние факторов биологизации на агрофизические свойства почвы чернозема выщелоченного // Научный обозреватель. – 2016. – №11(71). – С. 55-57.
12. Чиканова В.М. Бактериальные удобрения // Минск, «Уроджай», 1998. – 94с.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.37

SWEET CORN FARMING: THE EFFECT OF PRODUCTION FACTOR, EFFICIENCY AND RETURN TO SCALE

Dwijatenaya Ida Bagus Made Agung
Agribusiness Study Program, Faculty of Agriculture, University of Kutai Kartanegara, Indonesia
E-mail: info@unikarta.ac.id

ABSTRACT
This research aims to determine the effect of production factors on the sweet corn production, the efficiency of sweet corn farming, and the return to scale of sweet corn production. The sampling technique was taken by proportionate stratified random sampling method with the sample number of 57 people while the analyzer used was the program of Frointer 4.1c. The results show that the production factors of the land farm, seed, and fertilizer have a positive and significant effect on sweet corn production. On the other hand, labor production factors have a positive but not significant effect on sweet corn production. It also found that technical efficiency, price efficiency, and economic efficiency of sweet corn farming in Muara Wis Sub-district of Kutai Kartanegara Regency are not efficient yet. The return to scale of sweet corn yield has an increasing return to scale condition.

KEY WORDS
Sweet corn, farming, production factor, efficiency.

The grand strategy of Kutai Kartanegara Regency development in East Kalimantan, Indonesia puts agriculture as the main sector to be developed. This is demonstrated by the 4th point of Kutai regency development mission in 2016-2021 to improve farm management. Besides rice as the main commodity, Kutai also develops non-rice food sources like corn.

The corn production in Kutai has fluctuated from 2011 to 2015 as presented in Table 1 below. The fluctuating production was caused by the changing size of the land use. In addition to that, corn farming has not been well managed. Various factors causing the underdevelopment of non-rice food products handling such as corn in Kutai are that the product market has not formed yet, limited post-food handlers and that the production has not developed properly. Corn production is determined by the factors of production. The production factors are the land area, labor, seeds, fertilizers, insecticides, and so forth. An efficient production process requires a combination of the optimal use of production factors and supported by technological master by farmers.

Table 1 – Area and Production if Corn in Kutai Kartanegara, 2015

No.	Year	Area (ha)	Production (Tons)
1.	2011	630	2 015
2.	2012	581	1 881
3.	2013	413	1 342
4.	2014	249	834
5.	2015	420	1 576

Source: BPS of Kutai Kartenagara, 2016.

The fact that corn production has not been well developed in Kutai Kartanegara is inseparable from the people who still consider rice as their main food. The existence of government policies to improve the non-rice food production provide an opportunity for areas which have potential to develop corn production. Corn production is determined by various factors. Soekartawi in Risandewi (2013) explained that the factors affecting agricultural production are biological factors and socioeconomic factors.

Production is defined as the use or utilization of resources that transform a commodity into other commodities which are completely different (Miller and Meiners, 1994:249). In brief, production is a process of transforming inputs into outputs. He also said that the relationship between the physical output and the physical input is referred as a production function. The production function determines the maximum output that can be produced from a certain number of inputs, in a state of technical expertise and specific knowledge (Samuelson dan Nordhaus, 2003:125). Experts give different symbols in defining the production function into a mathematical equation as Doll and Orazem (19, 84: 21); Miller and Meiners (1994: 261); and Nicholson (2002: 159) have proved. It is known that all of those equations give the same meaning. In general, the function of production is written as follows.

$$Y=f(X_1,X_2,X_3, \ldots, X_N) \qquad (1)$$

Where: Y is the output; $X_{1.....N}$ is the input.

Experts in the study of the production function, including the production function in the agricultural sector, are commonly used the equation of Cobb-Douglas production function. The formulation is presented in this following section (Miller and Meiners, 1994:286; and Gujarati, 2007:213).

$$Y = AX^B \qquad (2)$$

Furtherly, it is explained that the Cobb-Douglas function is a non-linear function to be linear. Therefore, the function is transformed into a form *of natural logarithm* equation.

$$Ln\ Y = lnA + B\ lnX \qquad (3)$$

Where: A is the intercept; Y is the output; X is the input; B is the regression coefficient.

Various studies on agricultural sector which examine the influence of production factors have been carried out by using the Cobb-Douglas model approach. Khakim *et al.,* (2013) found that land, labor, fertilizer, and seed have a significant effect on rice production. Danilwan (2010) has proved that the influence of production factors (capital and labor) is significant to production (industrial output). The results from Darwanto (2010) showed that the factors of production that significantly affect the production are land area and seed, while the non-significant factors are pesticides, fertilizer, and labor. The research of Haryono *et al*., (2015) said that the factors of production have a simultaneous and significant effect on production. Some other studies related to the influence of production factors have been done by Gunes (2007); Simorangkir *et al.*, (2014); Effendy and Antara (2015); and Dwijatenaya (2016).

Besides the Cobb-Douglas production function which is the physical connection between the production factors to production, then to analyze the efficiency of the production process, a *stochastic production frontier Cobb-Douglas* is used. An optimization of production factors aims to achieve maximum profits in every business including sweet corn farming by allocating the production factors efficiently. According to Soekartawi (2001:49), the notion of efficiency is classified into three types, namely (1) the technical efficiency, (2) allocative efficiency (price), and economic efficiency. Moreover, it can be seen in Cobb-Douglas function that the regression coefficient describes the elasticity of production. Thus, the marginal product value (MPV) of X production factors is formulated as follows.

$$\text{MPV} = (b.Y\,.\,\text{Py})/X \qquad (4)$$

Where: b is the elasticity of production; Y is the production; Py is the price of production; X is the X production factor(s).

The condition of price efficiency requires MPV to be equal to the price of production factor. However, this condition is difficult to achieve for many reasons such as farmers'

limited knowledge, the difficulty to obtain production factors in the right amount, time management, and so on. The formulations of those conditions are:

$(b.Y.Py)/(X.Px) = 1$; efficient condition
$(b.Y.Py)/(X.Px) > 1$; inefficient X production factors
$(b.Y.Py)/(X.Px) < 1$; the use of X production factors is considered inefficient

To measure price efficiency and economic efficiency, it requires a technical efficiency. According to Miller and Meiners (1994: 260), technical efficiency requires or entails a production process that can utilize fewer inputs in order to produce output in the same amount. Battese and Coelli in Sukiyono (2004) defines technical efficiency as the ratio between the farming production and output (production) of the frontier production function. By that, the value of technical efficiency can be determined with the help of Frontier Software 4.1c Version. The indicators are consisted of (1) if the value of technical efficiency is equal to one, the use of production factors has been technically efficient and (2) if the value of technical efficiency of less than one, the use of production factors is not yet technically efficient.

The concept of economic efficiency embodied the idea that the best of this is the most cost-effective (Miller and Meiners, 1994:261). Economic efficiency is the product of technical efficiency and price efficiency of all input factors. Economic efficiency is defined as follows (Soekartawi, 2001:49).

$$EE = ET\ .EH \qquad (6)$$

Where: EE = Economic efficiency; TE = Technical Efficiency; PE = Price Efficiency.

The indicators of economic efficiency value are: EE < 1 means inefficient so that the use of production factors should be reduced; EE = 1 means efficient so that the combination of the use of production factors is appropriate; EE > 1 means not efficient so that the use of production factors should be increased.

Ismayani (2013) in her research used the approach of Cobb-Douglas production function through regression analysis that is related to efficiency. She found that production factors of land and labor are still inefficient. Suprapti *et al.,* (2014) also analyzed the efficiency of corn production with the approach of *stochastic production frontier* Cobb-Douglas. It is obtained that the level of economic efficiency and technical efficiency are inefficient while the allocative efficiency is already efficient. Some studies related to farm efficiency are carried out by Danilwan (2010); Sarinah (2010); Dewi *et al,.* (2012) and Simorangkir *et al*., (2014).

To determine whether a business including corn farming is in the business scale *of constant,* increasing, or decreasing, it can be analyzed with a *return to scale* model. Nicholson (2002: 169) defined the return to scale as a situation in which the *output is* increased in response to a proportional increase of all *inputs.* There are three possibilities in return to scale, namely (1) *increasing return to scale,* when each additional unit of input generated more additional output compared to the previous input, (2) *constant return to scale,* when additional unit of input produced the same output like the previous unit, and (3) *decreasing return to scale,* when each additional unit of input generated less additional output compared to the previous input. Research related to the return of scale conducted by Darwanto (2010) found that the return to scale of rice farming is in a state of *increasing the return to scale.* Khakim *et al*., (2013) also discovered that the return of scale of rice farming in Central Java is in a state of *increasing the return to scale.* Rahadi and Aswitari (2015) have examined that the economic scale of leather bag handicraft industry in Denpasar is in a state of *increasing the return to scale.* Moreover, Dwijatenaya (2016) found that the return to scale of barley is in a state of *increasing the return to scale*.

Besides the similarity with previous research which is examining corn farming, this research also has several differences. This research is focused on sweet corn farming seen from the aspects which influence the production factor usage, farming efficiency, and the

return to scale with a locus in Muara Wis, Kutai Kartanegara of East Kalimantan. Furthermore, more detailed equations and differences are described in the discussion. The use of production factors such as labor, land area, seed, and fertilizer affect the production of sweet corn. The combination of these production factors reflected the condition of the farming whether it is inefficient, not yet efficient, or already efficient. Similarly, the combination of the use of production factors will reveal whether the farm is in a state of *decreasing return to scale, constant return to scale,* or *increasing the return to scale.* The research objective is to determine the influence of production factors to the production of sweet corn as well as to know the sweet corn farming efficiency and return to scale.

METHODS OF RESEARCH

This research used a quantitative data. The data were described in the form of numbers obtained from the results of research including; corn production, land area, the use of seeds, the use of labor, the use of fertilizers, corn farming absorption, the cost of land, the cost of seeds, the cost of labor, and the cost of fertilizer. The sources of data used in this study were primary and secondary data. Primary data were collected and obtained directly from the source which in this case was from the farmers (respondents). Furthermore, secondary data were collected from the Central Bureau of Statistics of Kutai Kartanegara such as the area and the corn production in Kutai Kartanegara Regency. Data in scientific research are intended to obtain a relevant, accurate, and reliable data. Therefore, a good and suitable data collection method is required. In this research, data collection technique was carried out by questionnaires, structured interviews, and observation (Sugiyono, 2012:187-198).

The framework of this research was done by using quantitative research design and survey method. The study population was 131 farmers. These number of samples were taken by using Slovin formula (Sedarmayanti and Hidayat, 2002: 143) at the level of sampling error (e) by 10 percent in order to obtain 57 respondents. A sampling of respondents was reached by *Proportionate Stratified Random Sampling* method.

To answer research objectives, the research used analytical techniques of stochastic production frontier Cobb-Douglas function model with the parameter of Maximum Likelihood Estimated (MLE). The data were processed with the help of a computer program called Frontier 4.1c. The stochastic frontier production function used for sweetcorn farming is assumed to have a Cobb-Douglas form. For the purpose of function analysis, it is transformed into a linear form of the natural logarithm. The equation is formulated as follows (Coelli *et al*., in Darwanto, 2010).

$$Ln\ Y=b_0+b_1lnX_1+b_2lnX_2+b_3lnX_3+b_4lnX_4+V_i-U_i \qquad (7)$$

Where: b_0 is intercept; Y is the result of sweet corn production (kg); X_1 is the land area (ha); X_2 is the seed (kg); X_3 is the labor (HOK); X_4 is the fertilizer (kg); b_1 ... b_4 is the regression coefficient; V_i is the random error of model; U_i is the random variable that presenting the inefficiency technique of the i-th sample.

To know the influence significance of production factors on sweet corn production, t-ratio is consulted to t-table. If the t-ratio is greater than the t-table, it can be said that the production factors have a significant influence on production. If t-ratio is less than t-table, then, the influence of production factor is not significant.

With the help of *Frontier Software* 4.1c, the value of technical efficiency (TE) can be determined by two assessments, such as; (a) If the value of technical efficiency is equal to one (=1), then the use of production factors is technically efficient, and (b) If the value of the technical efficiency is less than one (<1), then the use of production factors is inefficient. Furthermore, to calculate the efficiency of price (PE), the formulation can be seen below.

$$\mathrm{PE} = (\mathrm{MPV1} + \mathrm{MPV2} + \mathrm{MPV3} + \mathrm{MPV4})/4 \qquad (8)$$

The condition of price efficiency requires MPV to be equal to the price of production factors. However, this condition is difficult to achieve. The condition can be seen as this following formulation.

$(b.Y.Py)/(X.Px) = 1$; efficient
$(b.Y.Py)/(X.Px) > 1$; the use of X production factor has not been efficient
$(b.Y.Py)/(X.Px) < 1$; the use of production factors is considered inefficient

After the technical efficiency (TE) and price efficiency (PE) is known, then, the economic efficiency can be obtained by formula (6) below.

$$EE = TE/PE$$

The economic efficiency indicator is described as follows: EE < 1 means inefficient so that the use of production factors should be reduced; EE = 1 means efficient so that the combination of the use of production factors is appropriate; EE > 1 means not efficient so that the use of production factors should be increased.

b_1, b_2, b_3, and b_4 on the Cobb-Douglas function show the elasticity of X to Y, and the amount of elasticity means a *return to scale.* If $b_1+b_2+b_3+b_4 = 1$, the production function will generate a state of constant return to scale. This means that the increase in the input will be followed by the increase in the proportion of sweet corn production. If $b_1+b_2+b_3+b_4 < 1$, the production function will show the state of decreasing return to scale which means that the increasing percentage of the production of sweet corn is smaller than the increasing percentage in the input. Lastly, if $b_1+b_2+b_3+b_4 > 1$, the production function will generate the state of increasing the return to scale. This means that the increasing percentage of sweet corn production (output) is greater than the increasing percentage of the input.

RESULTS AND DISCUSSION

The Effect of Production Factors on Sweet Corn Production. Sweet corn production is determined by several factors. In this analysis, the production factors which influence the production of sweet corn farming are; labor, land, and seed. To determine whether the factors significantly influence the production of sweet corn or not, the analysis of *Stochastic Frontier* production function is used. With the help of computer software of *Frontier 4.1c,* the results are summarized as presented in Table 2 below.

Table 2 – Estimation Results of *Stochastic Frontier* Function on Sweet Corn, 2017

Variables	Coefficient	Standard Error	t-ratio	Keputusan
Intercept	0,029	0,151	0,193	
Labor	0,025	0.052	0,047	n-Sig
Land area	0,311	0,104	3,001	Sig
Seed	0,689	0,088	7,847	Sig
Fertilizer	0,078	0,013	6,065	Sig
Sigma-squared	0,326	0,052		
Gamma	0,999	0,0004		
Log Likelihood	-10,921			
LR	11,567			
Mean Tech. Eff.	0,6579			

Note: t-Table (α = 1%) = 2,423; t-Table (α = 5%) = 2,021; t-Table (α = 10%) = 1,303.

Based on the estimation of stochastic frontier production function model, the meaning of each sweet corn production factors is described as follows. The value of labor variable is positive. However, the effect of labor on sweet corn production is not significant at all levels (α=1%, α=5%, and α=10%). This is because farmers prefer to recruit family members in the process of sweet corn production in Muara Wis, Kutai Kartanegara, East Kalimantan. The result of the research shows that the influence of labor is not significant to production. This is

in line with the findings of Darwanto (2010) and Dwijatenaya (2016). The coefficient of production factors of land area by 0,311 implies that the addition of land area by one percent *(ceteris paribus)* will be able to increase the production of sweet corn by 0,311 percent. By that, it can be said that the land area has the positive and significant effect on the production of sweet corn. The significant and positive effect shows that the land area will increase the production of sweet corn. These findings are in line with the research results of Gunes (2007); Khakim *et al*., (2013); and Haryono *et al.,* (2015).

The coefficient value of seed production factor by 0,689 implies that the addition of seeds by one percent *(ceteris paribus)* will be able to increase the production of sweet corn by 0,689 percent. The statistics show that the effect of seed on sweet corn production is positive and significant. The more the number of seeds used, the greater the production of sweet corn. The findings of this study are in line with the research findings of Darwanto (2010); Khakim *et al*., (2013); and Simorangkir *et al*., (2014). Moreover, fertilizer also has a positive and significant effect on sweet corn production in Muara Wis, Kutai Kartanegara. If the application of fertilizer is increased, it will increase the production of sweet corn. The coefficient value of fertilizer by 0,078 implies that the addition of fertilizer by one percent *(ceteris paribus)* will increase the production of sweet corn by 0,078 percent. The findings of this study are in line with the findings of Khakim *et al*., (2013); Haryono *et al.,* (2015); and Effendy and Antara (2015).

Technical Efficiency, Price Efficiency and Economic Efficiency. In order to gain profits, farmers must be able to use the production factors efficiently. However, the increased use of production factors not necessarily implies that the farm has been efficient. Based on the calculation of technical efficiency through the help of a computer program called *Frontier 4.1c,* the value of technical efficiency is 0,658. The value of technical efficiency by 0,658 means that the average productivity of sweet corn farming is 65,8 percent of the maximum production. If the value of technical efficiency is less than one (0.658 <1), this indicates that the use of production factors in this corn farming is not efficient. The results of this study support the findings of Suprapti *et al*., (2014) and Simorangkir *et al*., (2014).

The price efficiency describes a condition when the marginal product value (MPV) is equal to the price of production. Based on the calculation results as shown in Table 4, the sweet corn farming is still inefficient (10,247 > 1).

Table 3 – Summary of MPV Calculation on Sweet Corn Farming, 2017

Variable	b	Average Revenue and Cost (IDR)	MPV
Production		26,684,309,74	
Land area	0,311	300,000	27,663
Seed	0,689	3,699,245,94	4,970
Labor	0,025	3,522,331,79	0,189
Fertilizer	0,078	254,930,39	8,164
	Total		40.987
	Mean		10.247

Table 4 – The value of Technical Efficiency, Price Efficiency, Economic Efficiency and Results Scale, 2017

Variable	Coefficient	MPV	Efficiency
Land area	0,311	27,663	EH = 10,247
Seed	0,689	4,970	ET = 0,658
Labor	0,025	0,190	EE = 6,743
Fertilizer	0,078	8,164	
Total	1,103	40,987	

The production factors that have not been efficient in sweet corn farming consist of the use of land area, the use of seeds, and the use of fertilizers. Meanwhile, the inefficient production factor is only the use of labor. The use of production factors in Muara Wis, Kutai Kartanegara area can be expanded. This is because the average land area owned by farmers is 0,3 hectares while there's still spacious land in Muara Wis. However, farmers cannot increase the use of high-quality seed and balanced fertilizer because the region is

located in a rural area so that there are many obstacles to be faced. In correlation to labor, the inefficient use of labor happens because the majority of the workers are from the family itself so that they do not have to concern about the high cost of labor. The results show that sweet corn farming has not been effective as it is in line with the findings of Ismayani (2013); Suprapti *et al*., (2014) and Simorangkir *et al.*, (2014).

After technical efficiency (TE) and allocative efficiency or price efficiency (PE) are known, the economic efficiency can be calculated afterward. The concept of economic efficiency embodied the idea that the best of this is the most cost-effective (Miller and Meiners, 1994). Economic efficiency is the multiply result of technical efficiency and price efficiency of all input factors. According to Wadud in Suprapti *et al*., (2014), price efficiency and technical efficiency can provide an overview of relative success on farming through four ways: (1) technically and allocatively efficient farming, (2) technically efficient farming but allocatively inefficient, (3) technically inefficient farming but allocatively efficient, and (4) technically and allocatively inefficient farming. Based on the calculation, it is obtained that the value of economic efficiency is 6,73 (Table 3). The value of economic efficiency by 6,73 (EE=6,73) implies that the use of production factors in sweet corn farming is not efficient economically (6,73>1). This means that the addition of production factors is needed as for an instance by increasing the use of land area. These findings are in accordance with the research of Suprapti *et al*., (2014) and Simorangkir *et al*., (2014).

Return to Scale. Based on the calculations, the *return to scale* of sweet corn farming is amounted up to 1,103 as presented in Table 3. This shows that the sweet corn farming in Muara Wis, Kutai Kartanegara is in a condition of *increasing the return to scale.* This means if there is an addition of production factor by one percent, it will increase the production of sweet corn *(output)* up to 1,281 percent. It can be seen that the production *(output)* is more than one percent, meaning that the condition of sweet corn farming is good to be developed or continued. The results of this study are in line with the results of Darwanto (2010); Khakim *et al*., (2013); Rahadi and Aswitari (2015); and Dwijatenaya (2016).

CONCLUSION

The results of this study consist of the production factors (land area, seeds, and fertilizers) which have a significant and positive effect on the production of sweet corn. While on the other hand, the production factor of labor has a positive but not significant effect on sweet corn production. By that, technical efficiency, price efficiency, and economic efficiency of sweet corn farming in Muara Wis, Kutai Kartanegara are not efficient yet. It also noted that the return to scale of sweet corn production is not efficient yet. This shows that the return to scale of sweet corn farming in Muara Wis, Kutai Kartanegara is in a state of increasing return to scale.

REFERENCES

1. Badan Pusat Statistik Kabupaten Kutai Kartanegara. (2016). Kabupaten kutai kartanegara dalam angka 2016. Tenggarong: Badan Pusat Statistik Kabupaten Kutai Kartanegara.
2. Danilwan, Yuris. (2010). Analisis Industri Rotan Jawa Barat dengan Model Constan Elasticity of Substitution (CES). Trikonomika, 9(2), hal 113-123.
3. Darwanto. (2010). Analisis Efisiensi Usahatani Padi Di Jawa Tengah (Penerapan Analisis Frontier). Jurnal Organisasi dan Manajemen, 6 (1), hal 46-57.
4. Dewi, I Gusti Ayu Chintya, I Ketut Suamba, dan I G.A.A. Ambarawati. (2012). Analisis Efisiensi Usahatani Padi Sawah (Studi Kasus di Subak Pacung Babakan Kecamatan Mengwi Kabupaten Badung. E-Journal Agribisnis dan Agrowisata, 1(1).
5. Doll, John P. Dan Frank Orazem. (1984). Production economics theory with application. Second Edition. United State of America: John Wiley & Sons.Inc.

6. Dwijatenaya, Ida Bagus Made Agung. (2016). Analisis Usahatani Jelai (Coix lacryma-Jobi l.) Sebagai Sumber Pangan Alternatif di Kabupaten Kutai Kartanegara. Kalimantan timur. Jurnal Gerbang Etam,10(2), hal 46-53.
7. Eftendy dan Made Antara. (2015). Effect of Input Production Against Quality of Cocoa Beans. American Journal of Aplied Sciences, 12(10). hal 709.713.
8. Gujarati, Damodar N. (1992). Dasar-dasar ekonometrika. Jilid 1. Terjemahan oleh Julius A. Mulyadi. 2007. Jakarta: Penerbit Erlangga.
9. Gunes, Erdogan. (2007). The Econometric Analysis of Tomato Production with Contracting in Turkey. Journal of Applied Science, 7(14): pp 1981-1984.
10. Haryono, Syukur Umar, DESS dan Erniwati. (2015). Analisis Produksi dan Pendapatan Pada Izin Usaha Industri Primer Hasil Hutan Kayu (IUIPHHK) Di Kota Palu Studi Kasus Pada PT. Tatehe Nusa Jaya. E-Jurnal Mitra Sains, 3(2), hal 72-80.
11. Ismayani. (2013). Efisiensi Penggunaan Faktor Produksi Usahatani Kunyit di Kecamatan Lampanah Lengah Kabupaten Aceh Besar. Agrisep, 14(2).
12. Khakim, Ludfil, Dewi Astuti, dan Aniya Widiyani. (2013). Pengaruh Luas Lahan, Tenaga Kerja, Penggunaan Benih, Dan Pupuk Terhadap Produksi Padi Di Jawa Tengah. Mediagro, 9 (1), hal 71-79.
13. Miller, Roger Leroy dan Roger E. Meiners. (1986). Teori ekonomi mikro intermediate. Terjemahan oleh Haris Munandar. (1994). Jakarta: PT. RajaGrafindo Persada.
14. Nicholson, Walter. (2000). Mikroekonomi intermediate dan aplikasinya. Edisi Ke Delapan. Terjemahan oleh IGN Bayu Mahendra dan Abdul Azis. (2002). Jakarta: Erlangga.
15. Rahadi, I Gusti Agung Bagus Indra dan Luh Putu Aswitari. (2015). Analisis Skala Ekonomi Pada Industri Kerajinan Tas Kulit di Kota denpasar. E-Jurnal EP Unud, 4(12).
16. Risandewi, Tri. (2013). Analisis Efisiensi Produksi Kopi Robusta di Kabupeten Temanggung (Studi Kasus di Kecamatan Candiroto). Jurnal Litbang Provinsi Jawa Tengah, 11(88).
17. Samuelson, Paul A. dan William D. Nordhaus. (2001). Ilmu mikroekonomi. Edisi tujuh belas. Terjemahan oleh Nur Rosyidah, Anna Elly dan Bosco Carvallo, (2003). Jakarta: PT. Media Global Edukasi.
18. Sarinah. (2010). Efisiensi Penggunaan Faktor Produksi Pada Usahatani Padi Sawah di Kabupaten Konawe. Warta-Wiptek, 18(02).
19. Simorangkir, Ronald, Max Nur Alam dan Abdul Muis. (2015). Analisis Efisiensi Penggunaan Input Produksi Usahatani Jagung Manis di Desa Maku Kecamatan Dolo Kabupaten Sigi. J. Agroland, 21(1), hal 37-44.
20. Soekartawi. (2001). Agribisnis teori dan aplikasinya. Jakarta: PT RajaGrafindo Persada.
21. Sugiyono. (2012). Metode penelitian kombinasi (mixed methods). Bandung: Alfabeta, CV.
22. Sukiyono. (2004). Analisa Fungsi Produksi dan Efisiensi Teknik: Aplikasi Fungsi Produkso Frontier Pada Usahatani Cabe Di Kecamatan Selepu Rejang, Kabupaten Rejang Lebong. Jurnal Ilmu Ilmu Pertanian Indonesia, 6(2), hal 104-110.
23. Suprapti, Isdiana, Dwidjono Hadi Darwanto, Jangkung Handoyo Mulyo, dan Lestari Rahayu Waluyati. (2014). Efisiensi Produksi Petani Jagung Madura Dalam Mempertahankan Keberadaan Jagung Lokal. Agriekonomika, 3(1).

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.38

РЕАЛИЗАЦИЯ АДАПТИВНОЙ ЗАЩИТЫ РАСТЕНИЙ ОТ ВРЕДНЫХ ОРГАНИЗМОВ В УСЛОВИЯХ САНАТОРНО-КУРОТНОЙ ЗОНЫ

IMPLEMINTATION OF ADAPTIVE PLANT PROTECTION FROM PESTS IN THE CONDITIONS OF SANATORIUM-RESORT ZONE

Филипчук О.Д.*, **Глинушкин А.П.**, научные сотрудники
Filipchuk O.D., Glinushkin A.P., Researchers
Всероссийский научно-исследовательский институт фитопатологии, Московская область, Россия
All Russian Research Institute of Phytopathology, Moscow Region, Russia
*E-mail: o.d.fil@yandex.ru

АННОТАЦИЯ

Современная санитарно-курортная зона характеризуется многообразием декоративных растений парков, скверов, газонов, клумб и цветников. Адаптивная защита декоративных растений от вредных организмов в условиях санаторно-курортной зоны построена на интеграции карантинного, профилактического, агротехнического и биологического методов. Комплекс защитных мероприятий позволяет сдерживать распространение вредных видов, безопасен для природной среды, обеспечивает повышенную обильность и продолжительностью цветения декоративных культур.

ABSTRACT

The modern sanatorium zone is characterized by a variety of decorative plants of parks, squares, lawns, flower beds and flower beds. Adaptive protection of ornamental plants from harmful organisms in the conditions of the sanatorium-resort zone is based on the integration of quarantine, preventive, agrotechnical and biological methods. The complex of protective measures allows restraining the spread of harmful species, is safe for the natural environment, and provides increased abundance and duration of flowering of ornamental crops.

КЛЮЧЕВЫЕ СЛОВА

Адаптивная защита растений, оздоровительный комплекс, карантин, биологический метод.

KEY WORDS

Adaptive plant protection, health complex, quarantine, biological method.

Селитебные территории и рекреационные комплексы характеризуются многообразием декоративных насаждений парков, скверов, газонов, клумб и цветников. Растения оздоровительного комплекса (ОК) выполняют важные функции: эстетическую – обостряют зрение, слух, осязание, обоняние, вкус; пробуждают положительные эмоции, снимают стресс; и санитарную – поглощают пыль, освежают воздух, снижают уровень шума. Доминантой ландшафта ОК являются древесные растения, вокруг которых группируются кустарники, многолетние и однолетние цветочно-декоративные культуры.

В естественных экосистемах фитоценозы формируются в прямой зависимости от конкретных почвенно-климатических условий. В искусственных системах они нуждаются в специальных мерах по поддержанию их устойчивости и продуктивности. Ландшафт ОК формируется с учётом следующих экологических принципов: адаптивности (адекватности) растений среде произрастания; дифференциации (учёта) факторов влияния; экологической обусловленности растений; комплексной адаптивной защиты растений [1].

Особое значение в условиях санаторно-курортной зоны приобретает комплекс защитных мероприятий. Химический метод имеет объективные ограничения, и должен применяться только при выращивании посадочного материала в питомниках и оранжереях, расположенных вдали от территории ОК. Поэтому в санаторно-курортной зоне важно создать и реализовать эффективную, но безопасную систему защиты декоративных растений от вредных организмов.

Разработка и внедрение системы защитных мероприятий проводились в течение 11 лет совместно с комплексом работ по благоустройству и озеленению объектов на территории Федерального Государственного Унитарного предприятия «Оздоровительный комплекс "Дагомыс"» (г. Сочи, 2002-2012 гг.). Реконструкция охватывала природный ландшафт, площадью 22 га (из них газоны – 16 га), пляжную зону (1,8 км), архитектурный ансамбль из 20 объектов. Система защитных мероприятий в ОК строилась на интеграции основных методов: карантинного, профилактического, агротехнического и биологического [2].

Химический метод защиты растений применялся только при выращивании посадочного материала в защищённом грунте, расположенном за пределами ОК "Дагомыс" (п. Молдовка (г. Сочи) и г. Краснодар). При этом использовали химические препараты разных классов, разрешённые к применению на территории РФ против гнилей рассады (фузариоз (*Fusarium spp.*), фитофтороз *(Phytophthora spp.)*, ризоктониоз *(Rhizoctonia solani* Khn.)), слизней (*Deroceras spp.*) и сосущих вредителей: тли (*Aphididae*), трипсы (*Thripidae*), мучнистые червецы (*Pseudococcidae*), щитовки (*Diaspididae*), белокрылки (*Aleyrodidae*), цикадки *(Cicadellidae*).

Карантинный метод защиты декоративных насаждений на территории ОК "Дагомыс" основан на обязательном соблюдении распоряжений и указаний карантинной службы. Кроме того, в ОК был организован свой постоянный внутренний карантин, включающий выявление, ограничение и ликвидацию очагов размножения вредных видов, уже проникших на территорию здравницы.

Профилактический метод защиты растений в условиях ОК включал в себя использование здорового посадочного материала, выращивание видов и сортов декоративных растений, устойчивых к воздействию неблагоприятных факторов (в особенности к вредным организмам); своевременное проведение всех уходных работ (прополки, поливы, притенение, обрезки, косьба и др.). Это позволило создавать условия, при которых растения отличались повышенной декоративностью и устойчивостью к болезням и вредителям.

В "ОК Дагомыс" газоны размешаются на площади около 16 га. Причём, они представляют собой природный фитоценоз, включающий эндемики: виды овсяницы (*Festuca spp.*) и ползучий (белый) клевер (*Trifolium repens* L.). Автоматизированный полив газонов организовать было невозможно, ввиду сложной конфигурации участка (крутизна склонов, рассечённый рельеф местности, размещение объектов) и низкого дебета воды в скважинах. Поэтому своевременная стрижка газонов стала оптимальным способом поддержания их естественного травостоя и одним из способов уничтожения сорной и нежелательной растительности. Карантинные и злостные виды сорняков уничтожали вручную, до скашивания.

Подбор растений для ОК является основным как в фитодизайне, так и в системе защитных мероприятий. При реконструкции ОК "Дагомыс" на территории были сохранены все хвойные растения: секвойи *Sequoia* sp., ели *Picea* sp., сосны *Pinus* sp., кипарисы *Cupressus* sp., можжевельники *Juniperus* sp., кедры *Cedrus* sp., туи *Thuja* sp. и др. Среди лиственных деревьев и кустарников была произведена следующая замена: боярышника *Crataegus* sp.– на берёзы *Betula* sp., калины *Viburnum* sp.– на рябину *Sorbus* sp., сирени *Syringa* sp.– на витекс священный *Vitex agnus-castus* L., чубушников *Philadelphus* sp.– на спиреи *Spirea* sp., акации ленкоранской *Albizia julibrissin* Durazz. – на барбарисы *Berberis* sp. Кроме того были высажены такие ценные лекарственные культуры как хеномелес *Chaenomeles Lindl* и гинкго двулопасный *Ginkgo biloba* L. Реконструкция древесных насаждений должна была обеспечить не только

эстетическую и санитарную функции ОК, но и внедрить новые источники для получения ценного лекарственного сырья [3-5].

Организация культурных ландшафтов подчиняется определённым правилам и нормам. Выбор и замена культур должны осуществляться по требованиям к условиям произрастания (тип почвы, количество влаги, уровень освещённости и температуры), по их влиянию на человека (аллергенность пыльцы, фитонцидность) и по устойчивости к вредным организмам. Размещение растений на территории ОК проводится с обязательным учётом: розы ветров; загазованности местности; биологических и морфологических особенностей растений; взаимоотношений между ними (симбиоз, комменсализм, аллелопатия и др.); расположения подземных и надземных коммуникаций комплекса; близости моря, водоёмов, бассейнов и населённых пунктов. И наконец, виды растений, подобранные для озеленения ОК не должны нарушать отношения, сложившиеся между другими компонентами фитоценоза [6, 7].

При формировании цветочной клумбы основная задача это обеспечить её постоянное цветение. Также имеет значение фактура, высота, габитус растений, их цвет. Из декоративных растений предпочтение отдавали лекарственным растениям. Из них подбирали летники, двулетники и многолетники с разными сроками цветения, но с одинаковыми требованиями к условиям произрастания (кислотность и влажность почвы, освещенность, температура). Например: на солнечной клумбе в мае-июне зацветали ирисы (*Iris* L.) и гвоздика турецкая (*Dianthus barbatus* L.), в июне-июле – кореопсисы (*Coreopsis* L.) и розы (*Rosa* L.), а в августе-сентябре – гибискус (*Hibiscus* L.). [8].

При озеленении теневого участка ОК также использовали растения с одинаковыми требованиями к условиям среды: седум едкий (*Sedum acre* L.), как почвопокровную культуру, можжевельники (*Juniperus* L.) и герань *(Geranium* L.) как основу композиции, фикус карликовый (ползучий) (*Ficus pumila* L.), как "живую изгородь", лаванду (*Lavandula* L.) и львиный зев (*Antirrhinum* L.) для заполнения вазонов. Все эти декоративные растения не только оказались оптимально совместимы, но и положительно влияли друг на друга, что обеспечило их активный рост и развитие. Уходные работы за таким участком не требовали особых усилий.

Агротехнический метод является вторым по значимости для защиты растений здравницы. Правильно построенный комплекс агромероприятий предотвращает массовое размножение вредных видов и уменьшает их вредоносность. Он включал в себя уничтожение сорной и нежелательной растительности; сбор и уничтожение имаго вредителей, паутинных гнезд, кладок яиц; вырезку пораженных побегов и растений (источников инфекционных заболеваний); постройку механических преград (заградительных канавок), развешивание ловчих поясов для вредителей; корчёвку пней; удаление плодовых тел грибов-трутовиков; лечение ран и пломбирование дупел. Рыхление и мульчирование почвы, поливы, отвод излишней влаги, подрезка и стрижка древесных насаждений – способствовали выращиванию здоровых, сильных растений, восстановлению их нормальных функций и устранению дефектов роста.

Обеспечение растений элементами питания в соответствии с их потребностями, ускоряет рост и развитие растений, что приводит к расхождению во времени чувствительных фаз растений и периода наибольшей активности вредителей. Система питания растений в ОК "Дагомыс" состояла из двух этапов: подбора (или формирования) почвогрунта для растения или группы растений, и разработки схемы питания растений, состоящей из основного удобрения и подкормок с макро и микроэлементами.

Почвогрунт подбирали в зависимости от потребностей растений, их количества и продолжительности активной вегетации. Он должен обладать: высокой влагоёмкостью, нейтральной реакцией среды (или близкой к ней), оптимальной обеспеченностью питательными элементами, доступными формами макро- и микроэлементов и не содержать токсичных примесей. Несмотря на огромное количество почвогрунтов, сложно подобрать подходящий субстрат. Для цветочно-декоративных и овощных

культур была разработана и запатентована рецептура почвогрунта из табачной пыли [9, 10].

Для каждого типа растений (деревья, кустарники, полукустарники и др.), в ОК разработана своя индивидуальная система питания. Лиственные деревья и кустарники обеспечивали основным комплексным питанием при пересадке, а затем – дополнительным: весной, при набухании почек и во время цветения. Если они расположены на газонах, которые удобрялись 2-4 раза за сезон, то дополнительных подкормок не проводили. Учитывали, что хвойные растения не нуждаются в обильных и частых подкормках, т.к. способны самостоятельно обеспечить себя питанием. Особую осторожность соблюдали при подкормке карликовых сортов. От избыточного питания, или слишком плодородной почвы они быстро теряют характерную форму.

После скашивания газонов вносили раскислённый торф с семенами трав. Цветочные клумбы удобряли 2 раза за сезон, используя в основном хелатные формы удобрений, которые слабо вымываются. В условиях ОК "Дагомыс" встречается несколько типов почв (бурые и серые лесные, желтозёмы, краснозёмы), поэтому для повышения эффективности удобрений 1 раз в 2 года почвы подвергали раскислению.

Для сохранения влаги при выращивании декоративных культур в ОК "Дагомыс" использовали несколько приёмов. Это применение почвопокровной культуры, мульчирование почвы, выкладывание клумбы камнями, замена широколистных растений узколистными и суккулентами. Мульчирование почвы выполняли различными материалами: каменной крошкой, скорлупой орехов, корой, и даже скошенной травой. Наилучший эффект достигается при совместном применении камней и мульчирования почвы корой.

Кроме того, почвопокровная культура является эффективным способом борьбы с сорной растительностью. При использовании для озеленения вербейника монетолистного (*Lysimachia nummularia* L.) сорнякам сложно конкурировать с ним. Причём это растение одинаково хорошо растёт и на солнечных клумбах, и на теневых участках и даёт ценное лекарственное сырьё [8].

Биологический метод защиты растений имеет некоторую специфику в условиях ОК. Классический биометод, основанный на использовании естественных врагов вредных видов, имеет объективные ограничения по применению в разгар курортного сезона. На территории ОК проблематично проводить обработки микробиологическими препаратами, а также заниматься колонизацией и выпуском энтомофагов. Поэтому основными стали мероприятия по привлечению и сохранению хищных насекомых и птиц, которые контролируют численность тлей, трипсов, щитовок и гусениц чешуекрылых *(Lepidoptera)* вредителей.

Одним из наиболее приемлемых способов защиты декоративных растений является привлечение энтомофагов: галлиц (*Cecidomyiidae*), браконид (*Braconidae*) афидиид (*Aphidiidae*) и др. Для этого на клумбах, цветниках и газонах высаживают растения-нектароносы. В качестве таких нектароносов в ОК "Дагомыс" выращивали многолетние луки (*Allium* L.), лаванду (*Lavandula* L.), клевер (*Trifolium* L.), котовник (*Nepeta cataria* L.), душицу (*Origanum vulgare* L.) и др. Газон, сформированный из злаковых трав (сем. *Poaceae*) и белого клевера, обладает репеллентым эффектом для клещей (*Acariformes*). Устройство искусственных гнёзд, домиков для птиц, сохранение муравейников, особенно с лесными муравьями (*Formicidae*), также способствует снижению численности вредных видов. Птицы активно уничтожают различных гусениц, а лесные муравьи – мучнистых червецов.

Другим эффективным способом биологической защиты декоративных культур от сосущих вредителей является локальное применение настоев из пряно-ароматичных растений, таких как: горчица (*Sinapis* L.), перец (*Piper* L.), полынь (*Artemisia* L.), сосна (*Pinus* L.), тысячелистник (*Achillea* L.), лук, чеснок (*Allium* L.) лаванда (*Lavandula* L.), табак *(Nicotiana tabacum* L.), и др. При этом возможно достичь желаемого защитного эффекта от обработки и не привлекать внимания отдыхающих, поскольку специфический запах растительного настоя держится непродолжительное время.

Адаптивная защита декоративных растений от вредных организмов в условиях санаторно-курортной зоны включает 4 беспестицидных метода: карантинный, профилактический, агротехнический и биологический. Комплекс методов позволяет успешно сдерживать развитие и распространение вредных организмов, и безопасен для природной среды. Защитные мероприятия обеспечивают обильность, и продолжительность цветения декоративных культур, что создаёт дополнительный комфорт для людей, отдыхающих в оздоровительном комплексе.

ФИНАНСИРОВАНИЕ

Исследование выполнено в рамках выполнения Государственного задания ФАНО России на выполнение НИР № 0598-2015-0011 «Разработка экологичных методов контроля вредных организмов лекарственных растений (ЛР)» в 2017 г. в целях анализа современного состояния проблемы биоиндикации загрязнения агроценозов экотоксикантами.

БИБЛИОГРАФИЯ

1. Филипчук О.Д., Тонконог М.Д. Формирование ландшафта оздоровительного комплекса на основе экологических принципов землепользования // Биологическая защита растений – основа стабилизации агроэкосистем. Краснодар, 16-18 сентября 2014 г. – Краснодар, 2014. – С.493-495.
2. Филипчук О.Д. Альтернативные методы защиты цветочно-декоративных культур от вредных организмов. // Агротехнический метод защиты растений от вредных организмов. КубГАУ. 15-19 июня 2015 г.– Краснодар, 2015. – С.293-296.
3. Филипчук О.Д., Тонконог М.Д. Защита древесных растений от вредных организмов на территории крупного оздоровительного комплекса // "Мониторинг и биологические методы контроля вредителей и патогенов древесных растений: от теории к практике" Материалы всероссийской конференции с международным участием (Москва, 18-22 апреля 2016 г.) – Красноярск "Город", 2016. – С. 236-237.
4. Чукуриди С.С., Филипчук О.Д. Плоды хеномелеса *Chaenomeles Lindl. (Rosaceae)* – ценное пищевое и лекарственное сырьё // "Лекарственные растения Ботанического сада" / Научно-практическая конференция. Москва, 21-22 сентября 2016 г.) // М.: Издательство Первого Московского государственного медицинского университета имени И.М. Сеченова, 2016. – С.156-158.
5. Чукуриди С.С., Филипчук О.Д. Биологические особенности и лечебные свойства гинкго двулопасного (*Ginkgo biloba*) // Лекарственные растения: Фундаментальные и прикладные проблемы. Мат. II Междунар. науч. конф., Новосибирский ГАУ. 20-22 октября 2015 г.– Новосибирск, 2015. – С. 218-221.
6. Соколова Т.А. Декоративное растениеводство: цветоводство / Т.А. Соколова, И.Ю. Бочкова. – М.: Академия. - 2014. – 432 с.
7. Городков А.В. Архитектура, проектирование и организация культурных ландшафтов. СПб.: "Проспект науки". - 2013. - 416 с.
8. Филипчук О.Д., Тонконог М.Д. Роль лекарственных растений в формировании ландшафта крупного оздоровительного комплекса. // Лекарственные растения: Фундаментальные и прикладные проблемы. Мат. II Междунар. науч. конф., Новосибирский ГАУ. 20-22 октября 2015 г.– Новосибирск, 2015. – С.203-205.
9. Филипчук О.Д., Тонконог М.Д. Способ получения биоорганического удобрения: Патент РФ на изобретение № 2520730, 2014 г.
10. Филипчук О.Д., Тонконог М.Д. Эффективность органического удобрения из отходов табачной промышленности // Агро XXI – 2014. – № 7-9. – С.30-31.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.39

THE EFFICIENCY OF USE OF INNOVATIVE TECHNOLOGIES FOR GRINDING THE GRAIN CROPS

Alekseev G.V., Doctor of Technical Sciences
Saint Petersburg State National Research University of Information Technologies, Mechanics and Optics, Saint Petersburg, Russia

Romanchikov S.A., Candidate of Technical Sciences
Military Academy of Logistics, Saint Petersburg, Russia

Leu A.G., Magister
Saint Petersburg State National Research University of Information Technologies, Mechanics and Optics, Saint Petersburg, Russia

Derkanosova A.A.*, Candidate of Technical Sciences
Voronezh State University of Engineering Technologies, Voronezh, Russia

*E-mail: aa-derk@yandex.ru

ABSTRACT
The experience of advanced industries shows that at the current stage of the development of technologies, the effectiveness of investments in improving funds based on innovative developments is higher than investment in the new equipment. The high rates of obtaining new knowledges about the processes make it possible to ensure a high level of improvements and, thereby, to make the potentialities of innovative technical solutions more fully use. At the same time, the main sources of economic efficiency of innovation-based technological processes are: reducing the costs of energy resources, the cost of production and the loss of raw materials. The modern domestic flour milling industry belongs to the number of socially important branches of the national economy, since the products produced from flour are vital for all categories of the population. Because the flour production is resource intensive, and the quality and the cost of grain and products play a decisive role in its competitiveness, the introduction of innovative technologies in the production processes is becoming one of the main sources of growing the efficiency of a flour mill as a whole.

KEY WORDS
Efficiency, grinding, parameters, construction, working camera, simulation.

Among the main problems of grinding and mixing of dispersed environments with the participation of the solid phase depending on the settled goals, during the processing of the grain crops, the following are included: creation of food products with new properties; giving new flavors to the known products; giving an attractive look, the desired color scheme; increasing the shelf life of food products.

Solving these problems, the main problem of grinding and mixing is to obtain the maximum amount of the mixture in the shortest possible time with minimal costs of energy. In this connection, it is advisable to introduce the efficiency parameter as the ratio of the usefully achieved technological result of grinding (ΔS) to the total energy costs achieved per unit of working bulk of the working space:

$$Э = \frac{\Delta S}{V_A \cdot N} \quad (1)$$

After some transformations, we can reduce this relationship the form:

$$Э = \frac{\Delta S \cdot П_{PS}}{V_A \cdot N} \quad (2)$$

Approximation of the dependence of the parameter of the energy efficiency *Э* on the productivity of the mill or crusher on the finished product $V_м$ is carried out using Excel spreadsheets. The dependence is approximated by a power function of the form:

$$Э = nV_м^{-1} \quad (3)$$

Where: n - numerical coefficient (varies from 1200, for the upper limit of points to 1 - the lower limit).

The volumetric capacity of the mill or crusher for the finished product is in the numerator, so it is logical to expect the direct proportionality of *Э* and $V_м$, but the effect of the remaining parameters, in turn, is a function of productivity, leads to an inversely proportional relationship.

The analysis carried out with the help of the proposed parameter shows that among the most effective shredders are jet shredders, especially for high productivity.

Let's consider the realization of the jet milling process with the help of an aggregate in the simplest case, which contains drainage cylindrical branch pipes, crimping segments with some holes combined with the holes of the cylindrical branch pipes, and elastic gaskets having holes combined with the holes of the crimp segments. They are made with the possibility of joint movement along the external surface of the body of the working chamber at the outlet holes points, simultaneously up or down from the horizontal axis of the chamber shown on Figure 1.

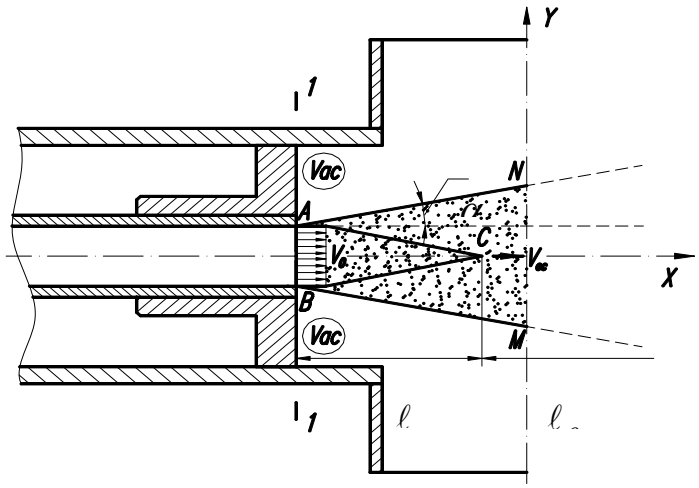


Figure 1 – Distribution of grain in the chamber of the jet shredder

When the drainage cylindrical branch pipes, crimping segments and elastic gaskets are moved together, simultaneously up or down from the horizontal axis of the chamber, the angle of rotation φ formed by the axis of the working chamber and the axis of the branch cylinder pipe changes the angle of withdrawal of the finished product from the grinding zone $\alpha_п$ - formed by the vertical axis working chamber and the axis of the drainage cylindrical branch pipe.

Let the gas carrier obeys the laws of motion of a submerged jet and has a drop-like form. This assumption is completely correct, since the jet coming out of the accelerating tube does not immediately fill the entire cross section of the working chamber.

It breaks away from the walls and then moves in the form of a free jet separated from the rest of the environment by the interface. The interface is usually unstable; vortices appear on it and as a result the jet mixed with the surrounding environment. When the flow of a jet out of the accelerating tube, in its output section 1-1, v_0 is equal to each other at all points of the section. Over the length of the initial section, the axial velocity is constant in magnitude and equal to the velocity at the incision of the accelerating tube v_0.

In the area of an isosceles pressure triangle, the base of which coincides with the plane of the incision of the accelerating tube at all points of the jet, the velocities of the gas carrier are equal to each other and are also equal to v_0 - this area forms the so-called core of the jet.

In the annular space between the jet and the walls of the working chamber, the environment is in a vortex motion. It is gradually drawn into the central jet from this zone, and on the other hand, the environment from the central jet enters the vortex zone. The energy of the energy carrier dissipates, owing to its detachment from the accelerating tubes, while the energy along the axis is dissipated at a greater length than at the periphery.

In the connection with the small distance from the incision of the accelerating tubes to the plane of impact of the flying jets, causes the area of the jet with a rectilinear generator, for which, according to AA. Goleevsky, the coefficient of energy dissipation of a flooded jet is equal to $\varphi = 0 \div 0,67$.

As the motion along the axis of the jet is blurred, and half of the angle of expansion can be determined by the term:

$$tg\alpha' \approx k \cdot \left(1 + \psi \cdot \frac{V_1}{V_0} \right) \cdot tg\alpha \qquad (4)$$

Where:

- V_0 – the speed of the energy carrier at the incision of the accelerating tube, m/s;
- V_1 – the velocity of entrained environment, m/s;
- k – coefficient of the shape of the accelerating tube;
- ψ – coefficient that depends on the velocity of the entrained environment;
- $tg\alpha = 0,222$ – for an axisymmetric jet.

Let's take into account that the initial sections of the jet are unchanged in the length and the angle of expansion. In this case, the length of the initial segment can be calculated by the formula proposed by G.N. Abramovich [3]:

$$\ell_н = 0,335 \cdot \frac{d_{mp}}{a} \qquad (5)$$

Where: d_{mp} – diameter of the accelerating tube, m; a – turbulence coefficient, $a=0.07 \div 0.08$.

In this case the length of the flooded jet can be determined:

$$\ell = \frac{\varphi}{1-\varphi} \cdot \frac{d_{mp}}{2 \cdot tg\alpha'} \qquad (6)$$

If we assume that the stable part of the jet develops independently of the degree of constraint and the content of the solid phase in it, then the expressions described above describing single-phase jets can also be used to calculate two-phase jets.

Getting into the jet of energy carrier during the process of injecting, solid particles are accelerated by the flow. Moving in the stream over the accelerating tube corpuscles of the

material to be minced acquire at the entrance to the working chamber a velocity *U*, which is lower than the velocity of the energy carrier V_0. After leaving the accelerating tubes, when the jet passes into the working chamber, due to the loss of the stability, the velocity of the carrier gas falling.

In this case, the solid phase is released from the jet, and the material corpuscles due to their inertia retain the velocity *U*. Thus, after some distance from the incision of the accelerating tube, a moment comes when the velocity of the corpuscles *U* becomes equal to, and then also of the higher velocity of the energy carrier V_0, the energy from the solid phase begins to shift to the gas phase, which leads to the deceleration of the corpuscles.

To prevent undesirable for the grinding efficiency of the corpuscles of the ground material, the distance between the cut of the accelerating tube and the middle plane in the working chamber is selected for reasons of maintaining the maximum velocity of the material corpuscles.

Some known methods for calculating countercurrent jet devices [2], the distance between the incision of the accelerating tube and the middle plane it is recommended to be chosen equal to half the length of the potential jet nucleus:

$$\ell_{cmp} = 2{,}22 \cdot d_{mp} \qquad (7)$$

As this distance increases, the area of encounter of potential jet nuclei and the efficiency of grinding decrease. With a decrease of in the counter pressure on the sections of the accelerating tubes of the ejectors increases, this also worsens the grinding characteristics of the machine.

In the framework of the study experiments of studying the influence of the distance between the cut of the accelerating tube and the middle plane in the working chamber on the counter pressure at the exiting section of the accelerating tubes were conducted.

The studies were carried out directly in the laboratory installation with the absolute air pressure changing before the ejector $P_{вх}$=0,4÷0,6 MPa, which corresponds to the working conditions of the jet mill equipped with a working chamber with an adjustable angle of the finished product withdrawal from the grinding zone.

A measurement of the static pressure at the exit from the accelerating tube, according to which the influence on the back pressure was evaluated, was taken from the liquid U-shaped manometer. The results of the experiment are presented in the form of a table.

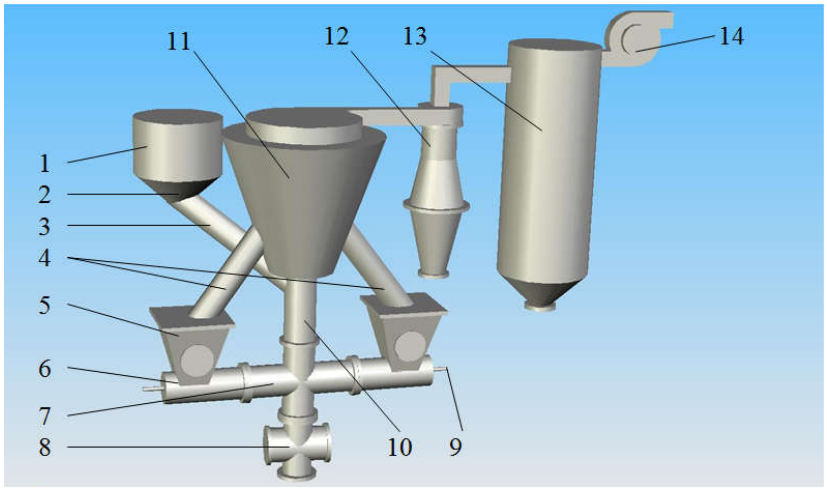


Figure 2 – Schematic diagram of the jet disperser: 1 – bunker for grain; 2 – the feeder; 3 – a pipe of giving of a material in a disperser; 4 – return tubes; 5 – material receiver; 6 – grinding ejector; 7 – grinding chamber; 8 – source of electromagnetic field; 9 – the main power line; 10 – dust pipe nozzle; 11 – separator; 12 – cyclone; 13 – bag filters;14 – exhaust fan.

Table 1 – The dependence of the pressure at the exit from the accelerating tube on the distance between the cut of the accelerating tube and the plane of symmetry of the working chamber

Variable Y_i	The distance between the incision of the accelerating tube and the plane of symmetry in the working chamber ℓ_{cmp}						
	$0,5 \cdot d_{mp}$	d_{mp}	$1,5 \cdot d_{mp}$	$2 \cdot d_{mp}$	$2,5 \cdot d_{mp}$	$3 \cdot d_{mp}$	$3,5 \cdot d_{mp}$
0,4	686,5	-343,2	-196,1	-137,3	-68,6	-68,6	-68,6
0,5	–	1176,8	-343,2	-245,2	-127,5	-78,5	-78,5
0,6	–	–	1569,1	-735,5	-441,3	-147,1	-117,7

During the analysis of the data from Table 1, it is necessary, first of all, to pay attention to the tendency of its change, depending on the reduction in the distance between the cut of the accelerating tube and the middle plane, but not on the absolute values of the static pressure. Statistical processing of data using the Mathcad software package is shown in Figure 4.

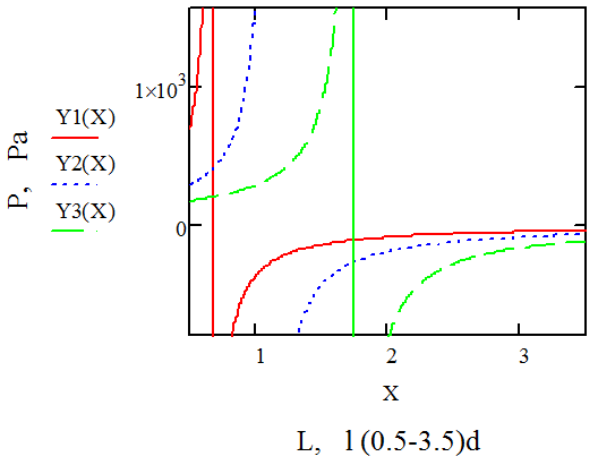


Figure 3 – Static pressure at the exit of the accelerating tube

Based on the analysis of the test results, it can be concluded that the distance between the cut of the accelerating tube and the middle plane in the grinding chamber does influence on the effective operation of the ejectors. It has been experimentally established that for a camera with variable parameters with minimum energy expenditure it is expedient to choose it from the condition:

$$\ell_{cmp} = 1,5 \div 2 \cdot d_{mp} \quad (8)$$

REFERENCES

1. Gerasimenko V.B., Kucherova E.A., Dudukalo A.YU. Pomol syr'ya i dobavok dlya proizvodstva elektroizolyacionnoj keramiki. V sbornike: Energosberegayushchie tekhnologicheskie kompleksy i oborudovanie dlya proizvodstva stroitel'nyh materialov Mezhvuzovskij sbornik statej. Pod red. V.S. Bogdanova. Belgorod, 2014. S. 117-121.
2. Semikopenko I.A., YArcev D.I. Napravlenie razvitiya strujnyh izmel'chitelej. V sbornike: Energosberegayushchie tekhnologicheskie kompleksy i oborudovanie dlya proizvodstva stroitel'nyh materialov Mezhvuzovskij sbornik statej. Belgorod, 2014. S. 122-125.
3. Patent RF na poleznuyu model' №170192. Strujnyj dispergator pishchevyh dobavok / Alekseev G.V., Pal'chikov A.N., Karpachev D.V., Zolotareva A.A.; Universitet ITMO; №2016144539; №11.
4. Karpachyov, D.V., Galicyn, A.E. Kulyakina, O.V. Strujnyj dispergator dlya tonkogo izmel'cheniya yaichnoj skorlupy [Elektronnyj resurs] / D.V. Karpachyov, A.E. Galicyn,

O.V. Kulyakina // Naukoemkie tekhnologii i innovacii: Mezhdunar. nauch.-prakt. konf. - Belgorod, 2016. Vol. 4. - S. 73-77.
5. Alekseev, G.V., Aksenova, O.I., Karpachev, D.V. Osobennosti podgotovki kal'cijsoderzhashchih pishchevyh dobavok dlya ispol'zovaniya // Vzaimodejstvie nauki i obshchestva: problemy i perspektivy: Sb. st. Mezhdunar. nauch.-prakt. konf. – Ufa: 2015. – S. 28-30.
6. Tutel'yan V.A., Pogozheva A.V.. Rol' pishchevyh volokon v pitanii cheloveka.Rol' pishchevyh volokon v pitanii cheloveka/Pod red. V.G. Vysockogo. – M.: Novoe tysyacheletie, 2008. – 320 s.
7. Makkans R., Uiddouson E.H. Himicheskij sostav i energeticheskaya cennost' pishchevyh produktov. M.: 2006 .420 s.
8. Volkov K., Emel'yanov V., Zazimko V. Turbulentnye strui - statisticheskie modeli i modelirovanie krupnyh vihrej. SPb, 2013, 360 s.
9. Alekseev G.V., Kondratov A.V. Perspektivy primeneniya kavitacionnogo vozdejstviya dlya izmel'cheniya pishchevyh produktov. Monografiya / Saratov, 2013.
10. Lozovaya S.Y., Bocharova Y.L. Centrobezhnyj gomogenizator dlya mekhanicheskoj obrabotki pishchevyh produktov. V sbornike: Energosberegayushchie tekhnologicheskie kompleksy i oborudovanie dlya proizvodstva stroitel'nyh materialov Mezhvuzovskij sbornik statej. Belgorod, 2014. S. 130-132.
11. Shevtsov A.A. Modeling the process of grain drying in a straight-through silo grain dryer / Shevtsov AA, Pavlov IO, Drannikov AV, Evdokimov AV // Vestnik VGUIT [Proceedings of VSUET]. 2005. № 10. S. 136-143.
12. Shevtsov A.A. Topological principle of formalization of the system of drying and storage of grain by methods of mathematical modeling / Shevtsov AA, Pavlov I.O., Fursova E.V. // Vestnik VGUIT [Proceedings of VSUET]. 2006. № 11. S. 45-50.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.40

EFFECTS OF INPUT COSTS ON EGG PRODUCTION AMONG PULLET FARMS IN JOS, PLATEAU STATE, NIGERIA

Onogwu G.O.*, **Bentley B.S.**, **Egbeadumah O.M.**
Department of Agricultural Economics and Extension Services, Federal University Wukari, Taraba State, Nigeria
*E-mail: gonogwu@yahoo.com.sg

ABSTRACT
This study was carried out with the view to examining the effects of input cost on the production among pullet farms in Jos South local government area of Jos, Plateau State, Nigeria. The major objectives were to determine the effects of inputs costs on pullet production and determine the effects of socio-economic profiles of the pullet rearers on farm productivity. A sample size of 100 pullets farming households were randomly sampled using a set of detailed and well-structured questionnaire. Objectives were realized using descriptive statistics such as mean, frequency distribution and percentages and multiple regression model. In determining the effects of the input costs on pullet productivity in the study area, the double log regression model gave the best fit to the data. The result indicates that 91% of the variations in pullet productivity was accounted for by variability of the input costs included in the model. The number of birds, cost of feed, additional light and additional heat; drugs, had significant effects at 1% & 5% level respectively on pullet productivity which suggests that they are important determinants of pullet productivity. In determining the effects of socio economic profiles of the pullet rearers in the study area, the linear regression model gave the best fit to the data. The results indicate that about 62% of the variations in pullets output was accounted for by socio economic characteristics (membership of cooperative, age; household size, farming experience; extension service and sex of the pullets rearers influenced the productivity of pullets egg farms in the study area) of the respondent included in the model. Provision of feed mill, extension services cum formation of cooperative groups are among the key prescriptions to save feed cost and improve egg productivity.

KEY WORDS
Pullet farms, input costs, socio-economic characteristics, effects, egg productivity.

Poultry are chickens, ducks, geese, guinea fowls, turkeys and other related birds kept for meat and egg. In Nigeria, the poultry population is estimated to be 140 million (Ocholi et al; 2006). They are the most commonly kept livestock and over 70% of those keeping livestock are reported to keep chickens (Amar-Klemesu and Maxwell, 2000). Chickens have its scientific name to be *Gallus domestica* and it is a type of poultry. It belongs to the family *phasiendae* and it is estimated to be about 69% of the total number of birds kept in Nigeria (Sonaiya, 1990). Pullets are a type of chicken solely kept for egg production and by implication a source of protein (FAO, 2006). They are young chickens suitable for egg production.

Background of the study. Generally, agriculture is very important in man's everyday life particularly in provision of food and revenue; generation of a sizable amount of national income and raw materials for agro-allied industries in addition to provision of employment in terms of processing and marketing activities for the populace. The importance of poultry industry is that it concentrates in providing employment not only to those engaged in its production directly, but also for the hatchery operations, feed dealers, manufactures of incubators, building materials, processors of egg and poultry products and all dealers engaged in the marketing of egg and poultry from the time they leave the producer until they are in hands of consumers (Morly, 1982). In particular, the Nigeria's poultry section of the agricultural sectors' industries has its root in the initiative of regional governments from the

1960's when the Western Regional Government entered into joint pilot poultry production schemes with some foreign partners, notably the Israeli government. The entry of private investors into poultry production in the late 1960s to early 1970s marked the beginning of indigenous commercial poultry production. It then spread from the west to the eastern region and parts of the Northern region. The size of the industry grew from less than a million in the mid-1960s to over 40 million by the early 1980s. All along, the growth of the industry had been propped by government initiatives and incentives, especially in terms of training, technological support, input support services and others. For example, many of the poultry technical staff were products of government subsidizing training programmes, while inputs like vaccines and diagnostic services were subsidized by government or even free initially (Adene and Oguntade, 2006). Meanwhile the national economic climate was enjoying a boost from the newly advancing petroleum sector and this visibly helped to propel national investment, including poultry sector. As from this time, the poultry industry had started to be self-supporting, viable and attractive to financial institutions.

Benefits of Poultry Egg and Meat Production. Augmenting the production of laying chickens is an important objective in helping to meet the nutritional needs of the growing population in Nigeria. Commercial egg production is perhaps the most significant and cheap source of quality protein and income as compared with other livestock production activities (Ebraheem *et al* 2012). Layers are prolific, easy to raise and their output can be generally expanded more rapidly and easily than that of other livestock. Furthermore, they are adaptable to various climates and altitudes. Poultry raising can often be combined with other types of farming and offers the possibility to raise extra revenue for farmers.

Egg production involves the use of good layers stock for the purpose of table egg production. The eggs are sold in off-fresh to the public, while the spent layers are culled off from the farm. Poultry are good converters of feeds to eggs and meat within a short period of time (Ebraheem *et al* 2012). The nutritive value of poultry eggs rank second to cow milk. Apart from providing employment and a livelihood to thousands of people, it also provides a remarkably high quality nutritious food. The egg is a complete protein with excellent quality; one egg gives 6g of protein (Ebraheem *et al* 2012). Egg white protein has a biological value of 100, the highest biological value of any single food protein (FAO, 2005). Poultry egg and meat are important sources of high quality proteins, minerals and vitamins to balance the human diet. Commercial layer strains are now available with traits of high egg production and high feed conversion efficiency. Depending on the farm-size, eggs production can be the main source of family income or can provide income and gainful employment to farmers throughout the year. Poultry manure has high manure value and can be used for increasing yield of all crops. Not all eggs produced are however, directly consumed by humans; some are used for production of vaccines and antibodies (EPA, 2011).

Similarly, government policies which were in favour of food crop production as against livestock production exacerbated the situation. Banks were directed to increase lending by 50% for food crops production and distribution, 15% to the livestock industry and 35% to other agricultural crops Onyeagocha *et al* (2010).

Importance of Poultry Production in Nigeria. The importance of poultry to national economy cannot be over emphasized as it has become popular for the small-holders that have contributed to the economic growth of the country. In Nigeria, poultry contributes about 15 percent of the total annual protein intake with approximately 1.3kg of poultry products consumed per head per annum Ologbon and Ambali (2012). The poultry industry has assumed greater importance in improving employment generation opportunities and animal food production in Nigeria. An earlier report by Mbanasor (2002) showed that about 10 percent of the Nigerian population is engaged in poultry production, but mostly subsistence and small or medium sized farms. Eggs production is carried out in all parts of the country, without religious, social or cultural inhibitions associated with their consumption. Specifically, investment in pullets' enterprises is attractive because the production cost per unit is low relative to other types of livestock production (Anwasia, 2015). Poultry meat is tender and commonly used in ceremonies compared to other birds and pullet's enterprises have short production circle. Owing to these obvious advantages of pullets enterprises, large number of

farmers, men and women go into their production, many of whom do so for income generation purposes (Nwajiuba and Nwoke, 2000), besides meeting the protein needs of their households. The evidence of this is the preponderance of producers–hawkers of pullet's products in the urban and rural markets particularly during festive periods, when their demands are highest and their selling prices as well. Pullet production like any other economic venture is dependent on resources used. As noted by Etim and Udoh, (2007) maximum poultry production depends partly on the environment, technical know-how and the quality of resources employed in the production process. But to optimize production and ensure sustainability, there is need for judicious management of the resources employed in the enterprise.

Problem Statement. In 2002, the Federal Government banned the importation of poultry products into the country. This posed a greater pressure and challenge to our local farmers to produce commercially so as to meet the ever-increasing demand for poultry and poultry products. However, few major glitches which truncated the growth path of the industry, included transiting from small-scale hybrid broilers and layers and backyard poultry enterprises/semi-commercial to medium scale commercial enterprises, high input cost of feeds for pullets, which constituted over 51% of total cost of production (Effiong and Onuekwusi, 2006)? These scenarios partly resulted from policy inconsistencies of the Government, giving rise to the Structural Adjustment Programme (SAP) between 1987and 1994, during which the industry almost collapsed due to the ban on raw materials for the poultry enterprises that vary from basic backyard poultry keeping to mechanized and automated production plants. Study by Ojo (2003) revealed that, the industry falls short of its aim of self-sufficiency in animal protein production in the country. Annual protein consumption is put at 5gm/capita per day which is a far cry from FAO recommended level of 35gm/capita per day (Anwasia, 2015). Also, in the past years, many small-scale operators in the poultry industry have been forced out of business due to problems ranging from shortage and high cost of feed, high cost and inadequate veterinary services and drugs, poor quality of equipment and other inputs. Lack of proper management in terms of feeding, housing, health care and traditional methods used by poultry farmers among other factors are responsible for the low productivity.

A lot of researches have been conducted on pullet production, technical efficiency and productivity in the study area but not much research have been done in the area of analysis of the effects of input costs on productivity among pullet rearers in the study area, and hence this research is aimed at bridging the gap. The associated problems including rising cost of the major inputs such as feeds, drugs, and equipment form a constant set back in poultry industry (Sekoni, 2002). Also, the storage of poultry products is another problem, which is largely due to epileptic power supply and as such farmers incur extra cost of hiring generators in order to avoid the spoilage of these products. The following research questions therefore are:

- What are the socio economic profiles of the pullet rearers in the study area?
- What are the management practices of the pullets rearer in the study area?
- What effects do inputs have on output in pullet egg production in the study area?
- What effects do socio economic profiles of the pullet rearers on productivity?

Objectives of the Study. The broad objective of the study is to determine the effects of input costs on the productivity among pullet farms in Jos south L.G.A of Plateau state.

The specific objectives are todescribe the socio economic profiles of the pullets rearers in the study area; identify the management practices among pullets rearers the in the study area; determine the effects of inputs costs on pullet egg production; determine the effects of socio economic profiles of the pullets rearers on farm productivity.

Research Hypothesis. The research hypothesis is stated below:

H_0: Inputs costs do not significantly influence egg production among small scale pullets in the study area;

H_1: Inputs costs significantly influence egg production among small scale pullets in the study area.

Justification of the Study. The study seeks to examine the effects of input costs on the productivity among pullet farms in Jos south local government area of Plateau State Nigeria. Specifically, the study will aid managers of pullet enterprise; to be able to have a wide range of solution to deal with the effects of input costs. The main concern of any production activity has been described as that of achieving maximum possible productivity in the transformation of inputs into outputs.

Although available literatures show that many studies have been done on poultry production, but the attention was more on the technical efficiency of poultry broiler farming (e.g Ugbome, 2006; Amos, 2006, Bamiro, 2008; Adebiyi, 2000; Ojo, 2003; Adebayo and Adeola, 2005). Some others looked at the Profit Efficiency in layers Production (Effiong and Onyenweaku. 2006; Oladeebo and Ambe-Lamidi 2007; Okafor, Odii, Emeyonu & Obih 2006). Little research has been done that looked at the effects of input cost on the productivity of pullet in Jos South Plateau State. Therefore, this study seeks to identify the input costs on egg production among pullet farms and their effects on productivity of pullets' enterprise in Jos South L.G.A of Plateaus State, Nigeria. Hence, the findings of the study will be a reliable quantitative result and source of reference to policy makers to adequately make relevant policies that would promote egg production in plateau state. It will equally contribute to the general body of knowledge in the study area.

METHODS OF RESEARCH

The Study Area. Jos south local government area is located between latitudes 9° 30' to 10° N and longitude 8° 48' E to 8.800°E of the Greenwich meridian. It is situated at the north western part of the state with its headquarters at Bukuru, which is about 15 km from the state capital, Jos. It share boundary with Jos North local government area in the North, in the East with Barkinladi local government area, in the south with Riyom local government area and in the west with Bassa local government area. The local government area has four districts: Du, Gyel, Kuru and Vwang districts and twelve wards. The local government area has total land area of about 1,037 km2 with a population of 306,716 (NPC, 2006). It has a cool climatic condition due to its altitude. The coldest period is between November and February with an average mean daily temperature of 18°C, while it gets warm between March and April before the onset of rain. The rainy season, which is between the months of May and October, has its peak in August. The mean annual rainfall varies between 1347.5 and 1460 mm per annum. The major inhabitants of the area are the Beroms and other tribes like; the Hausa, Igbo, Yoruba among others. The mild climatic condition and the accommodative nature of its people as well as tourists attraction have continued to attract investors. According to Gwom (1992), the people of Jos south were predominantly farmers and hunters, and the common food crops grown in the area include Irish potato, sweet-potato, maize, millet, Acha, tomato and many other varieties of vegetables. Due to the ever green vegetation and tse-tse-free nature of the area, cattle rearing and grazing has been quite profitable and poultry farming is a viable business in the area. The conducive environment for poultry production has attracted investors such as the Evangelican Church of West Africa (ECWA) Rural Development Company Limited which deals in poultry production and other veterinary services. Michael (2012).

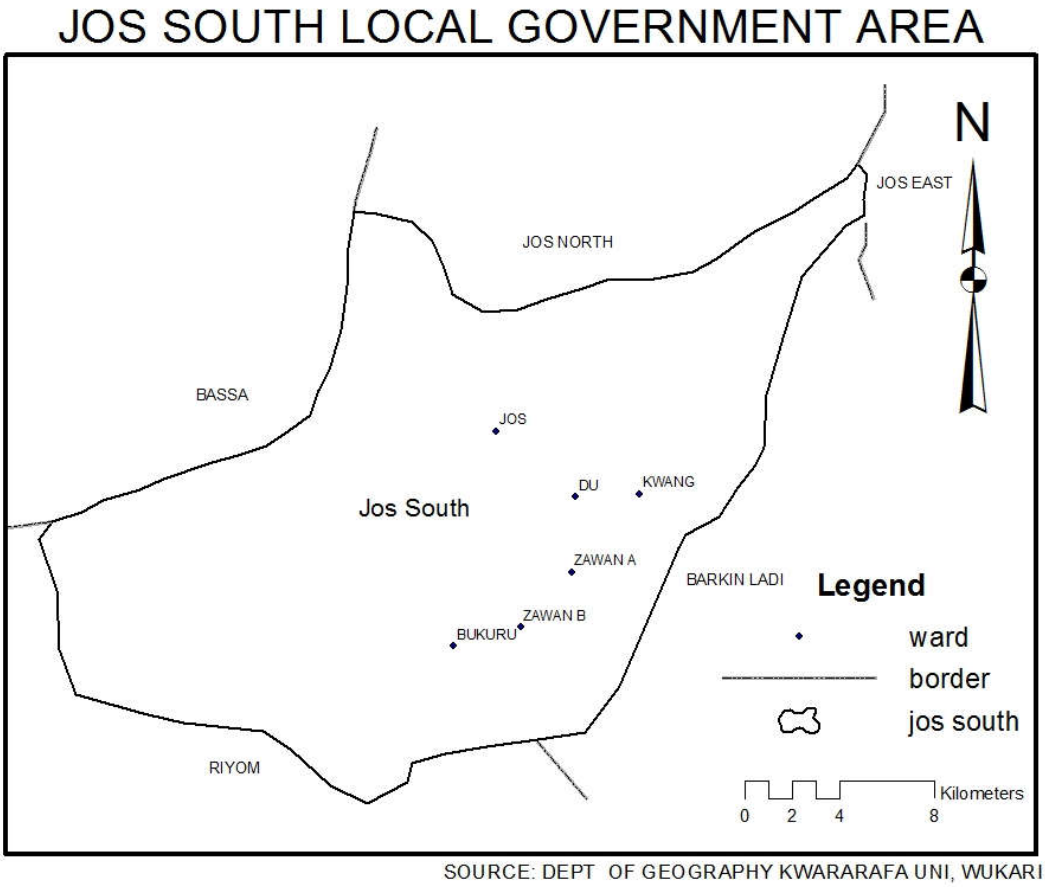


Figure 1 – Jos South Local Government Area

Sampling Procedure. Multistage random sampling technique was used to select respondents for the study. In the first stage, five wards were selected from the 12 wards in the Local Government for the study. These wards are Bukuru, Zawang A, Zawang B, Kwang and Du. In the second stage, five villages each was randomly selected from the five wards making a total number of 25 villages for the study. In the third or last stage 4 pullet farmers were randomly sampled, giving a total of 100 pullet farmers selected from the sampled villages for the study.

Data Collection. The study was conducted using primary data for the analysis. Primary data were collected using structured questionnaires administered to the respondents. The questions were structure based on the objective of the study.

Data Analysis. Objectives (i) and (ii) were achieved using descriptive statistics such as mean, frequency distribution and percentages. Objective (iii) & (iv) were achieved using Multiple regression model.

Multiple Regression Analytical Technique. Regression Analysis is a statistical tool for evaluating the relationship between one or more independent variables X_1, X_2…X_n to a single continuous variable Y. Thomas *(1984)* states that multiple regression analysis is a statistical tool for understanding the relationship between two or more variables. Four functional forms were tried: Linear, Semi-log, Double-log and Exponential. The implicit form of the regression model that was used is:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, +\mu$$

Where:

- *Y* = Output of pullet;
- $X_1 =$ Number of bird;

- $X_2 =$ Cost of feeds;
- $X_3 =$ Drugs and vaccines (vail, L, gram, mm);
- $X_4 =$ Labour (man days);
- $X_5 =$ Water (L);
- $X_6 =$ Additional Light;
- $X_7 =$ Additional Heat;
- $\mu =$ Error term.

The explicit functional forms that were tried are as follows:

(a) Linear functional form:

$$Y = b_0 + b_1 X_1 + b_2 X_2 + ...b_7 X_7 + \mu \quad (1)$$

(b) Semi-log form:

$$Y = b_0 + b_1 \log X_1 + b_2 \log X_2 + ...b_7 \log X_7 + \mu \quad (2)$$

(c) Double-log form:

$$LogY = b_0 + b_1 \log X_1 + b_2 \log X_2 + ...b_7 \log X_7 + \mu \quad (3)$$

(d) Exponential functional form:

$$LogY = b_0 + b_1 \log X_1 + b_2 \log X_2 + ...b_7 \log X_7 + \log \mu \quad (4)$$

Where: b_0 is a constant term and $b_1 \ldots b_n$ are estimated coefficients of the variables; $X_{1 \ldots} X_n$ are the independent variables respectively, as defined in equations above.

The variables $X_{1 \ldots} X_n$ were expected to have positive causal relationships with Y and were added to the model to determine the extent to which each of them explained variation in total output of pullets.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Pullet Farmers. Some socio-economic characteristics of the respondents were ascertained include age, gender, and marital status, level of education, household size and farming experience.

Age of the respondents. The frequency distribution of respondents according to age is shown in table 1. It shows that 31% of pullet farmers fell within the productive age range of 46-50years. The average age of the pullet farmers was estimated at 46years. Therefore, among the pullet farmers, there is a strong tendency that productivity will continue to rise in the meantime, given their ages. The implication of average age estimated at 46years is that pullet farmers are in their prime and active age of production. This result agrees with the findings of Ojo (2003) in his work Productivity and Technical Efficiency of Poultry Egg production in Nigeria where he stated that the farmers were relatively young with mean age of about 45 years with 11years standard deviation.

Table 1 – Frequency Distribution of Respondents according to their Age;

	Categories	Frequency	Percentage
Age (years)	26-30	4	4
	31-35	12	12
	36-40	24	24
	41-45	29	29
	46-50	31	31
Total		100	100

Source: Field survey data, 2017.

Sex of the Respondents. Table 2 shows that both men and women were actively involved in egg production, but the percentage of men were more. Men accounted for 68% while, female account for less 32%. The high number of males might be attributed to hard task (such as, building of the poultry house, changing of poultry litters) involved in egg production process.

Table 2 – Frequency Distribution of Respondents according to their Gender

	Categories	Frequency	Percentage
Gender	Male	68	68
	Female	32	32
Total		100	100

Source: field survey data, 2017.

Marital Status of the Respondents. Result from table 3 shows that about 88% of the respondents were married and 12% single. The high number of married people in the business was to reduce labour cost as most married persons have children that constitute the labour force in egg production.

Table 3 – Frequency Distribution of Respondents according to their Marital Status

	Categories	Frequency	Percentage
Marital status	Married	88	88
	Single	12	12
Total		100	100

Source: Field survey data, 2017.

Educational level of Respondents. The result shows that 100% of pullet farmers had formal education at tertiary level. The average years of schooling of the respondents as estimated by this study stood at 16years. This implies that all the rearers are educated. However, this does suggest that in egg production, education was an added advantage, rather than a barrier for efficient management. With this level of education, there is tendency of the farmers being able to put into use the level of technology adopted and skill acquired. This study agrees with the findings of (Ologbon, *et al* 2012) that found out that greater percentage of small scale poultry farmers in Ogun State had formal Education.

Table 4 – Frequency Distribution of Respondents according to their Educational level

	Categories	Frequency	Percentage
Educational level	No formal (0)	0	0
	Primary (6)	0	0
	Secondary (12)	0	0
	Tertiary (above 12)	100	100
Total		100	100

Source: Field survey data, 2017.

Household size of the Respondents. Table 5 shows the distribution of respondents according to their household size. Majority of the respondents (50%) fell within the household size of 4-6 persons, (42%) fell within the household size of 1 – 3 persons, (5%) fell with the household size of 7-9 persons and (3%) fell within the household size of 10 and above persons. The average family size of the respondents was about 6 persons per household. This result agrees with the findings of Ugbome (2006) who found out that majority of the respondents (small scale broiler farmers in Delta State) had an average family size of 6 people and also agrees with the finding of Ezeh, *et al*, (2012) that Poultry Broiler farmers in Umuahia Capital Territory of Abia State, Nigeria had the average household size of 6.

Table 5 – Frequency Distribution of Respondents According to their Household Size

	Categories	Frequency	Percentage
Household size	1-3persons	42	42
	4-6persons	50	50
	7-9persons	5	5
	10 and above	3	3
Total		100	100

Source: field survey data, 2017.

Farming Experience of the Respondents. The distribution of respondents by farming experience as shown in table 6 indicates that there was influx of new entrants into egg production in recent times. This could be due to the ban on importation of frozen poultry product by the Federal Government. The result shows that majority 38% had farming experience of 4-6years, followed by about 32% who had farming experience of 7-9years, 22% had farming experience of 1-3years and 8% had farming experience of 10years and above. Table 6 shows that the average farming experience of the respondents was about 6years which means that they were still new in the business and had little or no experience in egg production. However, the more experience the pullet farmers have, the more productive they will be.

Table 6 – Frequency Distribution of Respondents according to their Farming Experience

	Categories	Frequency	Percentage
Farming Experience	1-3years	22	22
	4-6years	38	38
	7-9years	32	32
	10 and above	8	8
Total		100	100

Source: Field survey data, 2017.

Membership of cooperation. Membership of cooperative organization provides means of interaction among farmers which can enhance diffusion of innovation easily among members. However, majority (66%) of the respondents were members of cooperative group. Cooperative society serves as a medium for information exchange that can improve farm output of respondents. From table 7, majority (34%) of the respondents were not members of cooperative organization, implying the existence of a wide gap in information sharing and assimilation as pullet producers. Membership of cooperative organization is important because it affords the farmers the opportunities of sharing information on modern agricultural production practices.

Table 7 – Distribution of respondents according to membership of cooperation

Membership of Cooperative	Frequency	Percentage
Yes	66	66
No	34	34
Total	100	100

Source: Field survey data, 2017.

Management Practices and Acquisition of Resources of the Respondents. The management practices and acquisition of resources by the respondents are presented in Table 8.

Table 8 – Management Practices and Acquisition of Resources of the Respondents

Categories	Frequency	Percentage
Management system adopted		
Deep litter	100	100
Battery cage	0	0
Free range	0	0
Semi intensive	0	0
Total	100	100
Number of birds		
100-300	4	4
350-550	18	18
600-800	22	22
850-1500	9	9
2000-4000	28	28
4500-6500	13	13
7000-9000	5	5
9500 and above	1	1
Total	100	100
Land acquisition		
Inheritance	10	10
Purchased	60	60
Gift	0	0
Rent	0	0
Lease	0	0
Place of residence	30	30
Total	100	100
Source of feed		
Commercial	100	100
Compounded by self	0	0
Total	100	100
Sources of capital		
Personal savings	96	96
Cooperative societies	0	0
Commercial banks	0	0
Bank of agriculture	0	0
Money lenders	0	0
Friends and family	4	4
Total	100	100
Source of labour		
Family	95	3
Hired	3	95
Both family and hired	2	2
Total	100	100

Source: field survey data, 2017.

The table shows that majority of the respondents (100%) adopted deep litter system, because it is cheaper than battery cage system of management. 28% of the respondents rose between 2000 and 4000 pullets, followed by about 22% who rose between 600 and 800 pullets. 18% raised 350 and 550 pullets; 13% raised between 4500 and 6500 pullets; 9% raised 850-1500pullets. 5% rose between7000 and 9000 pullets and 4% rose between 100 and 300 while the least (1%) raised about 10000 pullets.

Majority of the farmers 60% acquired land by purchase, this will promote large scale production that require large area of land in the study area; about 30% acquired land by place of residence and 10% acquired land by inheritance. This might limit large scale production that require large area of land because place of residence and inherited lands might be too small and fragmented into smaller portions in different areas. On feed source, table 8 shows that majority (100%) bought feed from the feed miller.

On sources of capital, table 8 shows that most of the respondents (96%) used personal savings; while 4% obtained Capital as gifts from relatives, friends and family. On source of

labour, table 8 shows that majority (95%) used only family labour, 3% used only hired labour while 2% used both family and hired labour.

The Effects of Input on the Productivity of Pullet Production. In explaining the factors influencing productivity of pullet among the respondents, the multiple regression models was used to test four (4) functional forms among which the best fit turned out to be double log. Double log model used gave results of the parameter estimates of these variables as presented in Table 9.The model gave the R-square as 0.908, which implies that all the explanatory variables included in the model were able to explain about 91% of the variations of inputs on productivity of pullets in the study area. The variables that were found to positive or negative and significantly influence the productivity included; numbers of birds, cost of feed, drugs, additional light and additional heat while labour and water are not significant.

The finding reveals that number of birds (X_1) has a coefficient of 0.273 and significant at 1%. This implies that there is a direct relationship between number of birds and egg productivity. In other words, an increase in the number of birds would lead to an increase in the egg productivity of pullet. This is in agreement with Umar (2012) who found that the coefficient of herd size had a positive and significant association with output at 1% level. This implies that poultry egg production increased with increase in number of birds kept.

The coefficients of cost of feed (X_2) 0.127 have a positive sign and is significant at 1% showing direct relationship with output. This implies that a 1% increase in quantity of feed will increase the quality of pullet-egg production. The positive and significant sign of the coefficient is in line with the findings of Oji and Chukwuma (2007) and Binuomote *et al.* (2007). The result is also supported by Olayide and Heady (1982), who said that feed intake has constant marginal efficiency until a maximum egg output per hen is attained. With constant feed-egg transformation rate, the limit of a hen's capacity to produce eggs economically lies in her ability to assimilate feed (Umar, 2012).

The coefficient of drugs (X_3) 0.031 was positive and significant at 5% level which implies that proper management involving the provision of adequate, qualitative and timely veterinary services to the birds improve the egg productivity of the pullet.

The finding reveals that additional heat (X_6) has a coefficient of -0.094 and significant at 1%. This implies that there is an inverse relationship between the additional heat and output. In other words, an increase in light during the night, have a negative effects on the pullets and it leads to decrease in the egg production.

The coefficient of additional number of hours of light (X_7) was 0.402 and is statistically significant at 1% and exhibits a positive relationship with output of pullets. Egg production is stimulated by daylight; therefore, as the days grow longer production increases. This implies that in open houses, found commonly in the tropics, additional heat may be used to increase the laying period. When darkness falls artificial lighting can be introduced for two to three hours, which may increase egg production by 20 to 30 percent. In closed houses, where layers are not exposed to natural light, the length of the artificial day should be increased either in one step or in a number of steps until the artificial day reaches 16-17 hours, which will ensure constant and maximized egg production. Effective day length should never decrease during the laying period (Ebraheem *et al* 2012).

The Effects of Socio- Economic Characteristics of Pullets Rearers on the Productivity of Pullet. The socio- economic characteristics of the sampled farms which influence the productivity of pullet production were years of farming experience, membership of cooperative, extension service, household size, age, and sex . However, education level, skill/training, ownership, farm location and access to credit were found to have insignificant effects. This implies that these factors do not significantly influence the egg productivity of pullet farms. Similar results were gotten by (Umoh, 2006).

Membership of cooperative society (Z1): Membership of cooperative society was found to have positive effect on the productivity of the farms with a coefficient of 80541.082 and is significant at 1% probability level. This implies that membership of cooperative society have a direct effect on pullet productivity because members pick information that impact positively on the farm. However, majority (66%) of the respondents were members of cooperative group. Cooperative society serves as a medium for information exchange that can improve

farm output of respondents. Membership of cooperative society can enhance the accessibility of farmers to credit facility and serve as a medium for exchange of ideas that can improve their farm activities. Membership of cooperative societies is believed to enhance the sharing of information on improved technologies through interactions as well as easing inputs acquisition and utilization constraints faced by decision makers (Effiong, 2005; Kebede, 2001). It was not significant.

Table 9 – Regression Result of Inputs on Egg Productivity

Coefficients

Independent variables	Unstandardized Coefficients		t	Sig.
	B	Std. Error		
(Constant)	6.581	.300	21.969	.000
lnNo. of birds	.273	.047	5.845	.000
lnCost of feed	.127	.035	3.647	.000
lnDrugs	.031	.012	2.481	.014
lnLabour	-.003	.037	-.070	.944
lnWater	-.007	.022	-.338	.736
lnAdditional heat	-.094	.031	-3.024	.003
lnAdditional light	.402	.043	9.265	.000
R Square	.908			
F Statistics	234.360			

a. Dependent Variable: lnOutput

Age (Z2): The coefficient of age has a positive sign and is statistically significant at 1% level of probability as shown in table 9. This implies that as the age of pullets rearers increases, their level of productivity increases (or technical efficiency increases). However, the findings tends to agree with the findings of Chavanapoonphol et al (2005) and Ogundari (2006) in which they found out that technical efficiency and profit efficiency, increase with age respectively.

Household size (Z4): Household size coefficient had a positive sign of 13677.755, that is, it has a positive effect on the productivity of pullets and it is significant at 1%. Therefore, respondents with larger household sizes increase productivity in pullet farms. Hence, as household size increases, productivity also increases. This could be as a result of the fact that large household size translates into cheaper and available labour which can reduce cost of production. This result was in conformity with opinion by Nwaru (2003) who reported that large household sizes enhance family labour availability, since it reduces labour constraints in poultry-egg production.

Farming experience (Z5): The year of experience is positively signed (16158.669) and highly significant at 1% level of probability which implies that farmers with more years of experience enjoy better pullet egg production. Continuous practice of an occupation for a long period presumably makes a person more experienced and more productive in practice. This agrees with (Adeoti, 2004), who reported that years of experience reduce farmers inefficiency.

Access to Extension service (Z7): The coefficient associated with extension in the linear regression function was positive (63437.462) and statistically significant at 10% level, implying that the variable increase farm's productivity. This is probably because extension agents frequently introduce packages and information which enhance the productivity of the farms and promote their efficiency. Similar result was gotten by (Amaza, 2002).

Sex (Z8): The coefficient of sex was -79028.685 and it was highly significant at 1% probability level which implies that it has a negatively effect on output. Men accounted for 68% while female were about 32%. The high number of males might be attributed to hard task (such as, building of the poultry house, changing of poultry litters) out in egg production process.

Table 10 – Regression Result of the Effects of Socio- Economic profiles of Pullets Rearers on the Productivity of Pullet

Independent variables	Unstandardized Coefficients		t	Sig.
	B	Std. Error		
(Constant)	-55756.077	95267.018	-.585	.559
Membership of Coops	80541.082	20004.057	4.026	.000
Age	6711.670	1579.823	4.248	.000
Education	-8917.273	5915.675	-1.507	.134
Household size	13677.755	3341.707	4.093	.000
Farm Experience	16158.669	4610.258	3.505	.001
Access to Credits	27716.651	24821.134	1.117	.266
Extension Service	63437.462	32450.921	1.955	.053
Sex	-79028.685	16651.099	-4.746	.000
Ownership	12300.247	16641.523	.739	.461
Training	-6384.994	17409.033	-.367	.714
Farm Location	-20722.461	20350.901	-1.018	.310
R Square	.623			
F Statistics	19.210			

a. Dependent Variable: Output.

Testing the Hypothesis. This was carried out using the estimated parameters (coefficients) of the relationship in order to draw conclusions about the population parameters. These tests were aimed at finding out whether the explanatory variables do actually have any significant influence on the dependent variable. It is a test of overall significance of the multiple regression models.

Testing the Overall Significance of Double Log Function:

Null hypothesis: H_0: $b_1 = b_2 = b_7 = 0$; i.e, Inputs costs do not significantly influence egg production among small scale pullet farms in the study area.

Against the Alternative hypothesis: H_0: $b_1 = b_2 = b_7 \neq 0$; not all b are zero, i.e, Inputs costs significantly influence egg production among small scale pullet farms in the study area.

Table 11 – ANOVA Table for Testing Hypothesis

Source of variation	Sum of squares	Df	Mean squares	F*cal	F tab	Probability level
Regression	22.283	7	3.183	234.360	3.45	.000
Residual	2.268	167	.014			
Total	24.552	174				

Decisions: (I) from the table above F*Cal = 234 > F tab = 3.45; the null hypothesis is rejected. (ii) Since the model P = 0.001< 0.01; the model is significant at 1% level of probability. This means that not all the b's are zero. (iii) Six explanatory variables, herd size, feed intake, farm size, and additional light used among others in testing the model were all found to be significant at 1% and related to output of pullets. The conclusion is that, herd size, feed intake, farm size, and additional light have effects on pullets output as evident from the analysis.

CONCLUSION AND RECOMMENDATIONS

This study was carried out with the view to examining the effects of input cost on the production among pullet farms in Jos South local government area of Jos, Plateau State, Nigeria. The specific objectives were to:- describe the socio economic characteristics of the respondents in the study area; identify the management practices among the respondents in the study area; determine the effects of inputs costs on pullet production; determine the effects of socio-economic profiles of the pullets rearers on farm productivity.

A sample size of 100 pullets farming households were randomly sampled using a set of detailed and well-structured questionnaire. Objectives (i) & (ii) were realized using descriptive statistics such as mean, frequency distribution and percentages, while objectives (iii) & (iv) were achieved using multiple regression model.

The study found out that, of the socio-economic characteristics of pullets rearers in the study area, a greater percentage of 31% fell between age ranges of 46-50 years with a computed average age of 46years. Male dominated pullets' production in the study area, with 68% as male. With regards to marital status, majority of the respondents 88% were married. Besides, all the pullets' farmers in the study area had tertiary education with average of 16years of formal education. With respect to household size, a greater percentage of about 50% of the pullets farmer household fell within the size of 4-6 with a computed average of 6 persons per household. Again, 38% of the respondents were found to have farming experience of 4-6years and a computed average of 6years.

Investigation into the management practices, stocking capacity and resource acquisition show that the household heads were involved in only in the use of deep litter system. And 28% raised between 2000-4000 pullets. Sixty percent (60%) of the respondents acquired land by purchase, while 10% were through inheritance. In terms of feed acquisition, all the respondents bought feed from the feed miller, and 96% had personal savings as source of capital while greater percentage of about 95% used hired labour.

In determining the effects of the input costs on pullet productivity in the study area, the double log regression model gave the best fit to the data. The result indicates that 91% of the variations in pullet productivity was accounted for by variability of the input costs included in the model. The number of birds, cost of feed, additional light and additional heat; drugs, had significant effects at 1% & 5% level respectively on pullet productivity which suggests that they are important determinants of pullet productivity.

In determining the effects of socio economic profiles of the pullets' rearers in the study area, the linear regression model gave the best fit to the data. The result indicates that about 62% of the variations in pullets output was accounted for by socio economic characteristics (membership of cooperative, age; household size, farming experience; extension service and sex of the pullets rearers influenced the productivity of pullets egg farms in the study area) of the respondent included in the model.

Based on the findings from the study, it can be concluded that the largest proportion of pullets-egg rearers in the area operated on a medium scale. High cost of inputs such as herd size, feed intake, and additional light used among others in testing the model were all found to be significant at 1% and related to output of pullets. Thus, these costs make it very difficult for existing firms to expand their scale of operation, hence a large number of them stagnate in the medium scale class, while prospective rearers are reluctant to go into the business. The socio-economic results revealed that membership of cooperative, age; household size, farming experience; extension service and sex of the pullets rearers influenced the productivity of pullets egg farms in the study area.

In line with the findings of the study, the following recommendations are made:-

(i). It is recommended that pullet rearers should encourage themselves to increased scale of production by coming together and pooling their resources together as in cooperatives to attract loanable credit facility.

(ii). Measures such as establishment of modern feed mill should be embarked upon by rearers associations cum corporate bodies, while research focused on incorporating available local feedstuffs/ materials in compounding poultry feeds will make feed available and affordable to the poultry-egg producers. This will reduce the cost of feed, thereby increasing productivity and net farm income.

(iii) It is also recommended that Federal and State Governments and indeed stakeholders in the sector should ensure steady power supply, given that increased lighting period/hours enhance productivity of the of farms.

(iv). It was found that membership of cooperative was also positively related to productivity of pullet farms the implication is that the making and implementing policies that would encourage farm owners to form cooperative/organization or join the existing ones will be a step in the right direction. This could also reduce the cost of inputs through bulk purchase as against individual procurement of inputs thereby reducing the cost of production.

(v) Since visits of extension workers are a significant factor, it is also recommended that stakeholders in the sector should encourage extension agents through the provision of

incentives such as in-services training, scholarship and better salaries. This will enhance productivity of the extension service provides and in the long run, a better productivity for rearers.

REFERENCES

1. Adebayo, O. O and Adeola, R. G. (2005). Socioeconomic Factors Affecting Poultry Farmers in Ejigbo Local government Area of Osun State. Journal of Human Ecology. 18:39-41.
2. Adebiyi, M. A. (2000). 'Economic Analysis of Egg Production in Ondo State'. An Unpublished B.Tech Project. Department of Agricultural Economics and Extension, Federal University of Technology, Akure.
3. Adene, D. F. (2006). Avian Influenza: The Trans-continental Plague. (WPSAS-Ghana , Poultry Seminar) Accra, 11 -14 April, 2006.
4. Adene, D.F. and Oguntade, A.E. (2006). The structure and importance of the commercial and rural based poultry industry in Nigeria. Nigerian Poultry Sector Report, FAO (Rome) study. http://www.fao.org/docs/ eims/upload//214281/Review Nigeria.
5. Adeoti, A.I. (2004). "Impact of Hiv/Aids and Related Sickness on the Technical Efficiencies of Farmers in Benue State, Nigeria". Issues in African Rural Development Monograph Series. Mongraph #34
6. Amar-Klemesu, M. and Maxwell, D. (2000). Accra: Urban Agriculture as an asset Strategy. In: Supplementary Income and Diets, Bakker, N., Dubbeling,M., Gundel, S., Koschella, U.S. and dezeeuw, H. (Eds.). Growing Cities, Growing Food, Havana, Cuba, pp: 234-236.
7. Amaza, P.S. (2002). "Analysis Of Technical Inefficiency in Food Crop Production in Gombe State, Nigeria. Applied Economics Letters 9:51-54
8. Amos, T.T (2006): Analysis of Backyard Poultry Production in Ondo State, Nigeria. International Journal of Poultry Science. 5 (3): 247-250.
9. Anwasia, A. I. (2015). Production efficiency of small scale broiler farmers in Delta State, Nigeria. Unpublished M.SC dissertation submitted to the Dept. of Agricultural Economics, University Nigeria, Nsukka.
10. Bamiro, O.M. (2008). Economic Performance of Commercial Poultry Farms in Oyo State Nigeria. International Journal of Poultry Science. 7(11); 1117-1121
11. Cobb, C.W. and Douglas, P.H. (1928) "A Theory of production" American economic review, supplement 18 Pp 139 – 165.
12. Ebraheem A., AL-Sharafat.A. and Mohammad A. (2012). Factors Affecting Profitability of Layer Hens Enterprises. American Journal of Agricultural and Biological Sciences 7 (1): 106-113.
13. Effiong, E.O. (2005). Efficiency of Production in Selected Livestock Enterprises in Akwa Ibom State, Nigeria. A PhD Dissertation Submitted to the Department of Agricultural Economics, Michael Okpara University of Agriculture, Umudike.
14. Effiong, E.O. and Onyenweaku. C.E. (2006). Profit Efficiency in Broiler Production in Akwa Ibom State. International Journal of Agriculture and Development 7(1)
15. Etim, N.A & Udoh, E.J. (2007). Measuring Technical Efficiency of Broiler Production among Rural Farmers in Akwa-Ibom State, Proceeding of the 32nd annual Conference of the Nigeria Society for Animal Prodection, held at the University of Calaber, Calabar, Cross River State, March 18-21, 2007: 412-414
16. Ezeh, C.O., Anyiro, & Chukwu, J.A. (2012). Technical Efficiency in Poultry Broiler Production in Umuahia Capital Territory of Abia State, Nigeria. Greener Journal of Agricultural Sciences 2 (1), pp. 001-007, January 2012.
17. Food and Agricultural Organisation of the United Nations (FAO), 2005. Recommended Nutrient Intakes forMalaysia. pp: 52-65.

18. Food and Agricultural Organisation of the United Nations (FAO), Marketing Guide No. 4, 1961. Marketing eggsand poultry by J.C. Abbott and G.F. Stewart, first published in 1961.
19. Food and Agricultural Organisation of the United Nations [FAO], (2006). Poultry review – Ghana: The structure and importance of the commercial and village based poultry in Ghana, by K.G. Aning. Final review report. Rome.
20. Gwom, S. L. (1992). The Berom Tribe of Plateau State Nigeria. Fist edition. Jos. Fab Anieh Nigeria Ltd., p. 15.
21. Kebede, T. A. (2001). " Farm Households Technical Efficiency: A Stochastic Frontier Analysis, A Study of Rice Producers in Mardo Watershed in Western Development Region of Nepal. An Unpublished Master Thesis, Department of Economics and Social Science, Agricultural University of Norway, Norway.
22. Mbanasor, J.A. (2002): "Resource use pattern among poultry enterprises in Abia State Nigeria". Nigeria Journal of Animal Production. 29: 64- 70.
23. Michael, A. A. (2012) Effect Of Mining On Farming In Jos South Local GovernmentArea Of Plateau State Journal of Soil Science and Environmental Management Vol. 3(4), pp. 77-83
24. Morly, A., (1982). A Guide to Econometric. 1st Edn.,The MIT Press Cambridge, Massachusetts.
25. Nwajiuba, C., and Nwoke, E. (2000). Inflation and the poultry industry in Nigeria: implications for profitability. In: Oji U.I, Mgbere O.O. (eds) Proceedings of the 5th Annual Conference of the Animal Science Society of Nigeria. Port Harcourt, Nigeria, pp 206-208.
26. Nwaru, J.C. (2003). "Gender and Relative Production Efficiency in Food Crop Farming in Abia State of Nigeria". Nigerian Agricultural Journal 34:1-10.
27. Ocholi, R.A., Oyetunde, I.L., Kumblish P., Odugbo M.O. & Taama et al., (2006). Epidemiology of an outbreak of highly pathogenic avian inflernza caused by the virus subtype H5N1 in Nigeria in 2006. VOM J. Vet. Sci., Nat. Vet. Res. Inst. Jos, pp:1-8.
28. Ogundari, K. (2006). Determinants of profit efficiency among small scale rice farmers in Nigeria: A Profit Function Approach. Paper presented at the International Association of Agricultural Economist Conference, Goal Cost, Australia. Research Journal of Applied Sciences, 1 (1–4): 116–22.
29. Ojo, S.O. (2003). Productivity and Technical Efficiency of Poultry Egg production in Nigeria. International Journal of Poultry Science, 2(6): 459-464.
30. Okafor, R.M., Odii, M.A., Emeyonu., C.A. & Obih,U. (2006). Profitability Analysis of Poultry Production in Imo State, Nigeria. In S.O. Adepoju and P. B. Okuneye (eds). 2006. Proceedings of the Farm Management Association of Nigeria
31. Oladeebo J.O., & Ambe-Lamidi A.I. (2007). Profitability, Input Elasticities and Economic Efficiency of Poultry Production among Youth Farmers in Osun State, Nigeria. International Journal of Poultry Science 6 (12): 994-998, 2007.
32. Olayide, S.O. & E. Heady (1982). Introduction to Agricultural Production Economics. Ibadan: Ibadan University Press.
33. Ologbon, A. C & Ambali, I. (2012). Poultry Enterprise Combination among Sall-Scale Farmers in Ogun State, Nigeria: A Technical Efficiency Approach. Journal of Agriculture and Veterinary Sciences. Pp 8.
34. Onyeagocha, S.U.O., Ehirim, N.C., Emenyonu, C.A., Onyemauwa, C.S & Nwaosu, F.O (2010). Post-Avian Flu Profitability and Resource Use Efficiency of Broiler Farmers in Akwa Ibom State, South-South, Nigeria. Agricultural Journal 5(2): 37-44, 2010.
35. Sekoni, A. A. (2002). Management of layers and breeders. In: Gefu, J. O., Adeyinka, I. A. and Sekoni, A. A (eds.) Poultry production in Nigeria: a training manual on national training workshop. NAPRI, ABU, Nigeria. 88-94.
36. Sonaiya, E.B. (1990). The context and prospects for development of smallholder rural poultry production in Africa. Proceedings of the CTA International Seminar on Smallholder Rural Poultry Production, Oct. 9-13, Thessaloniki, Greece, 35-52.

37. Ugbome, L. (2006). Economic analysis of poultry broiler farmers in Delta State. Unpublished M.SC dissertation submitted to the Dept. of Agricultural Economics, Delta State University Abraka, Nigeria.
38. Umar, Mukhtar. (2012). Economic Analysis of Poultry-egg Production in Bauchi local government area, Bauchi State, Nigeria. An Unpublished M.SC dissertation submitted to the school of postgraduate studies, Ahmadu Bello University, Zaria.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.41

ЗАРУБЕЖНЫЙ ОПЫТ ГОСУДАРСТВЕННОГО РЕГУЛИРОВАНИЯ ПРЕДПРИНИМАТЕЛЬСТВА В РЫБОХОЗЯЙСТВЕННОЙ ДЕЯТЕЛЬНОСТИ

FOREIGN EXPERIENCE OF STATE REGULATION OF ENTREPRENEURSHIP IN FISHERIES

Корнейко О.В., кандидат экономических наук
Korneyko O.V., Candidate of Economic Sciences
Владивостокский государственный университет экономики и сервиса, Владивосток, Россия
Vladivostok State University of Economics and Service, Vladivostok City, Russia
E-mail: olga30300@mail.ru

АННОТАЦИЯ
В условиях истощения запасов водных биологических ресурсов и обострения конкуренции на мировых рынках морские державы проводят целенаправленную политику управления рыбохозяйственными предпринимательскими структурами и водными биоресурсами своей зоны на основе сложившихся традиций, уникальной правовой среды, определенной культуры и конкретных целей каждой страны. Основными целями государственной политики управления предпринимательством в рыбохозяйственной деятельности является: развитие национального рыбного хозяйства, обеспечивающее продовольственную безопасность и занятость населения; защита запасов национальных водных биологических ресурсов от истощения и их воспроизводство.

ABSTRACT
In the conditions of depletion of stocks of aquatic biological resources and aggravation of competition in world markets, the maritime powers pursue a purposeful policy of managing fishery business structures and water bioresources of their zone on the basis of established traditions, unique legal environment, specific culture and specific goals of each country. The main objectives of the state policy of business management in fisheries activities are: the development of national fisheries, ensuring food security and employment of the population; Protection of the stocks of national aquatic biological resources from depletion and their reproduction.

КЛЮЧЕВЫЕ СЛОВА
Государственное регулирование, инструменты, механизмы, добыча, рыбопереработка, рыбаки, ценность производства рыбы, трансформация, структурное регулирование.

KEY WORDS
State regulation, tools, mechanisms, capture, aquatic product processing, fishermen, value of fisheries output, transformation, structure adjustment.

За период экономических реформ рыбохозяйственная деятельность (РХД) России сдала прежние позиции, передислоцировав промысел в ближайшие от портов базирования районы и снизив объемы добычи и переработки. В связи с чем в отечественной литературе отмечается активное обсуждение путей решения нарастающих проблем в отрасли, к числу которых относятся физическое и моральное устаревание рыбодобывающего флота, и как следствие, снижение его численности, низкая конкурентоспособность рыбопродукции на мировых рынках, фактическое отсутствие экспорта продукции глубокой переработки, зависимость от импорта орудий лова и рыболовных судов, обилие недобросовестных форм конкуренции [1-4]. Россия из-за несовершенства рыночных механизмов не может формировать эффективные процессы развития больших хозяйственных систем, подобных рыбохозяйственному комплексу. Поэтому становление и развитие предпринимательства нуждается в

государственной поддержке и регулировании как системы экономического, организационного и политического обеспечения благоприятной среды для устойчивого функционирования.

В связи с этим, возникает необходимость изучения опыта зарубежных стран, деятельность государственных органов в которых способствовала формированию развитых предпринимательских структур с учетом всех национальных интересов.

Формируя целенаправленную экономическую политику на базе зарубежного опыта, можно спасти отрасль от постепенного увядания, а меры государственной поддержки сделать более эффективными.

Мировая хозяйственная практика свидетельствует о том, что в каждой стране используется присущее ей сочетание комбинаций различных методов регулирования в зависимости от складывающейся обстановки: соотношения регулирующих и конкурентных сил, состояния хозяйственной конъюнктуры и др.

Вместе с тем административные методы ограничивают свободу выбора у экономических субъектов рынка. Экономические методы, наоборот, никак не сужают свободу выбора, а являются дополнительным стимулом, на который субъект рынка может отреагировать или нет по своему усмотрению, поскольку имеет право на свободное принятие рыночного решения.

Инструментами государственного регулирования предпринимательства в РХД являются Законы, указы и постановления, устанавливающие порядок осуществления ресурсной, бюджетной, кредитной, страховой, амортизационной, инновационной и интеграционной политики государства в производственной сфере, а также налоговой, таможенно-тарифной и антикоррупционной политики государства в сфере обращения.

Решение этих задач определяется прежде всего характером организации рыболовства как основы РХД. Предметом государственного регулирования предпринимательства в области рыболовства являются рентные отношения, объектом которых выступают водные биологические, в том числе и рыбные ресурсы. Вопрос о принадлежности рыбных ресурсов был решен в 1982 г. Конвенцией ООН по морскому праву введением 200-мильных исключительных экономических зон (ИЭЗ) и установлением суверенных прав по разведке, добыче и сохранению живых и неживых ресурсов (ст. 56). При переводе рыбодобывающего флота в 200-мильные зоны, где добывается более 90% мирового улова, возникла проблема выбора метода управления рыболовством.

Инструментом государственного регулирования предпринимательства в области рыболовства является организация открытого либо закрытого доступов к ВБР. Схема «открытого доступа» направлена на снижение промыслового давления на ВБР путем введения прямых (например, установление размера ячеи сети) или косвенных (введение квот, лимитов на промысел по времени или территории, возрастных пределов облавливаемого запаса) ограничений. Регулирование по схемам «открытого доступа» может стимулировать увеличение промыслового давления на ресурсы из-за увеличения размеров и мощности судов и не решает проблем рыболовства.

Инструментами государственного регулирования рыболовства по схеме «закрытого доступа» является лицензирование, индивидуальные передаваемые квоты (ИПК), закрепление промысловых участков, введение института «рыболовных прав».

Применение схемы ИПК в Новой Зеландии, Австралии, Исландии, Канаде, Норвегии, США, Чили и ряде других стран предполагает продажу (передачу) определенной доли общих допустимых уловов (ОДУ) и позволяет создать рынок рыболовных прав. Закрепление промысловых участков за определенными разработчиками (распространено в Японии, Северной Америке, Индии, Мексике, Турции) возможно лишь при промысле малоподвижных видов гидробионтов или в прибрежном рыболовстве.

Следует отметить, что новый правовой режим, введенный Конвенцией ООН по морскому праву в 1982 г., не дал ожидаемых результатов. Несмотря на прекращение доступа к ресурсам в ИЭЗ для иностранных судов, а также принятие и успешную реализацию программ прямой и косвенной государственной поддержки предпринимательства в РХД в отдельных странах, общемировые тенденции

подтверждают нарастание проявлений системного кризиса в мировом рыбном хозяйстве. К числу этих тенденций относятся:

- деградация мировых ВБР, что выражается в снижении объемов продукции добывающих рыбных хозяйств;
- несоответствие структуры и количества флота имеющимся биоресурсам, перекапитализация мирового флота выражена в двукратном превышении его суммарной мощности возможностей сырьевой базы.

Основную причину такой диспропорции отечественные исследователи видят в нерациональной финансовой поддержке предпринимательства в рыбохозяйственной деятельности, осуществляемую в следующих формах: дотации на развитие, финансирование доступа в иностранные зоны, государственные инвестиции, гарантия займов, освобождение от налога на топливо, ускоренная амортизация, льготное кредитование и др.

Так, в США в 1996 г. был принят Закон об устойчивом рыболовстве, устанавливающий порядок введения мер по сохранению морских биоресурсов. Согласно закону, из федерального бюджета выделяются государственные субсидии (и их объемы ежегодно возрастают) для финансирования программ, направленных на поддержание рыболовства (сохранение запасов, улучшение качества продукции, контроль за промыслом, совершенствование системы реализации продукции). Кроме того, дополнительно финансируются так называемые «новые задачи управления рыболовной деятельностью», а Программа возрождения национального судостроения (1993 г.) обеспечивает возможность судовладельцам получать правительственные гарантии кредита в размере 87,5% стоимости судна с рассрочкой на 25 лет [5, 6].

Эти и другие меры привели к излишнему субсидированию рыболовных предпринимательских структур.

Данный вывод подтверждается свидетельством о том, что США (вместе с Японией), обладающие мощными финансовыми ресурсами для поддержки рыбодобывающих производителей, являются при этом самыми крупными, основными импортерами рыбы на мировом рынке, а 80% объема мировой рыбопродукции производится Китаем и развивающимися странами [7]. Позиция известного специалиста научно-исследовательского центра экологической безопасности РАН Т.Г. Титовой выражена в следующей цитате: «Подорвав запасы ценных ВБР в собственных ИЭЗ, развитые страны стали использовать субсидии для направления мощных судов к чужим берегам, включая Россию. Это несет экологические и социальные угрозы: практика свидетельствует, что рыбопромысловые транснациональные корпорации, хищнически эксплуатируя чужие ресурсы, оставляют после себя истощенные морские экосистемы и социальный разлад. Ошибки политики субсидирования усугублены изъянами в политике распределения прав пользования ВБР. В результате свободной торговли квотами возросли конфликты среди рыбаков за обладание рентоприносящими ВБР, увеличилось недоверие рыбацкого сообщества к действиям властей, расширились масштабы браконьерства, противоправных сделок и коррупции при одновременном росте затрат на содержание бюрократии. Был разрушен уклад жизни прибрежных рыбацких общин, ускорились тенденции деградации морских экосистем, рухнули такие ценности, как исторически сложившиеся традиции, культура рыболовства, чувство профессиональной солидарности рыбаков. Торговля квотами притянула к себе глобальные финансовые интересы. Произошла концентрация рентных доходов в руках меньшинства. Владельцы гигантских квот приобрели достаточную мощь в навязывании своей политики рыболовства не только в национальных границах, но и в глобальных масштабах» [8].

Особый интерес для российских предпринимательских структур в РХД представляет опыт Норвегии - крупнейшего субъекта мировых рыбохозяйственных отношений. Государство определяет особую экономическую значимость своего рыбного хозяйства, реализует отличную от Евросоюза политику, направленную на достижение следующих целей: охрана сырьевой базы; повышение оплаты труда; обеспечение надежных и привлекательных для населения рабочих мест; сохранение характера поселений, участие в международных организациях и защита национальных

интересов на мировом рыбном рынке. Регулирование рыбохозяйственной деятельности в Норвегии происходит при доминирующем участии государства, выстроившего жесткие институциональные рамки рыночным механизмам функционирования. Власти Норвегии исходят из того факта, что рыночная конкуренция в борьбе за ограниченные биоресурсы с целью максимизации предпринимательского дохода может вызывать значительное социальное напряжение во всей рыбохозяйственной цепочке.

Норвежская система государственного регулирования предпринимательства в РХД имеет следующие характеристики:

- в Норвегии (как в Исландии, Канаде и многих других странах) главный орган исполнительной власти в области управления РХД имеет полноценный статус министерства;
- для охраны сырьевой базы предусмотрено квотирование рыболовства (на протяжении 1990-х гг. преобладало долгосрочное закрепление квот за профессиональными рыбаками), лицензирование большинства видов лова, борьба с приловами и выбросами, использование традиционных методов регулирования рыболовства: установление минимальных размеров добываемой рыбы; ограничение размера ячей и др.;
- с целью приведения в соответствие возможностей сырьевой базы и суммарной мощности промыслового флота государство осуществляет политику по сокращению тоннажа рыболовных судов посредством выплаты денежных пособий из Государственного фонда развития экономической деятельности регионов судовладельцам за вывод судов с промысла, а также посредством постепенного сокращения и ликвидации в любой форме государственной дотации на судостроительную промышленность;
- регулирование цен осуществляется за счет установления минимальных закупочных цен на рыбу-сырец (при этом цены согласуются между рыбаками, переработчиками, продавцами в ходе ежегодных переговоров), применения санкций при росте числа посредников в цепи сбыта рыбы и рыбопродукции, контролирования экспортных цен, установления торговой наценки на посреднические операции по продаже рыбы и рыбопродуктов, регулирования средней нормы прибыли по отрасли;
- реализация рыбы в «первые руки» с целью переработки, сбыта, экспорта осуществляется через специально созданные организации - торговые кооперативы, что дает возможность финансового контроля продаж и взаиморасчетов между продавцами и покупателями. Они разрабатывают минимальные цены по всем видам рыб в таком размере, чтобы рыбаки могли получить прибыль. Обязательные аукционы предусмотрены только для реализации креветки, в иных случаях аукционы проводятся в добровольном порядке. Кроме контроля реализации морепродуктов, кооперативы занимаются оформлением выхода рыбацких судов в море;
- система борьбы с приловами и выбросами в Норвегии стала неотъемлемой частью национальной политики регулирования рыболовства. Норвежские власти разрешили приемку и последующую реализацию приловов объектов промысла, которые были обусловлены объективными причинами. Суда, использующие специальные технические средства для сокращения прилова или гарантирующие сохранение прилова для последующей его сдачи на берегу, могут получить льготный доступ в районы промысла;
- ускоренное формирование новой сырьевой базы рыбного хозяйства Норвегии посредством интенсивного развития марикультуры. В 1999 г. продукция марикультуры сравнялась по стоимости с продукцией от морского промысла. Государственные органы обеспечивают субсидирование крупномасштабного рыбоводства лососевых. Об эффективном характере норвежского рыбоводства свидетельствуют следующие показатели: для производства 1 кг живого веса фермерской семги требуется 1,1 кг комбикормов, в птицеводстве это соотношение составляет 1:2, в свиноводстве - 1:3;
- освоение массовых, но малоценных с точки зрения экономической выгоды объектов промысла, составляющих категорию резервных и перспективных для мирового рыболовства. Например, для освоения арктического криля создаются

вертикально-интегрированные компании по следующей технологической цепочке: криль – крилевая мука – рыбный корм – лосось, выращенный на высокоэффективном корме из криля. То есть конечным продуктом является дорогой лосось, мировой рынок которого характеризуется высокими ценами, а проблемы, возникшие с поставками лосося из Чили, вызвали переориентацию норвежского продукта на рынок США. Этот пример устанавливает влияние интеграции на возможности освоения резервов сырьевой базы ВБР, а значит, на процесс обеспечения устойчивости рыбного хозяйства. Таким образом, жесткое государственное регулирование предпринимательства в РХД способствует укреплению позиций норвежских производителей и экспортеров на мировых рыбных рынках, а также росту государственных доходов от РХД, позволяющему компенсировать потерю доходов от экспорта нефти.

Заключение и выводы. Обобщив зарубежный опыт по практике управления рыбным хозяйством, видим, что ошибки в политиках субсидирования предпринимательских структур и «товаризации» ИПК привели к множеству негативных экологических, экономических и социальных последствий. Необходимость мощной финансовой поддержки модернизации российского рыбодобывающего флота со стороны государства должна основываться на соответствии структуры, количества, мощности и тоннажности флота возможностям сырьевой биоресурсной базы. Наличие же ОДУ делает нецелесообразным функционирование рынка квот на биоресурсы, а значит, позволяет снизить барьеры для вступления в отрасль.

Ведущим принципом государственного управления в области рыбного хозяйства во всех странах является принцип защиты национальных интересов и отечественных производителей с помощью таможенно-тарифных барьеров, ограничения импорта, сертификации, требований маркировки, санитарных норм и других мер.

Активная позиция государства, как показал опыт зарубежных стран, в защите интересов отрасли, несомненно, способствует укреплению рыбопромышленных компаний. Поддержать отечественную рыбную промышленность целесообразно, а на фоне продолжающихся инерционных негативных трендов делать это следует срочно.

БИБЛИОГРАФИЯ

1. Korneyko O.V. Integration of fishery enterprises in the Primorsky region: economic rationales and ways of their realization // Mediter. J. Soc. Sc. 2015; 5(6): 118-125.
2. Vorozhbit O., Korneyko O. Freeport of Vladivostok as the Competitiveness Increase Tool for Russian Fish Export // Social Sciences. 2016. Vol 11. Issue 16. PP. 3962-3968
3. Латкин А.П., Корнейко О.В. Особенности государственного регулирования предпринимательства в рыбохозяйственной деятельности (на примере Приморского края) монография // Владивосток, 2011.
4. Ворожбит О.Ю. Обеспечение конкурентоспособности менеджмента предприятий рыбной отрасли Дальнего Востока России в условиях присоединения к ВТО // Известия ТИНРО. 2013. Т. 173. С. 293-301.
5. Долматова Е. В. Государственное управление структурными преобразованиями в рыбной отрасли: дис. ... канд. экон. наук: 08.00.05 // Мурманск, 2006. - 211 с.
6. Кит, Р. Правовые основы управления рыбными ресурсами в США и эволюция основанного на правах управления рыбными ресурсами на Аляске // Режим доступа: http://www.fish-forum.ru/files/98.doc
7. Устойчивая торговля рыбопродукцией – вопросы и задачи: доклад Хельги Джозопейт на IV Международном конгрессе рыбаков / Новости рыболовства. – Режим доступа: http://www.fishnews.ru/rubric/kongress-ryibakov-2009/1662
8. Титова Г. Д. Экономическое обеспечение устойчивого развития промышленного рыболовства на основе рентных подходов: автореф. дис.; Мурманск, 2008 . - 41 с.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.42

NUTRITIONAL COMPOSITION AND SECONDARY METABOLITES OF WOTON LEAVES (STERCHULIA SP.): ALTERNATIVE RAW MATERIAL FOR FISH FEED

Sayuti Mohammad*, **Supriatna Iman**, **Hismayasari Intanurfemi B.**, **Budiadyani I Gusti Ayu**, **Yani Ahmad**
Marine and Fishery Polytechnics Sorong, Indonesia
*E-mail: mohsayut@gmail.com

ABSTRACT
The woton leaves (*Sterchulia sp.*) were collected from an island called Gag, Raja Ampat, West Papua, Indonesia in July, 2017. The objective of this study was to explore natural resources from Papua as an alternative raw materials for fish feed production. The leaves were cleaned, dried, grinded and finally analyzed to describe their chemical composition, vitamin C content and anti-nutritional content using the standard procedures. The findings showed that there were two types of woton plants (*Sterchulia sp.*), namely *Sterchulia sp*. and *Sterchulia trigacantha*. The proximate composition for *Sterchulia sp*. leaves was 4.8% protein, 0.5% fat, 64.32% water, 2.10% ash, 28.29% carbohydrate, and 81.79 mg/100 g vitamin C. The proximate composition for the *Sterchulia trigacantha* leaves was 4.45% protein, 8.86% fat, 50.59% water, 1.4% ash, 34.22% carbohydrate, and 17.36 mg/100 g vitamin C. The woton leaves (*Sterchulia sp.*) also contained secondary anti-nutrients/metabolites such as flavonoids, tannins, tannin errors, phenolic, and polyphenols. TLC Spectrophotometricometry test results showed that *Sterchulia sp.* leaves contained hyperoside and routine flavonoids, whereas *Sterchulia trigacantha* leaves contained compounds of quarcetin and routine flavonoids. The results of chemical and phytochemical screening tests showed that the leaves (*Sterchulia sp.*) are potential and affordable raw material for fish feed production.

KEY WORDS
Sterchulia, proximate, anti-nutritive, flavonoids.

Fish is the most affordable source of animal protein (Allison, 2001). Fish people consume is either caught by fishermen or obtained from fish farming (cultivation). Fish cultivation is the fastest food production in the world (Kureshy, et.al, 2000). Qualified fish feed is pivotal element in successful fish farming. Artificial feed is frequently used in fish farming business, especially intensive cultivation aiming to accelerate fish growth (Afriyanto and Evi, 2005). Qualified fish feed consists of qualified ingredients. Quality of fish food depends on how much nutrients such as proteins, fats, carbohydrates, vitamins and minerals it contains (Gopalan et al., 2004). Fish farming finds it difficult to get artificial fish feed since it is relatively expensive, even reaching 60-70% of total cost for production. Generally, price of fish feed on the market is relatively expensive (Nasution, 2006). Home-made fish feed produced using simple technique and inexpensive raw materials may become an alternative to overcome the problem. Raw materials used for fish feed should have good nutritional value, accessible, be easy to process, contain nutrients needed by fish, and be affordable (Nasution, 2006). One example of a potential plant for fish feed ingredient is woton (*Sterchulia sp.*) leaves or peel. In Indonesia, woton (*Sterchulia sp.*) can be found in Papua and West Papua. In West Papua, woton (Sterchulia sp.) grows in Gag Island, Raja Ampat and people living in the island use the plant as alternative food (Lekitoo, et.al, 2012). Therefore, an analysis is needed to describe chemical composition, vitamins and secondary metabolites of woton (*Sterchulia sp.*) because of its potential as raw ingredient for fish feed.

METHODS OF RESEARCH

Sample Collection. Woton leaves (*Sterchulia sp*) were collected in July, 2017 from Gag Island, Raja Ampat, West Papua, Indonesia. The leaves were dried naturally for 4 days and grinded using electric mill. Sample was filtered using size 40 mesh sieves. It was stored inside a plastic bag in room temperature for further analysis.

The Proximate Analysis. The proximate and vitamin C analysis were carried out in the Testing Laboratory of Food Quality and Food Safety, Brawijaya University, Indonesia. The chemical analysis describing percentage of crude protein, water, ash, fat and carbohydrate were carried out using methods described by AOAC (1999). All determinations were done in triplicates. Vitamin C was also analyzed according to the Methods of Vitamin Assay (FEFANA, 2006).

The Phytochemical Analysis. The respective anti-nutritive factors such as tannins, phenol, polyphenols and saponins were evaluated according to the standardized chemicals procedures (Harbornes, 1984). This analysis was carried out in *UPT. Materia Medica Batu*, located in Batu, East Java.

Flavonoid Test with TLC Spectrophotometerometry. Two 10x10 cm plates were washed and activated. The initial bottle was 10 mm from the left edge and 10 mm from the bottom of the plate, the band width was 3 mm, and the distance between the bottles was 6 mm. All stains were bottled on 2 separate plates. The first plate was eluted with a TE system motion phase and the second plate with a TF system motion phase. The chamber was saturated for 30 minutes before elution. The elution was carried out until 8 centimeters, and then the plates were dried in the oven at 60°C for 10 minutes. The dried plates were examined using TLC-Scanner 3 (Camag-Mutenz-Switzerland) spectrophotometer at a 210 nm wavelength. The spectra of each peak were read between 190 and 400 nm wavelength and tested for their spectral purity. Rf: 0.85-0.90 (Quercetin); Rf: 0.60-0.65 (Quercitrin); Rf: 0.45-0.50 (Hyperoside); Rf: 0.25-0.30 (Routine).

RESULTS AND DISCUSSION

Results of DNA testing conducted in Genetics Laboratory using Genomic DNA extraction methods using ZR Plants and Seed DNA MiniPrep ™ Kit (Zymo Research), PCR amplification using KOD FX Neo (Toyobo), PCR products purification with Zymoclean ™ Gel DNA Recovery Kit (Zymo Research), and Bi-directional Sequencing showed that there were 2 types of woton (*Sterchulia sp.*) in Gag Island, Raja Ampat, *Sterchulia tragacantha* and *Sterchulia sp*.

Proximate Test Result of Woton (Sterchulia sp.) Leaves. Table 1 described the result of the proximate composition test towards woton leaves (*Sterchulia sp.*) The composition of woton (*Sterchulia sp.*) leaves was not much different from that of woton (Sterchulia sp.) fruits. It consisted of 4.48% protein, 8.27% fat, 70.01% water content and 2.31% ash content 2.31%. Vitamin C the leaves contained was 178.94%, far different from vitamin C the fruit (*Sterchulia sp.*) (Lekitoo, et.al, 2012).

Table 1 – Proximate composition of Woton (*Sterchulia sp*) Leaves

Nutrients	Mean composition ± SD (%)	
	Sterchulia sp	*Sterchulia tragacantha*
Protein content	4.80±0.21	4.45±0.20
Fat content	0.50±0.01	8.86±0.25
Water content	64.32±0.12	50.59±0.16
Ash content	2.10±0.12	1.40±0.05
Carbohydrate	28.29±0.02	34.22±0.33
Vitamin C (mg/ 100 g)	81.79±0.31	17.36±2.66

The scores were mean ± standard deviation of triplicate determination expressed in wet weight basis.

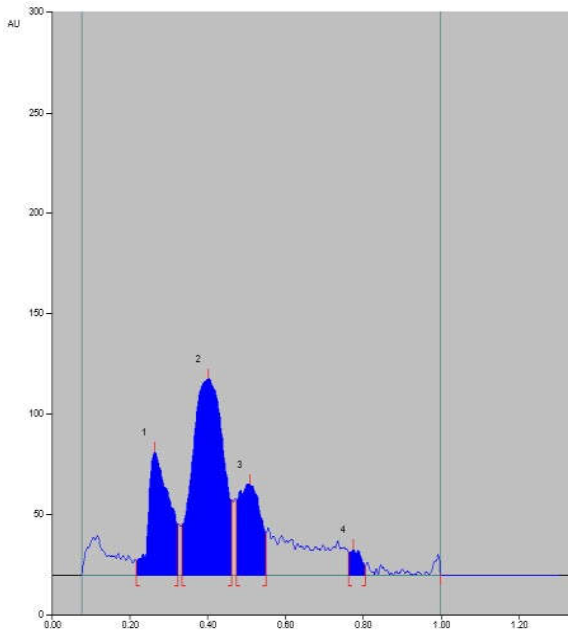
Photochemical Screening Test Result of Woton (Sterchulia sp.) Leaves. Result of phytochemical analysis showed that some anti-nutritive factors such as flavonoids, tannins,

tannins error, phenolic, polyphenol were detected (Table 2). Based on the phytochemical content, woton (*Sterchulia sp.*) was potential ingredient for fish feed production. Flavonoid may function as antioxidants, antibacterials, immunomitators, and anti-inflammatory (Milddlenton, et. Al, 2000) and saponin compounds served as membrane permeabilising and could affect growth and increase fish feeding response (Das, et.al., 2012). In addition, the findings of research on the increase of carp weights after the addition of green diet indicated that vitamin C and flavonoid content helped increasing the fish growth (Sulhi, et.al, 2011).

Table 2 – Phytochemical Content Test Result of Sterchulia sp. Leaf

No.	Phytochemical Test	Type of Woton Leaf		Standard
		Sterchulia sp	*Sterchulia tragacantha*	
1	Flavonoid	+	+	Red/ pink was developed
2	Terpenoid	+	-	Greenish blue was developed
3	Steroid	-	-	Orange or brownish orange was developed
4	Alkaloid Meyer	-	-	White sediment was developed
5	Alkaloid dragendroff	-	-	Orange sediment was developed
6	Tanin	+	+	Blackish brown, blackish blue, and blackish green were developed
7	Tanin error	+	+	Blackish brown, blackish blue, and blackish green were developed
8	Tanin Catechol	-	-	Red sediment was developed
9	Phenolic	+	+	Blackish brown, blackish blue, and blackish green were developed
10	Polyphenols	+	+	Blackish brown, blackish blue, and blackish green were developed
11	Saponen	+	-	Permanent foam was developed

- absent; + present.



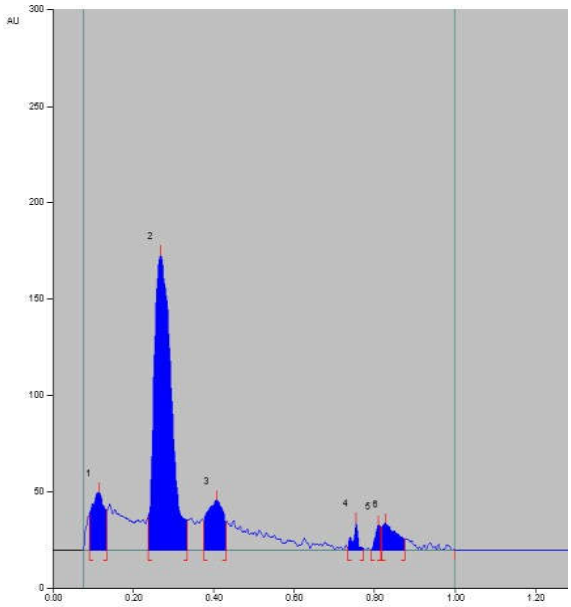
Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height
1	0.22 Rf	7.4 AU	0.26 Rf	61.4 AU	28.21 %	0.32 Rf	25.4 AU
2	0.34 Rf	25.4 AU	0.40 Rf	97.9 AU	45.01 %	0.46 Rf	37.7 AU
3	0.48 Rf	37.2 AU	0.51 Rf	45.3 AU	20.84 %	0.55 Rf	20.8 AU
4	0.76 Rf	11.5 AU	0.78 Rf	12.9 AU	5.94 %	0.81 Rf	4.7 AU

Figure 1 – TLC Flavonoid Test Result on *Sterchulia sp* Leaves

Several polyphenol compounds also had anti-hypertension activities. Some previous studies also showed that flavanoids and tannin, generally found in fruits, vegetables and beverage, were able to inhibit nicotinamida adenine dinucleotida phosphat (NADPH) oxidation by inhibiting ACE, increasing eNOS-specific, as well as changing cyclooxygenase-

2 (COX-2) (Baradaran, et.al., 2014; Sulastri and Liputo, 2011; Kizhakekuttu and Widlansky, 2010; Beg, et.al., 2011; Sharifi, et. al., 2013; Mensah, et.al., 2010). Flavonoids and tannin inhibited ACE activities, which is vital in arterial blood pressure regulation. Phenol compound activities were the result of a number of hydroxyl groups in benzene rings. Docking studies showed that phenolic and flavanoid acid inhibited ACE through interaction with zinc ions and the interaction was stabilized using another interaction with amino acid in the active side (Guerrero, et.al., 2012).

Flavonoid Test Using TLC Spectrophotodensitometer. Figure 1 described the result of flavanoid test using TLC spectrophotodensitometer for *Sterchulia sp*. leaves and Figure 2 describe the result of the same test for *Sterchulia trigacantha*.



Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position
1	0.09 Rf	18.2 AU	0.12 Rf	30.3 AU	12.06 %	0.14 Rf
2	0.24 Rf	17.1 AU	0.27 Rf	153.1 AU	60.98 %	0.33 Rf
3	0.38 Rf	15.3 AU	0.41 Rf	25.8 AU	10.29 %	0.43 Rf
4	0.73 Rf	1.4 AU	0.76 Rf	14.7 AU	5.87 %	0.77 Rf
5	0.79 Rf	0.0 AU	0.81 Rf	13.2 AU	5.28 %	0.82 Rf
6	0.82 Rf	11.9 AU	0.83 Rf	13.9 AU	5.52 %	0.88 Rf

Figure 2 – TLC Flavonoid Test Result on *Sterchulia trigaganta* Leaves

Based on Figure 1, the TLC result showed that *Sterchulia* sp. leaves contained quarcetin and routine flavanoids.

CONCLUSION

There are two types of woton (*Sterchulia sp.*) grown in Gag Island, Raja Ampat, namely *Sterchulia sp.* and *Sterchulia trigacantha.* The proximate composition of *Sterchulia sp.* leaves is 4.8 % protein, 0.5 % fat, 64.32 % water, 2.10 % ash, 28.29% carbohydrate, and 81.79 mg/ 100 g vitamin C. The proximate composition of *Sterchulia trigacntha.* leaves is 4.45% protein, 8.86% fat, 50.59% water, 1.4% ash, 34.22% carbohydrate, and 17.36mg/100g vitamin C. *Sterchulia sp* leaves contain anti-nutrient /secondary metabolite compounds such as flavonoids, terpenoid, tannin, tannin error, phenolic, polyphenols and saponin while *Sterchulia trigacantha* leaves contain anti-nutrient /secondary metabolite compounds such as flavonoids, tannin, tannin error, phenolic and polyphenols. TLC test results showed that *Sterchulia* sp. leaves contain hyperocide and routine flavanoids while *Sterchulia trigacantha* leaves contain quarcetin and routine flavanoids.

REFERENCES

1. Afrianto, Eddy and Evi Liviawaty, 2005, Pakan Ikan, Yogyakarta: Kanisius.
2. Allison E.H. (2001) Big laws, small catches: global ocean governance and the fisheries crisis, Journal of International Development 13(7): 933-950, DOI: 10,1002/jid,834.

3. AOAC (Association of Official Analytical Chemists) (1999) Official Method of Analysis. 2nd edition, Association of Official Analytical Chemists, Washington D.C., pp. 807-92.
4. Baradaran A, Nasri H, Kopaei RM. 2014. Oxidative stress and hypertension: possibility of hypertension therapy with antioxidants. J Res Med Sci.19(4):358–367.
5. Beg M, Sharma V, Akhtar N, Gupta A, Jasim M. 2011. Role of antioxidants in hypertension. J Indian Acad Clin Med. 12(2):122–7.
6. Das TT, Benerjee D, Chakraborty D, Pakhira MC Shirvastava B, Kuhad RC.2012 Saponi : Role in Animal System Veterenary World Vol 5.No.4.
7. EU Feed Additives and Premixtures Association (Fefana) (2006). Method of Analysis of Vitamins, Provitamins and Chemically well defined substances having a similar biological effect, Part 1 “Tel Quel”. pp. 6-45. www fefana.org.
8. Gopalan C, Sastri BVR, and Balasubramanian SC, (2004) Nutritive Value of Indian Foods, National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, India, pp.2-58.
9. Guerrero L, Castillo J, Quiñones M, Vallvé SG, Arola L, Pujadas G. 2012. Inhibition of angiotensin-converting enzyme activity by flavonoids structure-activity relationship studies. PLOS One. (11):e49493.
10. Harborne, J. B. (1984). Methods of plant analysis. In Phytochemical methods (pp.1-36). Springer Netherlands.
11. Kizhakekuttu TJ, Widlansky ME. 2010. Natural antioxidants and hypertension: promise and challenges. Cardiovas Ther. 28(4): e20–32.
12. Kureshy N, Davis DA and Arnold CR (2000) Partial replacement of fish–and bone-meal in practical diets for juvenile red drum, North American Journal of Aquaculture 62(4): 266-272, DOI: 10,1577/15488454(2000)062<0266:PROFMW>2,0,CO;2.
13. Lekitoo K., Batorinding E., Dimomonmau P.A., Wilson F. Heatubun R.C.D. and Lekitoo H.Y. 2012. Re-Diversifikasi Pangan Di Tanah Papua Bagian-1. Pemanfaatan Enam Jenis Tumbuhan Hutan Penghasil Buah sebagai Sumber Bahan Pangan di Tanah Papua. Badan Penelitian dan Pengembangan Kehutanan. First Edition. ISBN 978-979-8452-51-2
14. Mensah MEE, Komlaga G, Terlabi EO. 2010. Antiypertensive action of ethanolic extract of Imperata cylindrica leaves in animal models. L Med Plants Resch. 4(14):86–91.
15. Middleton EC, Kamdaswani C, Theoharides TC, 2000. The Effect of Plant Falvonoids on Mammalian Cells: Implications for Imfalmation, Heart Disease, and Cancer. Pharmacological Reviews 52:673 – 571.
16. Nasution, E, Z, (2006), Studi Pembuatan Pakan Ikan dari Campuran Ampas Tahu, Ampas Ikan, Darah Sapi Potong, dan Daun Keladi yang Disesuaikan dengan Standar Mutu Pakan Ikan, Sains Kimia, 10(1), 39.
17. Sharifi N, Souri E, Ziai SA, Amin G, Amanlou M. 2013. Discovery of new angiotensin converting enzyme (ACE) inhibitors from medicinal plants to treat hypertension using an in vitro assay. DARU J Pharm Sci. 21:74–81.
18. Sulastri D, Liputo NI. 2011. Konsumsi antioksidan dan ekspresi gen eNOS3 alel-786T>C pada penderita hipertensi etnik Minangkabau. MKB.43(1):1–9.
19. Sulhi, M., Samsudin, R., & Hendra, H. 2011. Penggunaan Kombinasi Beragam Pakan Hijauan Dan Pakan Komersial Terhadap Pertambahan Bobot Ikan Gurami (Ospronemus gouramy). In Prosiding Forum Inovasi Teknologi Akuakultur (Vol. 1, No. 1, pp. 759-764).
20. Wirasuta, I M.A.G. (2012). Chemical Profiling of Ecstasy Recovered From Around Jakarta By High Performance Thin Layer Chromatography (HPTLC)Densitometry (In Press). Egypt J Forensic Sci, vol 2 (3). p.97–104.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.43

MATURATION OBSERVATION OF GONAD IN MUDSKIPPER PSEUDAPOCRYPTES ELONGATUS FROM KALI LAMONG RIVER (GRESIK, INDONESIA)

Fariedah Fani*, **Widodo Sri Maheno**, **Yuwanita Rani**
Aquaculture Study Program, Department of Fisheries Resources Utilization,
Faculty of Fisheries and Marine Science, University of Brawijaya, Indonesia
*E-mail: fanifariedah@ub.ac.id

ABSTRACT
Pseudapocryptes elongatus is commonly found in river estuaries near mangroves. This fish can be caught These fish could be arrested as the water is undergoing high tide and is used as fish consumption by the inhabitants of around the north coast of java island, indonesia. The study was conducted to obtain information about the maturity of gonad and fecundity of *Pseudapocryptes elongatus* in Kalilamong River from July to September 2017. The fish were then dissected to do observation of the gonads. Weight, length and gonad *Pseudapocryptes elongatus* were weighed and measured, and then visual observations were performed on the fish gonads. The results showed that during observation not many fish were spawning, this was demonstrated by GSI calculations and visual observations of the gonads. The maturity stage of gonads varies from maturity stage of gonad I to IV, with GSI that varies from 0.03-0.75% for female fish and 0.001-0.65 for male fish.

KEY WORDS
Gonad, maturity, mudskipper, *Pseudapocryptes elongatus.*

Pseudapocryptes elongatus (Cuvier, 1816) including members of the family of gobiidae, also called mudskippers. In Gresik and its surroundings areas,it is known of "*P. elongatus*". *P. elongatus* not yet known by the community because it has not been cultivated. *P. elongatus* many traded in the gresik, especially in the northern part of Gresik which is the coastal area and estuary Bengawan Solo. This fish has a soft texture and with a delicious and distinctive flavor.

To meet market demand, until now *P. elongatus* continue to be caught from its natural habitat, so it is feared there is over exploitation, because there is an indication of the catch is declining. Kottelat et al. (2013) states that in terms of conservation, the decrease in the number and size of fish is one indication of the decrease in the quantity and quality of the population. The decrease in the quantity and quality of the population of a species may lead to a decrease in genetic variation, which in turn may result in a decrease in the ability to adapt to the environment. Further impact, the species is prone to extinction.

Assess the potential *P. elongatus* having excellence in some aspects and the consideration of conditions in *P. elongatus*in natural habitats threatened kelestariannya, so *P. elongatus* need to promoted to be used as fish cultivation.Information about *P. elongatus* which includes habitats and character biology that influential on the lives of *P. elongatus*in northern waters gresik still very limited, so he damaged support the domesticated and cultivation of *P. elongatus* necessary information from various aspects of biology, of them are biology reproduction, ecology, fodder and the habit of eating, character morfometrik, genetic character and others.

Seeing the potential of *P. elongatus* that have advantages in some aspects and consider the condition of the *P. elongatus* in natural habitats that are threatened sustainability, then *P. elongatus* should be promoted to be a fish cultivation. Information on *P. elongatus* that includes habitats and biological characters that affect the life of *P. elongatus* in the northern waters of Gresik is still very limited, so that to support the domesticated and cultivation of *P. elongatus* required biological information from various aspects, such as reproductive biology, ecology, feed and eating habits , morphometric characters, and genetic characters.

The fish reproduction character is an important biological information as a reference for conservation and domestication. Various aspects of reproductive character that can provide an overview of the reproductive capacity of fish species according to Bucholtz et al (2009) include sex ratio, the level of maturity stage, gonadosomatic index, first-size mature gonad, fecundity, and distributions of oocyte diameter.

Maturity stage is the stage of development of gonads before and after the fish spawn. Knowledge of the stages of gonad maturity is needed, among others, to predict the fish that have been and not mature gonads from stocks found in the waters, the size or age of fish first experienced mature gonads, as well as the season and frequency of spawning fish in one year. The quantitative change of maturity stage is expressed by GSI, which is a value in percent (%), as a result of the weight ratio of gonads to fish body weight including gonads multiplied by 100%. GSI value will be maximized at the time the fish will spawn and will be at least after the spawn fish (Effendie, 2002).

MATERIALS AND METHODS OF RESEARCH

The fish to be dissected, first measured in total length (TL), standard length (SL), body width (BW), height (HD), head length (HL), caudal fin length, head volume and lateral linea (LL) . The length measurement uses a sliding threshold with a precision of 0.1 mm, and weighed the body weight using a sartorius scale with accuracy of 0.0001 gr.

1. Taking of the gonads fish and preservation sample:

Taking fish gonads is done by dissecting fish on the abdominal portion vertically from the anus to the vertebrae, then horizontally leading to the ventral fin. When the abdomen of the fish is open, the gonads can be observed to determine the maturity stage. Gonads are taken from the gastrointestinal tract and swimming bubbles. Then the gonads are weighed and placed into a bottle of film containing 10% formalin until the gonad is submerged.

2. Determination of Gonadal Maturity stage:

The GonadalMaturity stage is determined based on the standard determination of morphological gonad maturity stage (Effendie, 2002) and through histology research. Maturity stage observations through morphology include: shape and size, weight, color and smoothness or absence of ovaries. The results were then compared with the general classification of maturity stage according to Effendie (1979. While assessment of gonadal maturity stage with histology research, observed the existence of oogonia, oocyte, ootid, egg yolk, and egg diameter.

3. Determination of Gonadosomatic Index (GSI):

The Gonadosomatic Index (GSI) can be determined by weight the fish and the gonads. Fish weights were weighed by using weight digital precision 0.01 in grams (gr). While the weight of gonad is calculated by using a sartorius scale precision of 0.0001 gr. The Gonadosomatic Index can be calculated using the formula (Effendie, 1979).

$$GSI = \frac{Gw}{w} \, x \, 10$$

Where: GSI = Gonad Maturity Index; Gw = Gonad Weight (gr); w = Fish weight (gr).

4. Determination of Fecundity:

Samples of gonad the *P. elongatus* which are thought to have matured gonads are selected for fecundity calculated. Pre-preserved gonads, dried and washed with aquades to remove 10% formaldehyde solution. Then,the gonad samples were placed on filter paper and dried for ± 10 minutes. Furthermore, the gonads are divided into three parts namely the tip, middle, and base of the gonad. Each part is taken 3% to be weighed and observed the number of eggs. In this research, determination of Fecundity the *P. elongatus* is done by gravimetric method which refers to Effendie (1979).

$$F = \frac{G}{Q} x N$$

Where: F = Fecundity (grains); G = Weight of gonad (gr); Q = Weight of sub gonad (gr); N = number of eggs in sub gonads (grains).

RESULTS OF STUDY

Gonad Maturity stage. Generally, male and female *P. elongatus* can be distinguished by observation on the dimorphism of the fish. Male and female *P. elongatus* have a slightly different pattern, female has a pattern that extends to the lateral linea, while the male pattern is not up to the lateral linea. Based on the surgery shows that the gonad of *P. elongatus* is located above the swim bladder.

Visual observation of fish gonad *P. elongatus* refers to *P. papilio* that has been done by Lawson, et al (2010) (Table 1). The visual observation of the gonads showed that maturity stages of male and female jaws ran vary from maturity stage 1 to 4 (Figures 1, 2).

Table 1 – Description of stages of gonadal maturity stage on *P. Papilio*

TKG	Degree of matur	Female	Male
1	immature	Gonad looks like a non transparent thread	Gonad looks like a non-transparent thread
2	Immature and developing	Gonad looks bigger and the surface is rough	Gonad looks bigger and the surface is rough
3	Ripening	many blood vessels on the surface of the gonads. Gonad is transparent yellow	Visible many blood vessels on the surface of the gonads. The color of the gonads begins to whiten
4	Ripe	Gonads fill most of the space in the abdominal cavity	Gonads fill most of the space in the abdominal cavity
5	Ripe Running	The egg will come out when it gets a little massage	Sperm cells will come out when they get a little massage
6	Spent	Abdominal cavity began to empty	Abdominal cavity began to empty
7	Recovery-spent	Invisible oocytes left, reddish gonads	Invisible spermatocytes left, reddish gonads

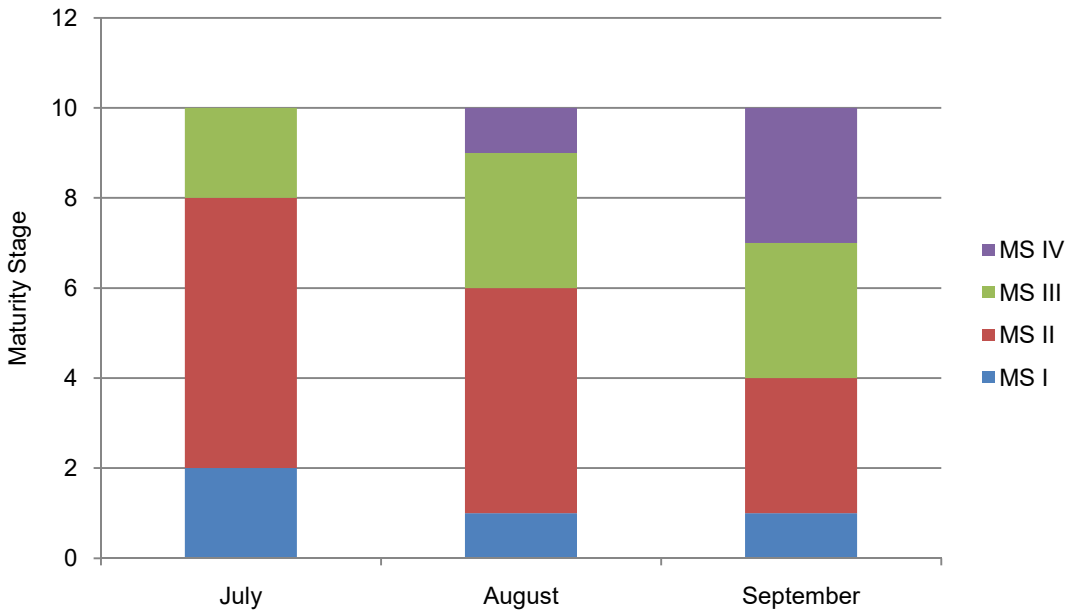


Figure 1 – The maturity stage of gonads on female *P. elongatus* based on observation months

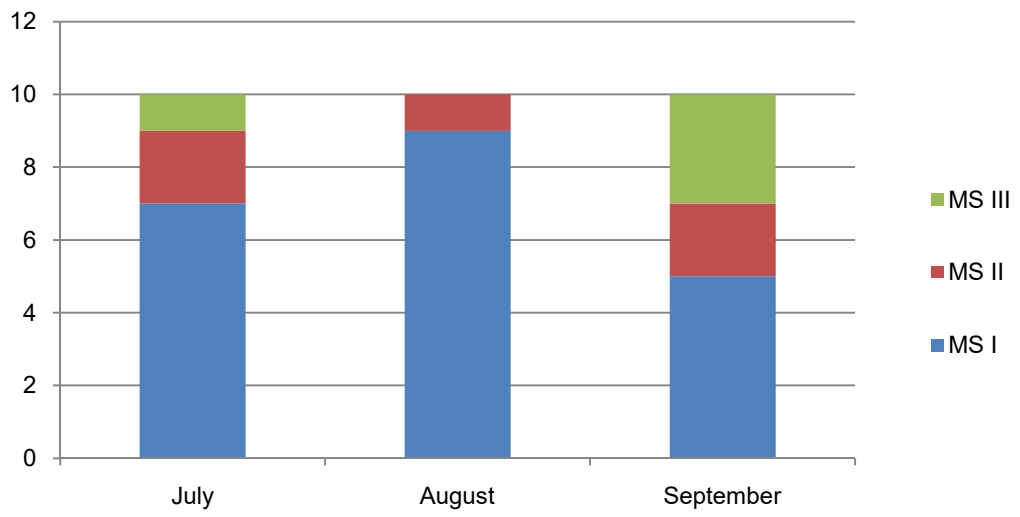


Figure 2 – The maturity stage of gonads on male *P. elongatus* by month of observation

Figure 1 showed gonad of *P. Elongatus* matures in September. In July, female gonads were not seen reaching maturity stage IV and not found in male fish *P. elongatus*mature the gonads, but it appeared to be seen maturing in September

Observation of gonad maturity is also done by calculating GSI (Gonadosomato index) presented in percent. GSI calculations show that *P. elongatus* captured from July to September does not exist in the mature condition of gonads with the largest GSI in Males 0.65% and 0.75% for females (Figure 3). This is also stated by Bucholtz et al (2009), that *P. elongatus* fish in China has a GSI value of 14.5% while *P. elongatus* in Pakistan has a GSI value of up to 4% in mature gonad conditions and is ready for breeding .

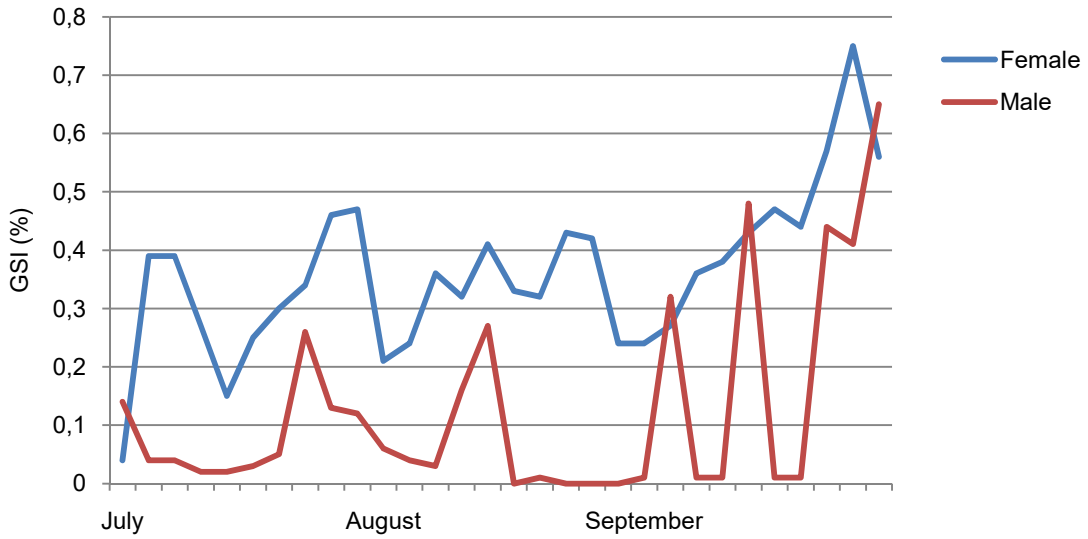


Figure 3 – The value of gonadosomatic index (%) *P. elongatus* by month

GSI has been used to explain the development of gonads in Pike fish (Danilenko, 1983). Progressively GSI will increase with the increasing percentage of individual that will enter the spawning season (Mohammed, 2010). The most practical method for determining the spawning season in fish is by knowing the value of GSI it has (El-Greisy, 2000: Assem, 2000 and 2003; honji et al, 2006). Similarly, Efriyeldi et al. (2012), the percentage value of

GSI changes with the change of maturity level of gonad, so it can be used to know the spawning season of a species.

Observations on gonadal maturity *P. elongatus*indicate that *P. elongatus*captured in July until September is not mature gonads, it is also said by Dinh, et al (2007) that *P. elongatus* will spawn at the beginning and end of the rainy season.

Fecundity. The number of eggs present in the female fish gonads before being expended for the purpose of spawning is called fecundity. Based on the calculation result, fecundity of*P. elongatus* varies between 68,334- 275,656 grains. The lowest fecundity was obtained in fish with total lenght 13 cm and the highest fecundity was obtained in fish with total lenght 18 (Figure 4).

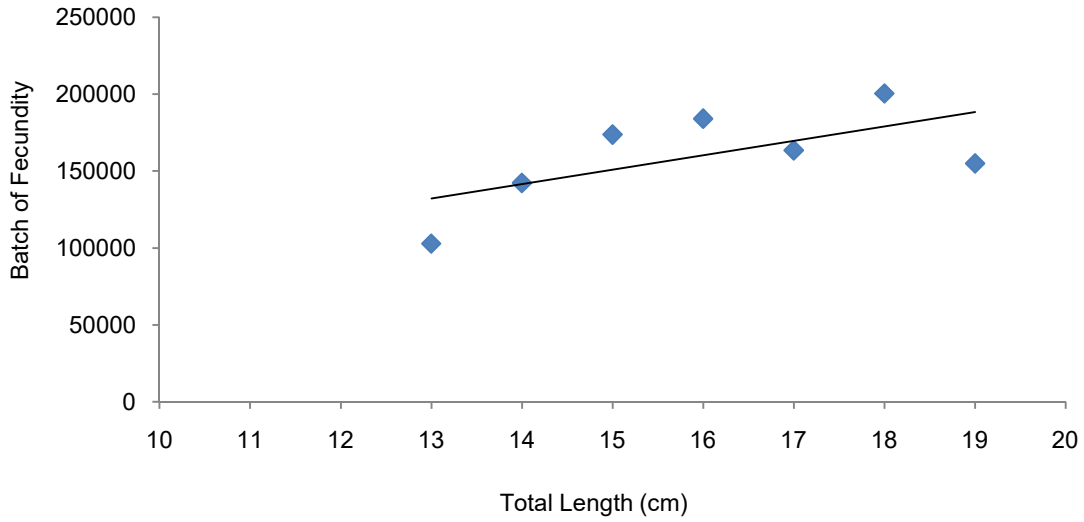


Figure 3 – The relationship between total lenght (TL) and batch fecundity (F) *P. Elongatus* in the Kalilamong River

The results of the study showed that *P. elongatus*fecundity can be quite high when compared with other mudskipper fish. The results of research conducted by Dinh et al (2015) showed that fecundity of *Parapocryptes seperaster* as much as 6,000 - 11,700 grains in total length 11.9 - 21.5 cm. In a study conducted by Sharifian et al. (2017) stated that in *Boleophthalmus dussumieri* has fecundity of 1,031 - 3,952 eggs per fish and P.barbarus has 900-23.933 (Udo, 2002). The batch of fecundity can affected by the geographic and water quality (Dinh, 2015).

CONCLUSION

Based on observations of the gonads of P. elongatus from July to September 2017, it was found that no P. elongatus was being ripe for either male or female gonads. This is because the observation month has not yet entered the rainy season, while P. elongatus is thought to spawn at the height of the rainy season until the end of the rainy season, so that in August it is seen that female P. elongatus gonad enters gonad maturity level 4 although gonad fish is still entering maturity level level 3 gonads

ACKNOWLEDGEMENTS

The research was funded by the Research and Community Service Institution Through Non-Tax State Revenue Fund (PNBP) Brawijaya University In accordance with the List of Implementation of Budget (DIPA) Brawijaya University Number DIPA-042.01.2.400919/2017.

REFERENCES

1. Assem SS. The reproductive biology and histological characteristic of the pelagic carangid female. Caranxcrysos from the Egyptian Mediterranean sea. Ger.SocZool, 2000; 31(c); 195-215.
2. Assem SS. The reproductive biology and histological and ultrastructural characteristics of the ovary of female pelagic fish Pagelluserythrinus from the Egyptian Mediterranean urater. J Egypt Ger Soc Zool. 2003; 42:77-103.
3. BucholtzR. H, A. S. Meilvang, T. Cedhagen1 and J.T. Christensen. 2009. Biological Observations on the Mudskipper Pseudapocrypteselongatus in the Mekong Delta, Vietnam. Journal of The World Aquaculture Society. 40 (6): 711-723.
4. Danilenko TP. The reproductive cycle of the Pike, Esox Lucius L. in the Kanev Reservoir. Hydrobiology 1983; 18:21-27.
5. Dinh TP, Ambak MA, Hassan A, Phuong NT. Biology and Population dynamics of the goby pseudopocrypte selogatus in the coastal mud flat areas of the Mekong Delta, Vietnam, Pakis, J Bio Sci. 2007; 10(9):3284-3294.
6. Dinh, M. Q., Nguyen, T. T. G., dan Nguyen, T. K. T. 2015. Reproductive Biology of the Mudskipper Boleophthalmus boddarti in Soc Trang. Tap Chi Sinh Hoc. 37 (3): 362 – 369.
7. Effendie, M. I. 1979. Metode Biologi Perikanan. Bogor: Yayasan Dewi Sri.
8. Biologi Perikanan. 2002. Bogor: Yayasan Pustaka Nusatama.
9. Efriyeldi, Ditriech G. B., Ridwan, A., dan Tri, P. 2012. Perkembangan Gonad dan Musim Pemijahan Kerang Sepetang (Pharella acutidens) di Ekosisitem Mangrove Dumai, Riau. Maspari Journal. 4(2): 137 – 147.
10. El-Greisy Z. Reproductive Biology and Physiology of DiplodusSargus (Family: Spariidae) in the Mediterranean environment. Ph. D Thesis Department of Environmental studies institution of Graduate studies Alex University, 2000.
11. Fariedah, Fani., Widodo, M. S., Fadjar, M., Ashshiddiqie, H. Morphological Character The Mudskipper Pseudapocryptes Elongatus In The Gresik North Coastal Area. Proceeding international conference the 7th green technology faculty of science and technology UIN Maliki. 2016.
12. Honji RM, Vas-dos-Santos AM, Rossi WS. Identificationof the stages of ovarian maturation of the Argernnehak, Merluccuus hubbsi marini, (Teleostei: Merluccidae) advantages and disadvantages of the use of the macroscopic and microscopic scales, Neotrop. Ichthiol 2006; 443:329-337.
13. Kottelat, M. 2013. The Fishes of the Inland Waters of Southeast Asia:A Catalogue and Core Bibliography of the Fishes Known to Occur in Freshwaters, Mangroves and Estuaries. The Raffles Bulletin of Zoology. (27): 1–663.
14. Lawson, Immanuel Olugbenga. 2010. Maturation and histological character of ovaries in mudskipper, peropthalmus papilio from Lagos lagoon. Journal of American Seriesю
15. Minh, T. H., Wenresti, G. G., dan Nguyen, T. P. 2010. Fishery and Aquaculture of Juvenile Mudskipper Pseudapocryptes elongatus (Cuvier, 1816) in the Coastal Zone of Mekong Delta, Vietnam. Asian Fisheries Science. 23: 224 – 239.
16. Sharifian, S. Taherizadeh, M. R., Salarpouri, A., dan Dehghani, M. 2017. Population Structure and Reproductive Biology of theMudskipper Boleophthalmus Dussumieri Valenciennes, 1837 from the Bay of Hormozgan Province, Persian Gulf. Cah. Biol. Mar. 58: 25-32.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.44

ОСОБЕННОСТИ РОСТА И РАЗВИТИЯ СКЕЛЕТА ТУШ БЫЧКОВ ЧЕРНО-ПЕСТРОЙ ПОРОДЫ И ЕЕ ПОМЕСЕЙ С АБЕРДИН-АНГУССКОЙ И ШАРОЛЕЗСКОЙ

CHARACTERISTICS OF GROWTH AND DEVELOPMENT OF THE SKELETON CARCASSES OF CALVES OF BLACK-MOTLEY BREED AND ITS HYBRIDS WITH ABERDEEN-ANGUS AND CHAROLAIS

Прохоров И.П., доктор сельскохозяйственных наук
Prokhorov I.P., Doctors of Agricultural Sciences
РГАУ-МСХА имени К.А. Тимирязева, Москва, Россия
Russian State Agrarian University - Moscow Timiryazev Agricultural Academy, Moscow, Russia

Пикуль А.Н., кандидат сельскохозяйственных наук
Pikul A.N., Candidate of Agricultural Sciences
Тульский научно исследовательский институт сельского хозяйства, Тульская область, Россия
Tula Research Institute of Agriculture, Tula Region, Russia

*E-mail: anzpikul@mail.ru.

АННОТАЦИЯ
В статье рассмотрены вопросы особенностей роста и развития скелета бычков черно-пестрой породы и ее помесей с абердин-ангусской и шаролезской. Установлено, что с возрастом бычков абсолютная масса скелета туш повышалась, а относительная его масса снижалась. Наибольшая относительная масса костяка туш (29,5 – 31,8%) установлена у новорожденных бычков. В годовалом возрасте его удельный вес снизился до 17,1-19,8%, а в конце опытного периода – до 16,2-18,6%. В постнатальный период интенсивность роста осевого отдела скелета повышалась, а периферического снижалась. Наибольшая интенсивность роста характерна для ребер и позвоночника, наименьшая – для дистальных отделов конечностей. Установленные различия в интенсивности роста различных отделов скелета приводят к изменениям соотношения между ними, вследствие чего изменяются линейные размеры тела и телосложение бычков. Индексы высоконогости и грудной индекс у телят при рождении составили в среднем 63,4-63,5 и 61,4-62,0 , а у 18-месячных бычков – 45,7-47,8 и 69,9-74,7.

ABSTRACT
The article considers issues of peculiarities of growth and development of the skeleton of calves of black-motley breed and its hybrids with Aberdeen-Angus and Charolais. It is established that with age, steers the absolute mass of the skeleton carcasses increased, but its relative weight has decreased. The greatest relative mass of the backbone of the carcasses (of 29.5 to 31.8%) was demonstrated in newborn calves. At one year of age its share declined to 17.1-19.8%, and at the end of the trial period – to 16.2-18.6%. In the postnatal period, the growth rate of the axial division of the skeleton is increased, and peripheral decreased. The highest intensity of growth is typical for ribs and spine, and lowest for distal extremities. The established differences in the rate of growth in different parts of the skeleton lead to changes in the ratio between them, resulting in changes of linear body dimensions and body composition of steers. Indexes vysokogorii and thoracic index in calves at birth amounted to an average of 63,4 at 63,5 and 61,4-62,0, and 18-month bulls – 45,7-47,8 and 69,9-74,7.

КЛЮЧЕВЫЕ СЛОВА
КРС, помеси, скелет, рост, развитие.

KEYWORDS
Cattle, hybrids, skeleton, growth, development.

Сущность индивидуального развития организма животных сводится к закономерному увеличению размеров тела до определенной константы, строго детерминированной генетической программой вида животных. При этом основную роль в формировании общих размеров туловища животных играет рост скелета, величина и форма которого определяют длину, высотные и широтные размеры тела животного. В связи с этим при изучении роста и развития животных большое значение придается развитию скелета, поскольку он является важным морфологическим показателем, отражающим экстерьер и конституциональный тип животного, которые тесно связаны с его продуктивностью. Однако следует отметить, что многие исследования, связанные с ростом скелета, в большей степени имеют анатомическую направленность и, как правило, ограничиваются изучением абсолютной и относительной массы костяка.

При производстве говядины стремятся получать животных с высоким выходом съедобной части туш при минимальном содержании костяка. В то же время известно, что интенсивное развитие мускулатуры возможно, если костяк имеет достаточную поверхность для ее прикрепления. Из этого следует, что долю скелета можно снижать лишь до определенного предела, так как мясным животным требуется костяк с достаточной поверхностью, как для прикрепления и поддержания мускулатуры, так и для локомоции. Кости животных современных скороспелых мясных пород шире и короче, что способствует развитию и наращиванию мощной мускулатуры. Большая ширина холки, спины и поясницы у них связана с особым строением позвонков и относительно короткими остистыми отростками.

Исходя из значимости костной ткани в формировании мясной продуктивности животных, следует отметить, что широкое использование голштинских быков в скрещивании с коровами черно-пестрой породы способствовало повышению удоев, пригодности к промышленной технологии помесных коров (5,11). Однако голштинский скот обладает лишь удовлетворительными мясными качествами и имеет присущие специализированным молочным породам особенности: относительную позднеспелость, высокий выход костей в туше. В связи с этим имеются вполне обоснованные опасения, что использование голштинских быков для повышения молочной продуктивности черно-пестрого скота может привести к изменению его типа и снижению мясных качеств (1, 2, 6, 9, 10).

В связи с необходимостью замещения на рынке импортной говядины на таковую отечественного производства, а, следовательно, для обеспечения продовольственной безопасности страны необходимы изыскания методов повышения производства говядины и улучшения ее качества. Известно, что наиболее эффективным методом повышения производства высококачественной говядины является использование в скрещивании коров молочного и комбинированного направления продуктивности с быками специализированных мясных пород (4, 7, 12, 14).

Настоящая работа посвящена изучению особенностей роста и развития скелета бычков черно-пестрой породы и ее помесей с абердин-ангусской и шаролезской.

МАТЕРИАЛЫ И МЕТОДЫ ИССЛЕДОВАНИЙ

Для проведения опытов были отобраны и сформированы 3 группы бычков по 15 голов в каждой. Формирование групп проводили методом пар-аналогов с учетом происхождения, возраста и массы при рождении. В первую (контрольную) группу были включены бычки черно-пестрой породы, во вторую и третью (опытные) группы – соответственно бычки 1/2 кровности от скрещивания коров указанной породы с абердин-ангусскими и шаролезскими быками. Формирование групп проводили по методу пар-аналогов с учетом происхождения, возраста, живой массы при рождении. Животные всех групп находились в одинаковых условиях кормления и содержания. Содержание животных было стойловое, до 6 месяцев групповое в клетках в последующие возрастные периоды – на привязи. Опыты проводили от рождения до 18 месячного возраста. Уровень кормления подопытного молодняка был интенсивным и

рассчитан для получения среднесуточных приростов 1000 – 1100 г. и достижения живой массы в возрасте 18 месяцев 550-600 кг. Учет потребленного корма проводили ежедекадно путем взвешивания заданных кормов и их остатков. Кормление и условия содержания по группам не различались.

Прирост живой массы бычков контролировали путем ежемесячного взвешивания. Контрольные убои были проведены на Подольском мясокомбинате. При рождении было убито по 1 бычку из каждой группы, в возрасте 6 и 12 месяцев – по 3 головы, а в 15 месяцев – по 5 бычков. После проведения контрольных убоев в 15 месячном возрасте, был продолжен откорм оставшихся бычков (по 3 головы в каждой группе). При этом ставилась задача изучить характер и интенсивность роста и развития основных тканей туш.

Для определения закономерностей возрастных изменений скелета туш после препарирования мускулатуры и тщательного очищения костей их взвешивали. Определяли суммарную массу позвоночника, ребер. Каждую кость конечностей и грудную кость взвешивали отдельно. На основе абсолютных данных о массе костей была высчитана их средняя для каждой группы, а также относительная масса костяка (масса, выраженная в процентах ко всей массе скелета туш).

РЕЗУЛЬТАТЫ И ИХ ОБСУЖДЕНИЕ

Интенсивное выращивание и откорм животных в течение опытного периода обеспечили высокую интенсивность роста бычков всех групп. Шаролезские помеси обладали повышенной энергией роста и в возрасте 12, 15 и 18 месяцев живая масса их достигла соответственно 409,7± 5,8; 498,8± 6,2 и 571,8 ± 9,7 кг, что на 6,1; 8,5 и 11,8% ($P< 0,05$ – $P< 0,001$) больше, чем у сверстников материнской породы. Различия в величине указанного показателя между животными 1 и 2 групп были незначительны.

По мере роста и развития абсолютная масса скелета полутуш бычков всех групп увеличивалась, а относительная масса снижалась. Так, масса скелета полутуш бычков черно-пестрой породы в возрасте 6, 12 и 18 месяцев составила соответственно 11,7±1,4; 20,4±2,1 и 24,2 ±1,8 кг, а абердин-ангусских и шаролезских помесей: 10,8±0,9 и 11,2±1,7; 17,9±1,8 и 18,4±2,1; 22,4±1,6 и 24,7 ± 1,0. Межгрупповые различия по величине этого показателя во все возрастные периоды были незначительны.

Наибольшая относительная масса костяка туш (29,5 – 31,8%) установлена у новорожденных бычков. В годовалом возрасте его удельный вес снизился до 17,1 – 19,8%, а в конце опытного периода – до 16,2 – 18,6%.

Для наиболее полной характеристики интенсивности роста костяка туш вычислены коэффициенты их роста. Коэффициенты роста скелета туш у бычков материнской породы в возрасте 6, 12 и 18 месяцев составили соответственно 3,34; 5,83 и 6,91, а у помесей 2 и 3 групп – 3,48 и 3,11; 5,77 и 5,11; 7,26 и 6,86.

Среднесуточный прирост скелета туш за опытный период у черно-пестрых бычков и у абердин-ангусских помесей составил по 71 г, а у шаролезских помесей – 77 г.

Выше было показано, что по мере роста и развития бычков доля костяка в их тушах снижалась. В связи с этим представляет интерес изучение возрастных изменений скелета туш и составляющих его отдельных костей и их комплексов, а также осевого и периферического отделов скелета. Поскольку характер и интенсивность роста и развития костной ткани туш у животных сравниваемых групп сходный, приведены возрастные изменения скелета черно-пестрых бычков (рис. 1).

Из данных видно, что удельный вес периферического отдела скелета у новорожденных бычков, по сравнению с относительной массой их в последующие возрастные периоды, значительно выше. Так, если доля периферического отдела в общей массе скелета у бычков при рождении составила 60,53%, то в возрасте 12 и 18 месяцев – соответственно 51,89 и 50,38%. Возрастные изменения относительной массы осевого отдела скелета существенно отличались от таковых периферического отдела. Так, удельный вес осевого отдела скелета у бычков в возрасте 12 и 18

месяцев, по сравнению с таковым новорожденных бычков, увеличился соответственно на 8,7 6 и 10,27%.

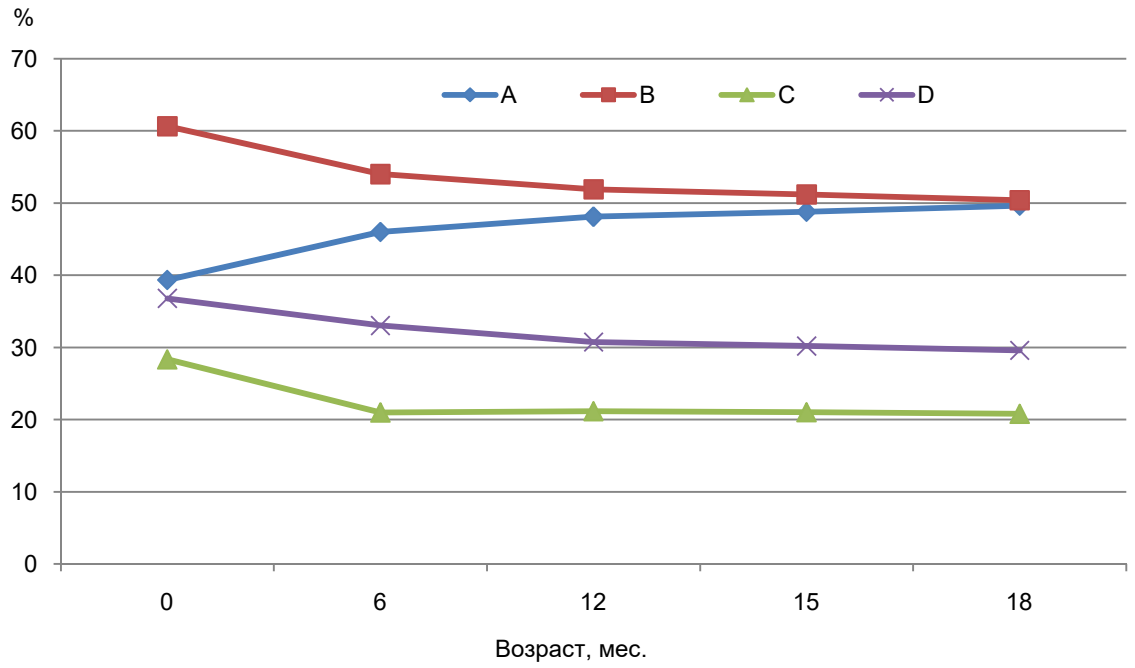


Рисунок 1 – Возрастная динамика относительной массы скелета туш
(А – осевого; В – периферического; С – грудной конечности; D – тазовой конечности)

Установленные различия в интенсивности роста различных отделов скелета сопряжены с изменениями соотношения между ними, вследствие чего изменяются линейные размеры тела и телосложение бычков. При изучении экстерьера подопытных животных было установлено, что новорожденные бычки имели достаточно развитые конечности для свободного передвижения за матерью. Об этом свидетельствуют приведенные ниже индексы телосложения. Так, индексы высоконогости у телят при рождении составили в среднем 63,4 – 63,5, а у 18-месячных бычков – 45,7 – 47,8. Грудной индекс, как отношение ширины груди к ее глубине, у бычков при рождении составил в среднем 61,4 – 62,0, а в конце опытного периода – 69,9 – 74,7. Узкие грудь и таз новорожденных телят предотвращают трудные отелы.

По данным К.Б.Свечина (13) примерно 70% длины ног у крупного рогатого скота формируется за счет их роста в период внутриутробного развития, тогда как ширина тазовых костей (промер ширины в маклоках) – только на 30%.

Известно, что на интенсивность роста костной ткани животных влияют уровень и соотношение гормонов (1, 5, 7, 8). В частности, гормону роста принадлежит особое место в системном контроле ростовых процессов в организме животных (2). Наиболее чувствительна к действию этого гормона хрящевая ткань и, прежде всего хрящи, расположенные в эпифизарной области трубчатых костей. Именно хрящевые зоны под воздействием СТГ и обусловливают рост скелета в высоту и длину. В медицинской литературе (3) показано, что концентрация гормона роста в крови плода человека резко возрастает с 12 до 16 недели и держится на очень высоком уровне до 32 недели. В это время содержание гормона в крови плода примерно в 40 раз превышает его уровень в крови взрослого человека. Этот период совпадает с наиболее интенсивным ростом активных тканей (скелет и мускулатура) плода.

Нейроэндокринная система в соответствии с генетической программой общего развития организма животных посредством избирательного расширения кровеносных сосудов направляет поступающие с кровью матери пластические и энергетические субстраты в те кости и их комплексы, рост и развитие которых в этот период онтогенеза должны быть приоритетными. Можно полагать, что такое векторное

перемещение пластических и энергетических ресурсов организма способствует формированию костных систем в такой степени, чтобы они к моменту рождения могли выполнять свойственные им функции.

Однако следует отметить, что рост костей и их комплексов обеспечивается не за счет глобального роста костяка всех отделов скелета туш животных, а за счет избирательной экспрессии генов именно тех костей и их комплексов, рост и развитие которых на определенном этапе онтогенеза должны быть приоритетными. Следовательно, нейроэндокринная система на определенном этапе онтогенеза является своеобразным инструментом перепрограммирования поступления пластических и энергетических субстратов в те или иные костные системы в определенные периоды онтогенеза и, как следствие этого, фактором, определяющим интенсивность их роста. Для суждения о характере и интенсивности роста осевого и периферического отделов скелета полутуш бычков черно-пестрой породы определены среднесуточные приросты (рис.2) и коэффициенты их роста (рис. 3).

Из приведенных данных видно, что абсолютная скорость роста периферического отдела скелета бычков в первые 6 месяцев жизни хотя и незначительно, но превышает таковую осевого отдела скелета. Это, по-видимому, связано с тем, что интенсивный рост конечностей, начавшийся в утробный период развития, продолжается и в ранний период постнатального онтогенеза. Уровень среднесуточных приростов осевого отдела скелета туш бычков в возрасте 6, 12 и 18 месяцев составили соответственно 44; 48 и 12 г, а периферического отдела – 45; 47 и 3 г. Среднесуточные приросты осевого отдела скелета за период опыта составили 39 г, а периферического 37 г.

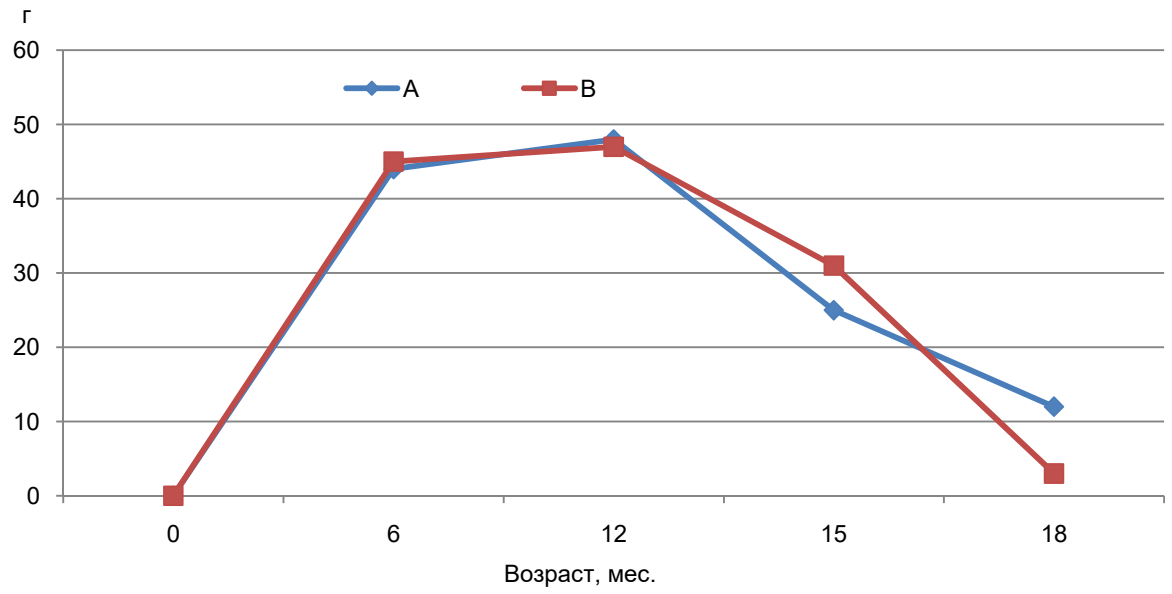


Рисунок 2 – Динамика среднесуточных приростов осевого (А) и периферического (В) отделов скелета туш черно-пестрых бычков

Определение кратности увеличения отделов скелета туш показало, что характер роста различных отделов скелета сходный, но интенсивность роста осевого отдела скелета превышает таковую периферического отдела. Так, коэффициенты роста осевого отдела скелета туш черно-пестрых бычков в возрасте 6, 12 и 18 месяцев составили соответственно 3,91; 7,14 и 8,74 против 2,95; 4,96 и 5,71 периферического отдела.

Неравномерность роста указанных отделов скелета обусловлена различной интенсивностью роста отдельных костей и их комплексов (рис. 3).

Анализ данных показал, что наибольшая интенсивность роста характерна для ребер и позвоночника, а наименьшая – для предплечья и бедренной кости. Так,

коэффициенты роста ребер и позвоночника в конце опытного периода составили соответственно 10,9 и 8,3 против 5,2 и 5,5 – предплечья и бедренной кости.

Установленные различия в интенсивности роста различных отделов скелета приводят к изменениям соотношения между ними, вследствие чего изменяются линейные размеры тела и телосложение бычков. Выше было показано, что новорожденные бычки имели достаточно развитые конечности для свободного передвижения за матерью.

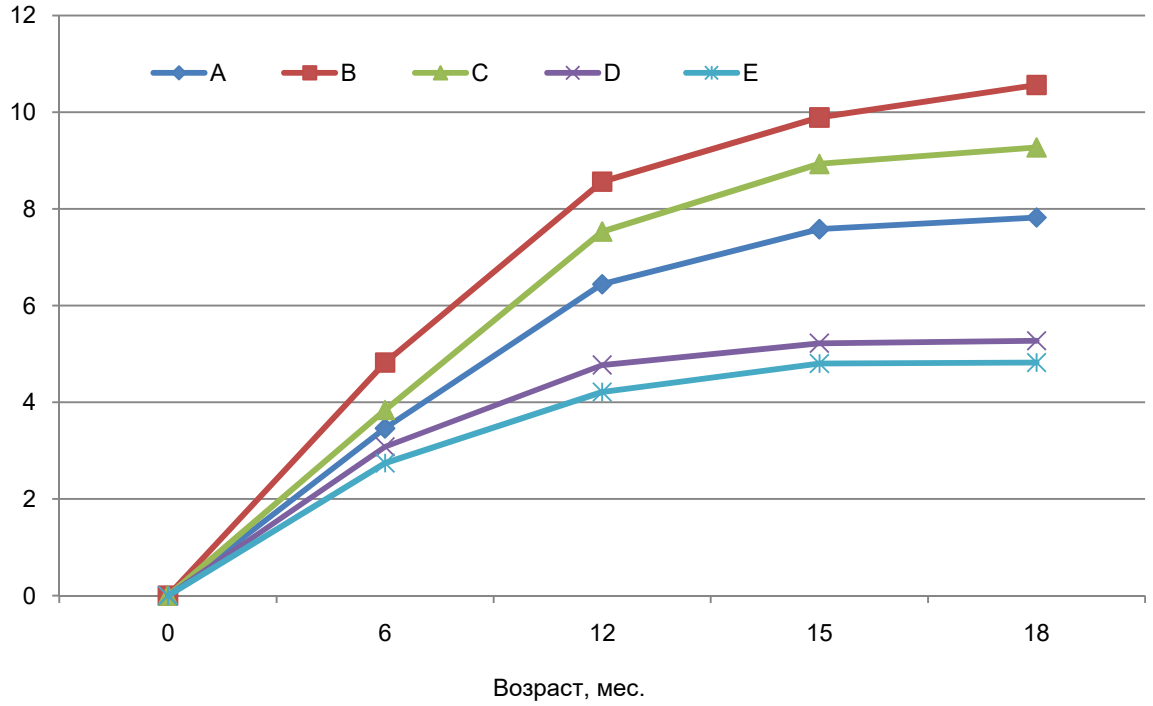


Рисунок 3 – Коэффициенты роста костей скелета туш: позвоночника (A), ребер (B), тазовой кости (C), бедренной кости (D), голени (E)

ЗАКЛЮЧЕНИЕ

На основании проведенных исследований было установлено, что с возрастом бычков абсолютная массы скелета туш повышалась, а относительная его масса снижалась. Наибольшая относительная масса костяка туш (29,5 – 31,8%) установлена у новорожденных бычков. В годовалом возрасте его удельный вес снизился до 17,1 – 19,8%, а в конце опытного периода – до 16,2 – 18,6%.

Возрастные изменения абсолютной и относительной массы костяка туш бычков сопряжены с различной интенсивностью роста осевого и периферического отделов скелета. В постнатальный период интенсивность роста осевого отдела скелета повышалась, а периферического снижалась.

Неравномерность роста указанных отделов скелета обусловлена различной интенсивностью роста отдельных костей и их комплексов. Наибольшая интенсивность роста характерна для ребер и позвоночника, а наименьшая – для дистальных отделов конечностей.

Установленные различия в интенсивности роста различных отделов скелета приводят к изменениям соотношения между ними, вследствие чего изменяются линейные размеры тела и телосложение бычков. Индексы высоконогости и грудной индекс у телят при рождении составили в среднем 63,4 – 63,5 и 61,4 – 62,0 , а у 18-месячных бычков – 45,7 – 47,8 и 69,9 – 74,7.

БИБЛИОГРАФИЯ

1. Берг Р.Т. Мясной скот: концепция роста (пер. с англ.) / Р.Т. Берг, Р.М. Баттерфилд – М.: Колос, 1979. – 280 с.
2. Джевецкая И.А. Основы физиологии обмена веществ и эндокринной системы / И.А. Джевецкая – М.: Высшая школа, 1977. – 256 с..
3. Крюгер Л.. Выращивание и откорм крупного рогатого скота / Л. Крюгер, Ф. Майер – М.:Колос,1972.2–16 с.
4. Ланина А.В. Мясное скотоводство / А.В. Ланина – М.:Колос,1973. – 280 с.
5. Левантин Д.Л. Теория и практика повышения мясной продуктивности в скотоводстве / Левантин Д.Л. – М.: Колос, 1966. – 408 с.
6. Лукьянов В.Н. Особенности линейного роста и мясная продуктивность помесных бычков / В.Н. Лукьянов, И.П. Прохоров // Вестник Мичуринского государственного аграрного университета // – 2015. – № 4. – С. 67-73.
7. Лукьянов В.Н. Возрастные особенности гормонального статуса и отложения жира у помесных бычков / Лукьянов В.Н., Прохоров И.П.//
8. Вестник Алтайского государственного аграрного университета. – 2016. – № 7 (141). – С. 98-104.
9. Лукьянов В.Н. Гормональный статус бычков симментальской породы и ее помесей с герефордской и шаролезской / Лукьянов В.Н., Прохоров И.П. //
10. Известия Тимирязевской сельскохозяйственной академии. – 2015. – № 4. – С. 95-105.
11. Прохоров И.П. Формирование мясной продуктивности молодняка у крупного рогатого скота при промышленном скрещивании / И.П. Прохоров // Автореф. дисс. д-ра с.-х. наук. – М. – 2013. – 33 с.
12. Прохоров И.П. Особенности роста и мясная продуктивность бычков черно-пестрой породы и их помесей с абердин-ангусами и шароле / И.П. Прохоров // Вестник Казанского государственного аграрного университета. – 2012. – Т. 7. – № 2 (24). – С. 110-114.
13. Розен В.Б. Основы эндокринологии / В.Б. Розен – М.: Высшая школа,1984. – 336 с.
14. Салихов А.А. Генотипические особенности формирования мясной продуктивности молодняка крупного рогатого скота в постнатальный период онтогенеза / А.А. Салихов // Автореф. дис. д-ра с.-х. наук. – Оренбург. – 2006. – 43 с.
15. Свечин К.Б. Индивидуальное развитие сельскохозяйственных животных / К.Б Свечин – Киев.: Урожай,1976. – 286 с.
16. Шамберев Ю.Н. Мясная продуктивность чистопородных и помесных бычков при разных технологиях выращивания / Ю.Н. Шамберев, И.П. Прохоров, О.А. Калмыкова // Молочное и мясное скотоводство. – 2012. – № 2. – С. 21-22.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.45

ГИСТОФИЛЁЗ КРУПНОГО РОГАТОГО СКОТА
HISTOPHILOSIS OF CATTLE

Капустин А.В.*, **Моисеева Н.В.**, **Лаишевцев А.И.**, **Лучко М.А.**, научные сотрудники
Kapustin A.V., Moiseeva N.V., Laishevtcev A.I., Luchko M.A., Researchers
Всероссийский научно-исследовательский институт экспериментальной ветеринарии имени Я.Р. Коваленко, Москва, Россия
All-Russian Research Institute of Experimental Veterinary Medicine named after Y.R. Kovalenko, Moscow, Russia

Яцентюк С.П., **Горбачева Н.С.**, научные сотрудники
Yatsentyuk S.P., Gorbacheva N.S., Researchers
Всероссийский государственный центр качества и стандартизации лекарственных средств для животных и кормов, Москва, Россия
All-Russian State Research Institute for Control Standardization and Certification of Veterinary Preparations, Moscow, Russia

*E-mail: kapustin_andrei@mail.ru

АННОТАЦИЯ
В работе приведены данные об инфекционном заболевании крупного рогатого скота – гистофилёзе, зафиксированном на территории Российской Федерации. Описано клинико-морфологическое проявление данного заболевания у восприимчивых животных. Рассмотрены физико-биологические особенности изолята *Histophilus somni*, выделенного на территории Российской Федерации. При сравнении двух методов диагностирования заболевания было установлено, превосходство молекулярно-биологических методы над методами рутинной микробиологии в плане диагностики гистофилёза. Так в ходе проведения комплексного микробиологического исследования 186 образцов клинического и секционного материала был выделен всего 1 изолят *Histophilus somni*, что составило 0,53 %. При этом изолят был выделен из вагинальных смывов коровы, не оплодотворявшейся длительное время. Из тканей лёгких, сердечной мышцы, смывов с препуция, а также образцов семени, бактериологическими методами, возбудитель выделен не был.

ABSTRACT
The paper contains data on the infectious disease of cattle - histophilosis, recorded in the territory of the Russian Federation. A clinical and morphological manifestation of this disease in susceptible animals is described. The physicobiological peculiarities of Histophilus somni isolated in the territory of the Russian Federation are considered. When comparing the two methods of diagnosing the disease, it was established that the superiority of molecular biological methods over methods of routine microbiology in the diagnosis of histophilosis. So, during the complex microbiological study of 186 samples of clinical and sectional material, only one isolate of Histophilus somni was isolated, which was 0.53%. In this case, the isolate was allocated from the vaginal washings of the cow, not fertilized for a long time. Of the lungs, heart muscle, washings with prepuce, as well as seed samples, bacteriological methods, the causative agent was not isolated.

КЛЮЧЕВЫЕ СЛОВА
Крупный рогатый скот, диагностика, респираторные инфекции, эпизоотическое благополучие, клинические признаки, распространённость заболевания.

KEY WORDS
Cattle, diagnosis, respiratory infections, epizootic well-being, clinical signs, prevalence of the disease.

Инфекционные болезни сельскохозяйственных животных, вызванные бактериями семейства *Pasteurellaceae*, являясь широко распространёнными на территории Российской Федерации, часто не могут быть диагностированы. Причин этому несколько: во-первых, это связано с отсутствием структурированных данных о том или ином заболевании, позволяющих поставить предварительный диагноз на основе клинико-морфологических проявлений инфекции, и отсутствием чёткой последовательности действий, направленных на подтверждение диагноза лабораторными методами. Во-вторых, сложность постановки окончательного диагноза обуславливается отсутствием доступных средств, необходимых для проведения лабораторной диагностики. В-третьих, диагностика микробиологическими методами осложняется особенностями возбудителя, связанными с его низкой сохранностью in vitro, высокой чувствительностью к факторам внешней среды, а также особыми ростовыми требованиями. В качестве яркого примера данной ситуации стоит рассмотреть гистофилёз, возбудителем которого являются бактерии вида Histophilus somni.

Гистофилёз - инфекционное заболевание преимущественно жвачных видов животных, проявляющееся поражением органов респираторной и/или репродуктивной систем, а также сепсисом [4, 17]. До недавнего времени инфекция часто фиксировалась в странах северной и южной Америки, Европы, Африки, а также в Японии, Австралии, Новой Зеландии и т.д. [9, 13, 15, 21]. На территории Российской Федерации эта инфекционная патология официально фиксируется редко, что в свою очередь стоит объяснять отсутствием разработанной научно-технической документации, регламентирующей проведение лабораторной диагностики.

Согласно современной классификации возбудителем гистофилёза является вид Histophilus somni, относящийся к семейству Pasteurellaceae. Впервые H. somni был выделен от быков с инфекционным менингоэнцефалитом в Калифорнии в 1960 году и описан как «*Haemophilus* - подобный микроорганизм» [3, 14]. Поэтому в более ранней литературе этот вид имеет синонимичное название *Haemophilus somnus* [7, 10, 18, 22].

Histophilus somni - это неподвижная аэробная грамотрицательная коккобацилла, не обладающая способностью образовывать споры и капсулу. В соответствии с научной литературой возбудитель стоит рассматривать комменсалом нижних и верхних дыхательных путей, а также репродуктивной системы крупного рогатого скота. Но при этом возбудитель способен вызывать у крупного рогатого скота широкий спектр заболеваний, среди которых стоит отметить: менингоэнцефалит, миокардит, отит, мастит, заболевания кишечного тракта у крупного рогатого скота, овец и американского бизона, и эндометриты у коров в послеродовой период [1, 19].

Источником возбудителя инфекции являются больные животные, а также бактерионосители, которые выделяют возбудитель с биологическими жидкостями. Болезнь быстро распространяется среди животных, содержащихся в помещениях не соответствующих санитарным нормам. Возбудитель способен длительное время персистировать в организме восприимчивого животного, постепенно распространяясь по всему стаду. При этом само распространение инфекции в стаде зачастую происходит без проявления явных клинических признаков, что обуславливает сложность диагностики заболевания, основанной на клинико-морфологическом проявлении.

К гистофилёзу восприимчив крупный рогатый скот всех возрастных групп, но наибольший процент заболеваемости и летальности наблюдается у телят в возрасте 1-2 месяцев. У данной группы молодняка заболевание протекает в респираторной форме в виде воспаления лёгких с переменной лихорадкой, кашлем и т.д., но аналогичное проявление не исключено и у более взрослых животных на откорме [8].

Гистофилёз имеет 3 формы проявления заболевания, а именно:

1. Мочеполовая форма, сопровождающаяся поражением мочевыводящих путей и репродуктивных органов у коров, а также препуция у быков. Распространению патогена и передаче его здоровым животным способствуют маточные и вагинальные выделения, моча инфицированных животных. Как правило, такая форма проявления

болезни длительно остается не замеченной, однако при возникновении стресс-факторов может проявляться внутриутробной гибелью плодов и массовым бесплодием. Стоит отметить, что распространение возбудителя в стаде происходит как при естественном, так и при искусственном осеменении животных, так как возбудитель может находиться в семени производителей.

2. Респираторная форма проявляется поражением верхних и нижних дыхательных путей. У животных развивается воспаление лёгких, наблюдается лихорадка, отказ от корма, затруднённое дыхание, кашель. Если позволить инфекции распространиться, то поражается дыхательное горло и голосовые связки, а затем легкие, что ведет к пневмонии и быстрой гибели животного [12]. Пневмонии редко вызываются исключительно *Histophilus somni*, часто при этом возникает ассоциация с другими микроорганизмами, такими как *Pasteurella multocida* и *Mannheimia haemolytica* [6, 11, 23].

3. Септическая форма развивается из-за заражения крови. Клинические признаки зависят от локализации возбудителя в организме животного, в то время как степень тяжести зависит от количества отмерших тканей в результате сгущения крови. После попадания в кровоток бактерии могут уйти от защитных механизмов организма и вызвать апоптоз эндотелиальных клеток. Это ведет к васкулиту и тромбозу, которые приводят к нейтрофильной инфильтрации и некрозу тканей в головном мозге, что проявляется нервными расстройствами. В тканях сердца это может вызвать миокардит с множественными инфарктами и некрозом. У животных с миокардитом болезнь развивается быстро, единственным клиническим проявлением может быть летальный исход. Миокардит диагностируют редко [16]. КРС, имеющий это заболевание, демонстрирует признаки сердечной недостаточности (непереносимость физических нагрузок, дыхание с открытым ртом, кашель и т.д.) [5, 20].

Начало инфекционного процесса, как правило, требует наличие предрасполагающих факторов, в роли которых могут быть стресс, первичное вирусное или бактериальное заболевание. В свою очередь стресс-факторы могут быть разделены на психологические и физические. В первом случае стресс вызывается страхом, лечебными манипуляциями, фиксацией животного. Возникновению физического стресса предшествует голод, жажда, усталость, скученность, нарушение зоогигиенических условий. Реакция на стрессовые факторы для каждого отдельного животного является сугубо индивидуальным процессом. Значение стресс-фактора при развитии патогенеза инфекционной болезни подтверждается множественными наблюдениями, свидетельствующими о резком начале массовых заболеваний после смены погодных или зоогигиенических условий. Кроме того, причиной возникновения повышенной чувствительности при стрессе можно считать естественное снижение иммунитета. В качестве первичных вирусных или бактериальных возбудителей, открывающих ворота инфекции для Histophilus somni, стоит рассматривать парагрипп и герпесвирусную инфекцию крупного рогатого скота, респираторно-синцитиальную инфекцию, аденовирозы и реовирозы, а также микоплазмоз.

Гистофилез КРС в РФ ошибочно считается малозначимым инфекционным заболеванием и не отслеживается в ходе проведения государственного эпизоотического мониторинга, что обуславливает отсутствие современных отечественных данных о распространённости данного вида бактерий и вызываемом им заболевании.

Цель работы – изучение распространённости возбудителя гистофилёза в скотоводческих предприятиях Российской Федерации при использовании для диагностики микробиологических методов и методов молекулярной биологии.

МАТЕРИАЛЫ И МЕТОДЫ ИССЛЕДОВАНИЙ

Исследование проводилось на базе Федерального государственного бюджетного научного учреждения «Всероссийский научно-исследовательский институт экспериментальной ветеринарии имени Я.Р. Коваленко», а также Федерального

государственного бюджетного учреждения «Всероссийский государственный центр качества и стандартизации лекарственных средств для животных и кормов». Секционный и клинический материал для выделения возбудителя был получен из предприятий Московской, Тульской, Смоленской, Владимирской, Калужской, Тверской, Новгородской, Нижегородской, Белгородской, Орловской, Рязанской, Курской, Кировской, Тамбовской, Челябинской, Пензенской областей, Ставропольского и Краснодарского краев, Республики Мордовия.

При проведении комплексного микробиологического исследования, для выделения бактерий семейства *Pasteurellaceae*, были использованы: агар МакКонки, колумбийский агар, сердечно-мозговой агар, эугоник агар, эугоник бульон, бульон с бромкрезоловым пурпурным, мясо-пептонный агар, мясо-пептонный бульон, триптон-соевый бульон, среда для *Haemophilus CM0898B*, триптон соевый агар производства ООО «*Himedia*» (Индия) и фирмы «*Oxoid*» (Великобритания).

Микробиологическое исследование с целью обнаружения *Histophilus somni* проводили по следующей схеме: посев материала проводился методом отпечатка на питательную среду CM0898B с добавлением саплимента *FD117*, а также на шоколадный агар. Культивирование проводили в условиях 10%-ной CO2 атмосферы в течение 48 часов.

Для изучения биохимических свойств, а также для родовой и видовой идентификации выделенных изолятов бактерий семейства *Pasteurellaceae* использовали следующие коммерческие тест системы: *RapID NF Plus Panel* (*R8311005*), *API® NH*, *API®* 20 *E*, *API®* 20 *NE ID* 32 *E* с сопутствующими расходными принадлежностями и электронной базой для интерпретации полученного результата. Помимо коммерческих биохимических тест-систем были использованы углеводы в дисках для определения сахаролитических свойств выделенных изолятов: адонит, арабиноза, галактоза, D-глюкоза, дульцит, инозит, инулин, ксилоза, мальтоза, маннит, манноза, раффиноза, рамноза, салицит, сорбит, сахароза, трегалоза, фруктоза, целлобиоза производства ООО «*Himedia*».

ПЦР с гибридизационно-флуоресцентной детекцией в режиме реального времени проводили с использованием набора *LSI VetMAX HISTOPHILUS SOMNI* (*Thermo Fisher*, Франция). Для 23 образцов дополнительно проводили подтверждение результатов ПЦР секвенированием фрагмента генома возбудителя с использованием дополнительной пары праймеров, комплиментарных фрагменту гена 16 *S pPHK H. somni*. Секвенирование ПЦР-фрагментов осуществляли с использованием набора *Big Dye® Terminator* v1.1. *Cycle Sequencing Kit* на амплификаторе *GeneAmp PCR System* 2720 (*Applied Biosystem*, США) и автоматическом секвенаторе *ABI PRISM* 3130 *Genetic Analyzer*.

РЕЗУЛЬТАТЫ И ИХ ОБСУЖДЕНИЕ

Для достижения поставленной цели в период 2016-2017 гг. были проведены диагностические исследования 186 проб клинического и секционного материала (кусочки лёгких, сердечная мышца, вагинальные смывы и смывы с препуция) полученных от 145 животных разных возрастных, половых и физиологических групп, с признаками респираторных и репродуктивных поражений. Из 145 животных 76 голов были коровы или тёлки, длительное время не осеменявшиеся, 41 телёнок в возрасте 7-60 дней с признаками респираторной патологии, 28 бычков в возрасте 1,5-2 года. Поскольку клинико-морфологическое проявление ряда заболеваний, вызванных бактериями семейства *Pasteurellaceae*, может иметь схожие черты, то при диагностике обращалось особое внимание на все представители данного семейства. Кроме этого исследованию было подвергнуто 222 образца стабилизированной спермы быков из отечественных и иностранных племенных центров. При этом исследование проб клинического и секционного материала проводилось комплексно для выявления бактерий семейства *Pasteurellaceae*, являющимися возможными возбудителями

респираторных инфекций. Микробиологические исследования образцов семени проводилось лишь с целью выделения *Histophilus somni*.

В ходе проведения бактериологического исследования секционного и клинического материала был выделен широкий спектр бактериальных агентов. Структура выделенной флоры приведена в таблице №1.

Таблица 1 – Структура бактериальной микрофлоры выделенной от крупного рогатого скота

Образец или ткань (количество)	Вид	Количество (%)
Вагинальные смывы (n=76)	*Histophilus somni* *Actinobacillus ureae*	1 (1,3) 1 (1,3)
Лёгкие (n=41)	*Pasteurella multocida* *Actinobacillus ureae* *Mannheimia haemolytica* *Bibersteinia trehalosi* *Mannheimia glucosida*	23 (56,0) 2 (4,8) 5 (12,2) 1 (2,4) 1 (2,4)
Сердечная мышца (n=41)	*Pasteurella multocida* *Actinobacillus ureae* *Mannheimia haemolytica*	4 (9,7) 1 (2,4) 2 (4,8)
Смывы с препуций (n=28)	-	-

Как видно из приведённых в таблице 1 данных, из 186 образцов, подвергнутых бактериологическому исследованию, был выделен всего один изолят Histophilus somni. Принадлежность изолята к данному виду была подтверждена при помощи нуклеотидного секвенирования. Культура была выделена из образца вагинальных смывов от коровы с хроническим эндометритом. При исследовании тканей лёгких и сердечной мышцы в преобладающем количестве случаев были выделены изоляты *Pasteurella multocida*, *Mannheimia haemolytica*, *Actinobacillus ureae*, *Bibersteinia trehalosi* и *Mannheimia glucosida*.

При бактериологическом исследовании 222 проб семени, ни в одном случае возбудитель гистофилёза выделен не был, не смотря на то, что методом ПЦР ДНК возбудителя была обнаружена в 78,8% случаев.

Выделенный изолят *Histophilus somni* на колумбийском агаре с добавлением 5% дефибринированной крови барана, образовывал мелкие колонии диаметром до 1 мм при культивировании в условиях 10%-ной CO_2 атмосферы в течение 48 часов (рис. 1).

Рисунок 1 – Рост 48-ми часовой культуры *Histophilus somni* на кровяном агаре

Примечательным стало то, что рост культуры способствовал незначительному просветлению питательной среды вокруг колонии, слабо заметном при визуальном

осмотре (рис. 2). Для наглядности изображение с гемолизом было отредактировано в графическом редакторе благодаря функции «автотон» (рис. 3).

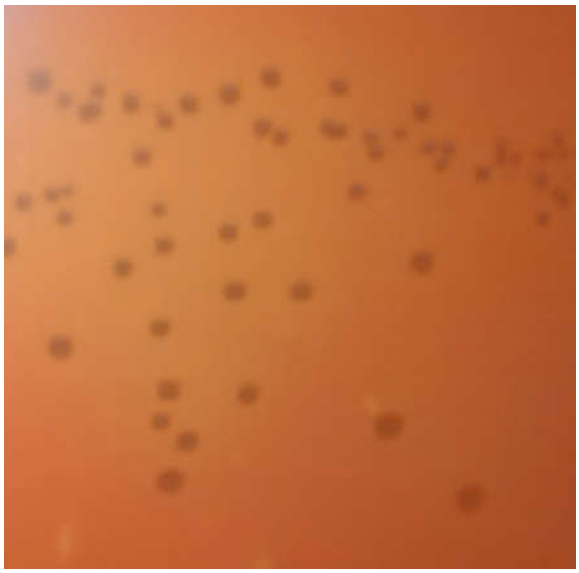


Рисунок 2 – слабый гемолиз гистофилюсов при обычной фотосъёмке

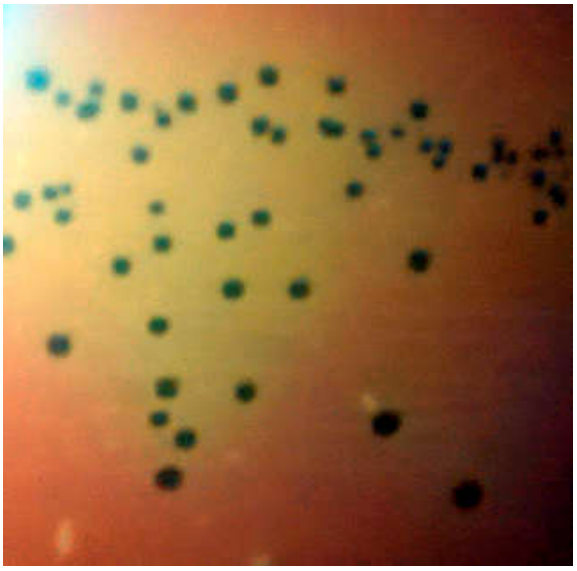


Рисунок 3 – слабый гемолиз гистофилюсов. Фото обработано в программе *Photoshop* с использованием функции автотон

Как видно на изображении №3, гистофилы проявляют неполный гемолиз на кровяной среде. При микроскопировании было обнаружено, что клетки данного вида - грамотрицательные тонкие палочки (рис. 4).

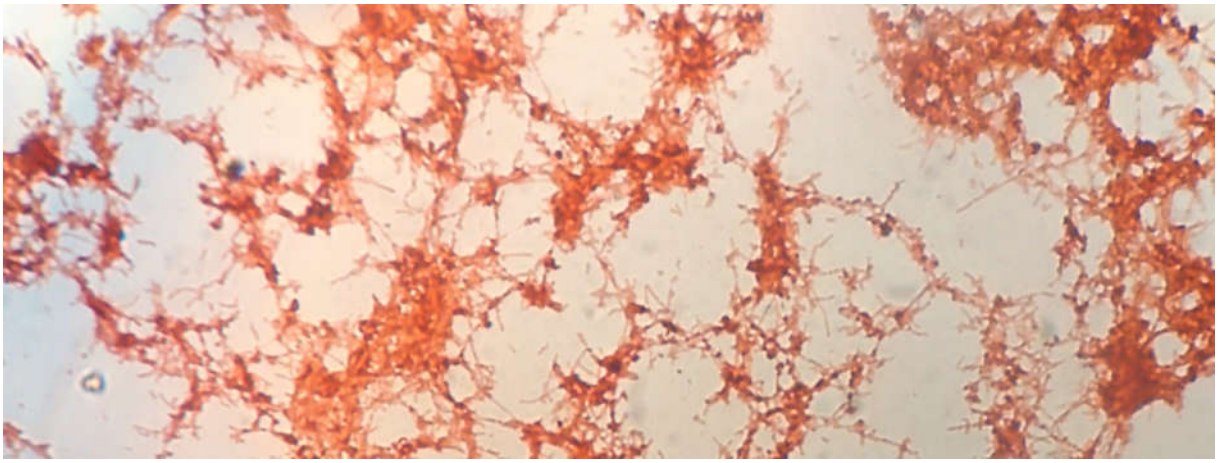


Рисунок 4 – морфологические и тинкториальные свойства *Histophilus somni* при окрашивании методом Грама и микроскопировании при 100х кратном увеличении

Как видно из фото №4, клетки *Histophilus somni* имеют типичные морфологические и тинкториальные свойства данного вида.

Все выделенные изоляты были сохранены в коллекции микроорганизмов ФГБНУ ВИЭВ имени Я.Р. Коваленко для дальнейшего изучения, в том числе для разработки отечественных средств специфической профилактики гистофилёза.

ЗАКЛЮЧЕНИЕ

В настоящее время лабораторная диагностика гистофилёза проводится с помощью бактериологического и молекулярно-биологического методов [2]. При этом нами подтверждена высокая чувствительность ПЦР для выявления данного

возбудителя, ДНК *Histophilus somni* была обнаружена в 78,8% образцах спермы КРС при исследовании 222 образцов. ПЦР широко используется для выявления животных с клинической и скрытой формой заболевания, а также бактерионосителей. Данный метод, благодаря высокой чувствительности и специфичности может с успехом использоваться при проведении скрининговых исследований, как альтернатива выделению микроорганизма, т.к. из-за особых требований *Histophilus somni* к условиям культивирования, на основании рутинных микробиологических методов диагностика часто затруднительна.

Отсутствие своевременной диагностики приводит к широкому распространению инфекции в стаде. Совершенствование диагностики, в частности разработка методик на основе ПЦР, является очень актуальной задачей, позволяющей своевременно поставить диагноз и организовать систему мероприятий, предотвратив экономический ущерб, который складывается из гибели животных, снижения их продуктивности, развития бесплодия и т.д. Полученные данные подтверждают необходимость разработки методических указаний по лабораторной диагностике гистофилёза.

БИБЛИОГРАФИЯ

1. Andrews JJ, Anderson TD, Slife LN, Stevenson GW. Microscopic lesions associated with the isolation of Haemophilus somnus from pneumonic bovine lungs. Vet Pathol. 1985;22(2):131–6.
2. Angen Ø, Ahrens P, Tegtmeier C, Angen E, Ahrens P, Tegtmeier C. Development of a PCR test for identification of Haemophilus somnus in pure and mixed cultures. Vet Microbiol. 1998 Aug;63(1):39–48.
3. Brown WW, Griner LA, Jensen R. Infectious embolic meningo-encephalitis in cattle. J Am Vet Med Assoc. Not Available; 1956 Nov;129(9):417–21.
4. Bryan Markey, Finola Leonard, Marie Archambault, Ann Cullinane DM. Haemophilus and Histophilus species. In: Clinical Veterinary Microbiology. 2013. p. 349–54.
5. Guichon PT, Pritchard J, Jim GK. Haemophilus somnus myocarditis in a feedlot steer. Can Vet J. 1988;29(12):1012–3.
6. Haines DM, Moline KM, Sargent R a., Campbell JR, Myers DJ, Doig P a. Immunohistochemical study of Hemophilus somnus, Mycoplasma bovis, Mannheimia hemolytica and bovine viral diarrhea virus in death losses due to myocarditis in feedlot cattle. Can Vet J. 2004;45(3):231–4.
7. Harris FW, Janzen ED. The Haemophilus somnus disease complex (hemophilosis): a review. Can Vet J. 1989;30(10):816–22.
8. http://www.tgw1916.net/image_tem.html
9. Humphrey JD, Stephens LR. “Haemophilus somnus”: A Review. Commonhealth Bur Anim Heal Vet Bull. 1983;53(11):987–1004.
10. Janzen ED. Overview of histophilosis. In: The Merck Veterinary Manual, 10th edition. 2010.
11. Kapustin A.V., Laishevtcev A.I. Pasteurellosis of cattle caused by Mannheimia haemolytica// Russian Journal of Agricultural and Socio-Economic Sciences. 2016. T. 52. № 4. C. 3-12.
12. Klima CL, Zaheer R, Cook SR, Booker CW, Hendrick S, Alexander TW, et al. Pathogens of bovine respiratory disease in North American feedlots conferring multidrug resistance via integrative conjugative elements. J Clin Microbiol. 2014;52(2):438–48.
13. Krishna Datt Bhatt // «Characterization of Antimicrobial and Metal Resistance in Contemporary and Historical clinical isolates of Histophilus somni from Feedlot cattle in Alberta », September, 2016
14. MacDonald DW, Christian RG CG. Infectious thromboembolic meningoencephalitis: literature review and occurrence in Alberta, 1969-71. Can Vet Journal. 1973;14(3):57–61.
15. Miller JJ, Handerek BP, Beasley BW, Olson ECS, Yanke LJ, Larney FJ, et al. Quantity and quality of runoff from a beef cattle feedlot in southern Alberta. J Environ Qual. 2005;33(3):1088–97.

16. O'Toole D, Allen T, Hunter R, Corbeil LB. Diagnostic exercise: Myocarditis due to Histophilus somni in feedlot and backgrounded cattle. Vet Pathol. 2009;46(5):1015–7.
17. O'Toole D, Sondgeroth KS. Histophilosis as a Natural Disease. In: Current topics in microbiology and immunology. 2015.
18. Orr JP. Haemophilus somnus infection: A retrospective analysis of cattle necropsied at the Western College of Veterinary Medicine from 1970 to 1990. Can Vet J. 1992;33(11):719–22.
19. Saunders JR, Thiessen W a., Janzen ED. Haemophilus somnus infections I. A ten year (1969-1978) retrospective study of losses in cattle herds in Western Canada. Can Vet J. 1980;21(4):119–23.
20. Schuh J, Harland R. Saskatchewan. Haemophilus somnus myocarditis versus thrombotic meningoencephalitis in western Canada. Can Vet J. 1991;32(7):439.
21. Sharifzadeh A., Doosti A., and Dehkordi P.G. Frequency of Haemophilus somnus in the semen of bulls in Iran as determined by polymerase chain reaction Scientific Research and Essays Vol. 6(6), pp. 1458-1460, 2011
22. Van Donkersgoed J, Janzen ED, Harland RJ. Epidemiological features of calf mortality due to hemophilosis in a large feedlot. Can Vet J. 1990;31(12):821–5.
23. Капустин А.В., Лаишевцев А.И., Ездакова И.Ю., Скворцов В.Н., Степанова Т.В., Гулюкин М.И. Диагностика пастереллёза сельскохозяйственных животных, птиц и пушных зверей // Москва, 2016.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.46

АНТИБИОТИКОРЕЗИСТЕНТНОСТЬ ЭПИЗООТИЧЕСКИХ ИЗОЛЯТОВ MANNHEIMIA HAEMOLYTICA, ВЫДЕЛЕННЫХ НА ТЕРРИТОРИИ РОССИЙСКОЙ ФЕДЕРАЦИИ

ANTIBIOTIC RESISTANCE OF EPIZOOTIC ISOLATES OF MANNHEIMIA HAEMOLYTICA, ALLOCATED ON THE TERRITORY OF THE RUSSIAN FEDERATION

Лаишевцев А.И.*, **Капустин А.В.**, **Якимова Э.А.**, **Лучко М.А.**, **научные сотрудники**
Laishevtcev A.I., Kapustin A.V., Yakimova E.A., Luchko M.A., Researchers
Всероссийский научно-исследовательский институт экспериментальной ветеринарии имени Я.Р. Коваленко, Москва, Россия
All-Russian Research Institute of Experimental Veterinary Medicine named after Y.R. Kovalenko, Moscow, Russia

Пименов Н.В., профессор РАН
Pimenov N.V., Professor of the Russian Academy of Sciences
Московская государственная академия ветеринарной медицины и биотехнологии – МВА имени К.И. Скрябина, Москва, Россия
Moscow State Academy of Veterinary Medicine and Biotechnology – MVA named after K.I. Skryabin, Moscow, Russia

*E-mail: a-laishevtsev@bk.ru

АННОТАЦИЯ
В работе приведены сведения о чувствительности изолятов *Mannheimia haemolytica* к различным антибактериальным препаратам. Установлено, что высокая чувствительность культур *Mannheimia haemolytica* проявляется к моксифлоксацину, канамицину, фосфомицину, имипенему, ко-тримоксазолу, доксициклину, норфлоксацину, ципрофлоксацину, энрофлоксацину, цефазолину и цефалексину, поэтому использование данных препаратов должно демонстрировать наилучший лечебный эффект.

ABSTRACT
The paper provides information on the sensitivity of isolates of Mannheimia haemolytica to various antibacterial drugs. It has been established that the high sensitivity of Mannheimia haemolytica is manifested to moxifloxacin, kanamycin, phosphomycin, imipenem, co-trimoxazole, doxycycline, norfloxacin, ciprofloxacin, enrofloxacin, cefazolin and cephalexin, so their use makes it possible to achieve the best therapeutic effect.

КЛЮЧЕВЫЕ СЛОВА
Манхеймиоз, антибиотикотерапия, лечение, эффективность.

KEY WORDS
Manheimiosis, antibiotic therapy, treatment, effectiveness.

В соответствии с литературными данными, манхеймиоз – это пастереллез-подобная инфекционная болезнь преимущественно жвачных видов животных, вызванная *Mannheimia haemolytica* и сопровождающаяся обширным поражением органов респираторной системы [3,4,6,11,12]. Использование антибактериальных препаратов является эффективным способом лечение больных животных от данной инфекционной патологии [5,9]. При этом рекомендуется использование препаратов с пролонгированным действием с целью сокращения физических затрат на обработку поголовья [7]. Ранее было установлено, что наиболее эффективными препаратами для лечения болезней, вызванных *Mannheimia haemolytica*, являются антибиотики на основе амоксиклава, тилозина, доксициклина, энрофлоксацина, цефазолина,

цефалексина, хлорфеникола [1,8], что подтверждается данными Европейского комитета по определению чувствительности к антибактериальным препаратам [2].

Кроме того, сейчас часто практикуется применение антибактериальных препаратов вновь вводимых в стадо животным как превентивная мера, позволяющая достичь снижения заболеваемости и падежа. При подборе антибактериального средства, по рекомендациям комитета, стоит обращать внимание на степень чувствительности культур *Mannheimia haemolytica*, выделяемых от животных. Так, культуры бактерий, выделенные от крупного рогатого скота являются более устойчивыми к ампициллину, стрептомицину, неомицину, гентамицину, тетрациклину, хлорамфениколу, чем культуры манхемий выделенные от мелкого рогатого скота.

Цель работы – изучение антибиотикорезистентности полевых изолятов *Mannheimia haemolytica* и подбор оптимального средства лечения манхеймиоза.

МАТЕРИАЛЫ И МЕТОДЫ ИССЛЕДОВАНИЙ

Исследование проводилось на базе федерального государственного бюджетного научного учреждения «Всероссийский научно-исследовательский институт экспериментальной ветеринарии имени Я.Р. Коваленко» в течение 2016-2017 гг., в рамках государственного задания 0578-2016-0002 «Разработка технологии изготовления и методов контроля инактивированной вакцины против манхеймиоза крупного и мелкого рогатого скота».

Определение антибиотикочувствительности выделенных из патологического и/или клинического материала изолятов бактерий *Mannheimia haemolytica* проводили диско-диффузным методом (ДДМ) в соответствии с МУК 4.2.1890-04 «Определение чувствительности микроорганизмов к антибактериальным препаратам». Использовались антибактериальные препараты различных групп, в частности: аминогликозиды – неомицин, стрептомицин, гентамицин, амикацин, канамицин; карбапенемы – меропенем, имипенем; линкозамиды – линкомицин, клиндамицин; пенициллины – ампициллин, амоксиклав, карбенициллин; сульфаниламиды - ко-тримоксазол; тетрациклины – доксициклин, тетрациклин; фторхинолоны – норфлоксацин, ципрофлоксацин, пефлоксацин, энрофлоксацин; цефалоспорины – цефалексин, моксифлоксацин, цефепим, цефоперазон, цефотаксим, цефтазидим, цефтриаксон, цефазолин; макролиды – кларитромицин, эритромицин; полимиксины – полимиксин В, а также другие антибиотики – фосфомицин, триметроприм.

Результаты учитывали спустя 18 часов термостатирования по диаметру зон задержки роста бактерий, интерпретация результатов проводилась в соответствии с рекомендациями *CLSI* и *EUCAST* в зависимости от антибактериального средства.

РЕЗУЛЬТАТЫ И ИХ ОБСУЖДЕНИЕ

В работе использовали 5 культур *Mannheimia haemolytica*, выделенных в ходе выполнения бактериологических исследований секционного материала от крупного и мелкого рогатого скота с клиническим проявлением пастереллёз-подобных заболеваний.

Результаты определения антибиотикочувствительности изолятов *Mannheimia haemolytica* представлены в таблице №1. Как видно из данных, выделенные нами штаммы *Mannheimia haemolytica* проявляют абсолютную резистентность к цефепиму и ванкомицину. Кроме того изучаемые штаммы не обладали высокой чувствительностью к гентамицину, неомицину, клиндамицину, кларитромицину, эритромицину, тетрациклину, цефтазидиму, что стоит рассматривать как обоснованную причину отказа от использования данных препаратов при назначении антибактериальной терапии больным животным. Из всех имеющихся штаммов 60% культур оказались резистентными к действию меропенема и полимиксина В, 40% культур были резистентны к амикацину, рифампицину, амоксиклаву, линкомицину, пефлоксацину и

цефтриаксону, 20% культур к стрептомицину, триметроприму, ампициллину, карбенициллину, цефоперазону и цефотаксиму.

Таблица №1 – Антибиотикорезистентность полевых изолятов *Mannheimia haemolytica*

п/п	Антибактериальное средство	Сокращённое название с указанием концентрации	Чувствительность			КП-ВИЭВ	M.h. AM9	M.h. 219	M.h. 207	M.h. 217
			r	i	s					
Аминогликозиды 1 пок.	Амикацин	Ak30	14	(15-16)	17	13	12	15	18	15
	Гентамицин	Cn10	12	(13-14)	15	11	12	14	13	13
Аминогликозиды 2 пок.	Канамицин	K30	13	(14-17)	18	15	14	17	18	15
Аминогликозиды 3 пок.	Неомицин	N30	12	(13-16)	17	9	8	10	13	13
Аминогликозиды природные	Стрептомицин	S25	13	(14-16)	17	26	14	14	10	24
Другие антибиотики	Триметоприм	Tr5	10	(11-15)	16	22	10	14	15	19
	Фосфомицин	Fos200	12	(13-15)	16	14	13	17	15	22
Карбапенемы	Имипенем	I10	13	(14-15)	16	24	17	23	14	21
	Меропенем	Mrp10	19	(20-22)	23	18	23	26	17	19
Линкозамиды	Клиндамицин	Cd2	14	(15-20)	21	12	15	14	19	14
	Линкомицин	L15	12	(13-16)	17	12	18	16	15	9
Макролиды	Кларитромицин	Clr15	10	(11-12)	13	0	11	10	10	0
	Эритромицин	E15	13	(14-22)	23	12	15	11	22	19
Пенициллины полусинтетические	Амоксиклав	Amc30	19	-	20	22	21	19	14	23
	Ампициллин	Amp10	18	(19-21)	22	23	22	19	20	18
Пенициллины природные	Карбенициллин	Car25	14	(15-18)	19	15	17	19	11	16
Полимиксины	Полимиксин B	Pb300u	11	-	12	14	10	0	13	10
Сульфаниламиды	Ко-тримоксазол	Cot25	10	(11-15)	16	17	17	15	21	13
Тетрациклины	Доксициклин	Dxt30	12	(13-15)	16	25	17	24	15	18
	Тетрациклин	TE30	25	(26-28)	29	18	26	19	19	21
Фторхинолоны 2 пок.	Норфлоксацин	Nor10	12	(13-16)	17	16	20	21	18	16
	Пефлоксацин	Pf5	18	(19-21)	22	19	22	23	18	14
	Ципрофлоксацин	Cip10	15	(16-20)	21	26	24	19	24	16
Фторхинолоны 3 пок.	Энрофлоксацин	Ex5	17	(18-21)	22	25	26	24	21	31
Цефалоспорины 1 пок.	Моксифлоксацин	Mo5	-	-	18	21	23	24	26	20
	Цефазолин	Cz30	14	(15-17)	18	17	18	16	23	17
Цефалоспорины 3 пок.	Цефалексин	Cn30	14	(15-18)	19	25	20	17	16	21
	Цефепим	Cpm30	25	-	26	17	16	25	21	18
	Цефоперазон	Cpz75	15	(16-20)	21	22	16	21	19	14
	Цефотаксим	Ctx30	14	(15-22)	23	20	25	14	19	16
Цефалоспорины 4 пок.	Цефтазидим	Caz30	14	(15-17)	18	14	12	13	16	12
	Цефтриаксон	Cro30	25	(26-26)	27	35	24	27	26	14

Наилучшей антибактериальной активностью в отношении штаммов манхемий обладал моксифлоксацин, ингибирующий рост 100% культур. Такие препараты как канамицин, фосфомицин, имипенем, ко-тримоксазол, доксициклин, норфлоксацин, ципрофлоксацин, энрофлоксацин, цефазолин и цефалексин оказывали на изучаемые штаммы высокую и промежуточную активность.

ЗАКЛЮЧЕНИЕ

Плановое проведение мониторинга лекарственной резистентности любого возбудителя инфекционной патологии позволяет своевременно разработать и применить эффективную схему лечебных мероприятий [10,13-15]. Кроме того, отслеживание тенденции появления резистентных культур микроорганизмов позволяет прогнозировать возможную потерю определёнными группами препаратов антибактериальных свойств, и принимать меры по их замене, либо использованию комбинированной антибактериальной терапии. При проведении исследования установлена высокая чувствительность культур *Mannheimia haemolytica* к моксифлоксацину, канамицину, фосфомицину, имипенему, ко-тримоксазолу, доксициклину, норфлоксацину, ципрофлоксацину, энрофлоксацину, цефазолину и цефалексину, поэтому использование этих препаратов позволит получать наилучший лечебный эффект.

БИБЛИОГРАФИЯ

1. Carson C.A., Reid-Smith R., Irwin R.J., Martin W.S., McEwen S.A. Antimicrobial use on 24 beef farms in Ontario. // Can J Vet Res 72, 2008, 109-118.
2. Электронный ресурс: https://mic.eucast.org/Eucast2/
3. Jaramillo, A.C., Trigo, T.F., Suárez-Güernes, F., 2009. Mannheimiosis bovina: etiología, prevención y control. // Vet. Mex. 40, 293-314.
4. Kapustin A.V. Pasteurellosis of cattle caused by Mannheimia haemolytica. Russian Journal of Agricultural and Socio-Economic Sciences. 2016. T. 52. №4. C. 3-12.
5. Laishevtcev A.I., Kapustin A.V., Pimenov N.V. Specific identification of pasteurella bacteria on the basis of biochemical properties in accordance with modern classification. //Russian Journal of Agricultural and Socio-Economic Sciences. 2017. T. 61. №1. C. 320-328.
6. Mohamed R.A., Abdelsalam, E.B., A Review on Pneumonic Pasteurellosis (Respiratory Mannheimiosis) with Emphasis on Pathogenesis, Virulence Mechanisms and Predisposing Factors. // Bulgarian J. Vet. Med. 11, 2008.139 -160.
7. Rice J.A., Carrasco-Medina L., Hodgins D.C., Shewen P.E. Mannheimia haemolytica and bovine respiratory disease. // Anim Health Res Rev 8, 2007, 117-128.
8. Thomson D.U., White B.J. Backgrounding beef cattle. // Vet Clin North Am Food Anim Pract 22, 2006, 373-398.
9. Watts J.L. at al. A 4-year survey of antimicrobial susceptibility trends for isolates from cattle with bovine respiratory disease in North America. // J Clin Microbiol 1994, 32, 725-731.
10. Yakimova E.A., Laishevtcev A.I., Kapustin A.V., Lenev S.V., Motorygin A.V., Kuteynikova N.S. Antibiotic resistance of field isolates of Pseudomonas aeruginosa isolated from exotic and ornamental birds // Russian Journal of Agricultural and Socio-Economic Sciences. 2016. T. 55. №7. C. 3-7.
11. Капустин А.В. Диагностика пастереллёза сельскохозяйственных животных, птиц и пушных зверей. Методические указания. ФГБНУ ВИЭВ им. Коваленко Я.Р. 2016
12. Лаишевцев А.И., Капустин А.В., Гулюкин А.М. Сравнительный анализ антибиотикочувствительности коллекционных штаммов pasteurella multocida, выделенных в период до 1990 г., с полевыми изолятами, выделенными в течение 2014-2016 гг. от крупного и мелкого рогатого скота на территории Российской Федерации. // Труды Кубанского государственного аграрного университета. 2016. №63. С. 132-138.
13. Лаишевцев А.И., Ленёв С.В., Капустин А.В., Пименов Н.В., Якимова Э.А. Антибиотикорезистентность музейных штаммов бактерий рода Klebsiella spp. //Ветеринария, зоотехния и биотехнология. 2016. №5. С. 38-45.
14. Пименов Н.В., Лаишевцев А.И. Современные аспекты борьбы с сальмонеллезной инфекцией в птицеводстве // Монография, Москва, 2017, с.172.
15. Татаренко Я.С., Пименов Н.В., Лаишевцев А.И. Определение оптимального средства для оздоровления поголовья перепелов при ассоциированной протейной и стрептококкозной инфекции // Ветеринария, зоотехния и биотехнология. 2017. №2. С. 38-42.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.47

ИСПОЛЬЗОВАНИЕ МЕТОДА ПЦР ДЛЯ ВЫЯВЛЕНИЯ ВОЗБУДИТЕЛЕЙ ИНФЕКЦИОННЫХ БОЛЕЗНЕЙ В СПЕРМЕ КРУПНОГО РОГАТОГО СКОТА

USING THE PCR METHOD TO IDENTIFY THE CAUSATIVE AGENTS OF INFECTIOUS DISEASES IN CATTLE SPERM

Яцентюк С.П., **Горбачева Н.С.**, **Яралова Е.А.**, **Козлова А.Д.**, научные сотрудники
Yatsenyuk S.P., Gorbacheva N.S., Yaralova E.A., Kozlova A.D., Researchers
Всероссийский государственный центр качества и стандартизации лекарственных средств для животных и кормов, Москва, Россия
All-Russian State Research Institute for Control Standardization and Certification of Veterinary Preparations, Moscow, Russia
E-mail: pcr-lab@vgnki.ru

АННОТАЦИЯ

Образцы замороженной спермы от 217 отечественных и импортных быков были исследованы методом ПЦР на наличие фрагментов генома *Neospora caninum*, вируса герпеса КРС 1 и 4 типа, вируса диареи КРС, лейкоза КРС, вируса Шмалленберг, нодулярного дерматита, микроорганизмов рода *Mycoplasma*, *Brucella*, *Chlamydia*, *Campylobacter*, *Leptospira* а также *Histophilus somni*. Было показано присутствие в сперме КРС генетического материала вирусов герпеса КРС (0.92%). Проведенный анализ результатов ПЦР-исследований показал высокую частоту встречаемости *Histophillus somni*, микроорганизмов рода *Campylobacter* и *Mycoplasma* в стабилизированной сперме отечественного производства и поставляемой из других государств.

ABSTRACT

The results of the study of bull's semen used for artificial insemination are presented in the article. 217 samples of frozen semen from bulls of Russian and international origin were analyzed by PCR assays for genetic material of *Neospora caninum*, Bovine Herpesvirus types 1 and 4, Bovine viral diarrhea virus, Bovine leukemia virus, Schmallenberg virus, Lumpy skin disease virus, *Mycoplasma spp.*, *Brucella spp.*, *Chlamydia spp.*, *Campylobacter spp.*, *Leptospira spp.* and *Histophilus somni*. The results showed presence of Bovine Herpesvirus type 1 and Bovine Herpesvirus type 4 (0.92% semen samples) and high frequency of *Histophillus somni*, *Campylobacter spp.* and *Mycoplasma spp.* in artificially prepared semen that is used for artificial insemination.

КЛЮЧЕВЫЕ СЛОВА

Полимеразная цепная реакция, сперма КРС, искусственное осеменение, идентификация возбудителей.

KEY WORDS

PCR, cattle's semen, artificial insemination, pathogen identification.

При разведении крупного рогатого скота в настоящее время широко используются технологии искусственного осеменения коров спермой, полученной от быков-доноров из различных племенных центров. Современные технологии получения спермодоз предполагают использование глубокого замораживания и применения криопротекторов, что позволяет некоторым возбудителям инфекционных болезней сохранять жизнеспособность. Широкая продажа спермодоз племенных животных увеличивает потенциальные риски распространения инфекционных болезней. Национальные стандарты и требования к тестированию быков-производителей и контролю качества спермопродукции, как правило, разрабатывают на основе комплексной оценки, учитывающей статус страны по заболеванию и анализ здоровья

поголовья животных. Требования и правила контроля и мониторинга должны постоянно совершенствоваться и обновляться по мере поступления новой информации о патогенезе заболеваний, о циркулирующих штаммах известных возбудителей, используемых средствах специфической профилактики и методах диагностики, а также с учетом обнаружения новых возбудителей и/или появления информации об изменении роли ранее выявлявшихся и малоизученных патогенов [4].

На настоящий момент широкий спектр инфекционных агентов может быть обнаружен в сперме крупного рогатого скота [6, 9-12,15]. При оценке степени рисков, связанных с передачей инфекционных агентов через сперму, предназначенную для искусственного осеменения коров, согласно данным 1997 года, выделяют 3 категории [11]:

1 категория – инфекционные заболевания, для которых доказанной является степень риска передачи через сперму от умеренной до высокой. В данную категорию входят ящур, везикулярный стоматит, чума КРС, инфекционный ринотрахеит КРС, вирусная диарея КРС, туберкулез, кампилобактериоз, бруцеллез, трихомоноз, микоплазмоз, гистофилез. Высокая частота встречаемости в сперме КРС также показана для убиквитарных микроорганизмов (*P. aeruginosa, E. coli, Staphylococcus spp., Streptococcus spp.*).

2 категория – заболевания, для которых существуют свидетельства о низкой степени риска передачи через сперму. К этой категории отнесены такие заболевания, как блутанг, лейкоз КРС, лептоспироз, эфемерная лихорадка КРС, болезнь Акабане.

3 категория - заболевания, для которых мало или нет информации о передаче через сперму, включающая как инфекции, для которых передача посредством искусственного осеменения вероятна и инфекции, для которых передача возбудителя через спермопродукцию маловероятна. В перечень данных заболеваний входят нодулярный дерматит, хламидиоз, инфекции, вызванные грибной микрофлорой, паратуберкулез, лихорадка долины Рифт, пастереллез, листериоз, контагиозная плевропневмония, анаплазмоз.

Со временем набор возбудителей, обнаруживаемых в сперме быков был пополнен *Ureaplasma diversum*, *Acholeplasma spp*., *Arcanobacteriun pyogenes* и *Neospora caninum* [16], а также пестивирусом Hobi-like (вирус диареи КРС 3 типа, BVD-3) [7-8] герпесвирусом 4 типа [13,15] и вирусом болезни Шмалленберг [18-19]. В отдельных работах [21] при проведении оценки опасностей, связанных с передачей возбудителей инфекций КРС со спермой, рассматриваются также вирус респираторно-синцитиальной инфекции КРС, вирус парагриппа-3 КРС, коронавирус КРС, а также микроорганизмы рода *Salmonella*.

В отношении оценки качества и безопасности спермы быков в России сейчас действует ГОСТ 26030 [1], согласно которому определение патогенных и условно-патогенных бактерий и грибов в спермодозах производится микробиологическим методом по ГОСТ ISO 8607 [2] и ГОСТ 32198, а методы определения вирусов и микоплазм не регламентированы. Для оценки существующих рисков и, следовательно, необходимости усовершенствования правил контроля спермопродукции актуальным является проведение исследований методом ПЦР для выявления инфекционных агентов.

Цель работы - оценка частоты встречаемости возбудителей болезней в спермопродукциии КРС, предназначенной для искусственного осеменения молекулярно-генетическими методами.

МАТЕРИАЛЫ И МЕТОДЫ ИССЛЕДОВАНИЙ

Исследовали 217 доз семени быков-производителей различных пород мясного и молочного направления, в том числе 103 спермодозы от быков из отечественных племенных центров, 114 – из иностранных племенных центров, включая 13 образцов спермы, разделенной по полу.

Выделение нуклеиновых кислот осуществляли наборами «ДНК-сорб-С», «Рибо-преп» («Amplisens», ФБУН ЦНИИЭ), а также наборами «Проба-ГС» и «Проба-НК» («ДНК-технология») и с помощью автоматической станции NucliSENS easyMAG (bioMérieux, Франция).

При проведении ПЦР использовали наборы реагентов, представленные в таблице 1.

Таблица 1 – Наборы реагентов для ПЦР, использованные в работе

N п/п	Наименование набора	Детектируемый возбудитель	Формат детекции продуктов амплификации	Производитель набора
1	LSI VetMAX™ Neospora caninum	Neospora caninum	Гибридизационно-флуоресцентная в режиме «реального времени»	Life Technologies Corporation (Франция)
2	LSI VetMAX™ IBR gB	Вирус герпеса КРС 1 типа	Гибридизационно-флуоресцентная в режиме «реального времени»	Life Technologies Corporation (Франция)
3	LSI VetMAX™ Bovine Herpes Virus Type 4	Вирус герпеса КРС 4 типа	Гибридизационно-флуоресцентная в режиме «реального времени»	Life Technologies Corporation (Франция)
4	LSI VetMAX™ Histophilus somni	Histophilus somni	Гибридизационно-флуоресцентная в режиме «реального времени»	Life Technologies Corporation (Франция)
5	LSI VetMAX™ Campylobacter spp.	Виды рода Campylobacter	Гибридизационно-флуоресцентная в режиме «реального времени»	Life Technologies Corporation (Франция)
6	LSI VetMAX™ Campylobacter fetus	Campylobacter fetus	Гибридизационно-флуоресцентная в режиме «реального времени»	Life Technologies Corporation (Франция)
7	LSI VetMAX™ Mycoplasma bovis	Mycoplasma bovis	Гибридизационно-флуоресцентная в режиме «реального времени»	Life Technologies Corporation (Франция)
8	Тест-система "МИК-КОМ"	Виды рода Mycoplasma	Электрофоретическая детекция в агарозном геле	Amplisens (Россия)
9	Тест-система "ХЛА-КОМ"	Виды рода Chlamydia	Электрофоретическая детекция в агарозном геле	Amplisens (Россия)
10	Тест-система "РИНОКОР"	Вирус герпеса КРС 1 типа	Гибридизационно-флуоресцентная в режиме «реального времени»	Amplisens (Россия)
11	Тест-система "ЛЕЙКОЗ"	Вирус лейкоза крупного рогатого скота	Гибридизационно-флуоресцентная в режиме «реального времени»	Amplisens (Россия)
12	Тест-система «КАМ-БАК»	Campylobacter jejuni	Электрофоретическая детекция в агарозном геле	Amplisens (Россия)
13	Тест-система «SBV»	Вирус Шмалленберг	Гибридизационно-флуоресцентная в режиме «реального времени»	Amplisens (Россия)
14	Тест-система «ЛПС»	Патогенные виды рода Leptospira	Гибридизационно-флуоресцентная в режиме «реального времени»	Amplisens (Россия)
15	Тест-система «ВД»	Вирус диареи КРС	Гибридизационно-флуоресцентная в режиме «реального времени»	Amplisens (Россия)
16	Тест-система «Бру-ком»	Виды рода Brucella	Гибридизационно-флуоресцентная в режиме «реального времени»	Amplisens (Россия)
17	Набор для выявления ДНК вируса нодулярного дерматита КРС (Lumpy skin disease)	Вирус нодулярного дерматита	Гибридизационно-флуоресцентная в режиме «реального времени»	FractalBio (Россия)

В каждой ПЦР использовали контрольные образцы: отрицательный и положительный контроли ПЦР, а также отрицательный контроль экстракции РНК/ДНК. Реакцию амплификации для наборов с гибридизационно-флуоресцентной детекцией в режиме «реального времени» проводили согласно инструкции производителя на приборах RotorGene 6000 и RotorGene Q (Corbett Research, Австралия, Qiagen, Германия). ПЦР с электрофоретической детекцией осуществляли с использованием амплификаторов «Терцик» производства «ДНК-технология».

Эффективность экстракции РНК/ДНК из образцов материала оценивали по прохождению реакции амплификации внутренних контролей (ВКО). В работе использовали два типа ВКО: экзогенный контроль, добавляемый при проведении этапа выделения ДНК и эндогенный контроль, которым служили фрагменты генома животного – хозяина, амплифицируемые в мультиплексной реакции вместе с искомой мишенью возбудителя.

Результаты амплификации в «реальном времени» интерпретировали на основании наличия (или отсутствия) пересечения кривой флуоресценции с установленной на соответствующем уровне пороговой линией.

Электрофоретическую детекцию результатов амплификации проводили в 1,5% агарозном геле, содержащем бромистый этидий.

Продукты амплификации секвенировали с использованием специфичных праймеров. Секвенирование ПЦР-фрагментов осуществляли с использованием набора Big Dye® Terminator v1.1. Cycle Sequencing Kit на амплификаторе GeneAmp PCR System 2720 (Applied Biosystem, США) и автоматическом секвенаторе ABI PRISM 3130 Genetic Analyzer.

РЕЗУЛЬТАТЫ И ИХ ОБСУЖДЕНИЕ

Экстракцию нуклеиновых кислот проводили с использованием разных наборов для ручного выделения нуклеиновых кислот и автоматической станции для экстракции нуклеиновых кислот NucliSENS easyMAG. Эффективность выделения оценивали по амплификации внутреннего экзогенного контроля при использовании тест-системы «Ринокор» (Amplisens) и внутреннего эндогенного контроля при использовании тест-системы LSI VetMAX™ IBR gB (Life Technologies Corporation).

В целом было показано, что использование сорбентного метода выделения ДНК менее эффективно, чем использование метода, включающего стадию спиртового осаждения нуклеиновых кислот. Из-за удобства использования, связанного, в том числе, с сокращением общего времени экстракции, набор «Рибо-преп» был выбран для дальнейшей работы.

Спермодозы от 217 быков были исследованы методом ПЦР на наличие фрагментов генома *Neospora caninum*, вируса герпеса КРС 1 и 4 типа, вируса диареи КРС, лейкоза КРС, вируса Шмалленберг, вируса нодулярного дерматита, микроорганизмов рода *Mycoplasma*, *Chlamydia*, *Campylobacter*, *Leptospira, Brucella* а также *Histophilus somni*.

По результатам молекулярно-генетических исследований ни в одном образце не была выявлена инфицированность патогенными видами рода *Leptospira*, мироорганизмами рода *Brucella*, *Neospora caninum*, вирусом Шмалленберг и вирусом лейкоза КРС.

В нашей работе, в отличие от исследований украинских ученых [14], в образцах семени не был выявлен генетический материал микроорганизмов рода *Chlamydia*. Также ни в одном из образцов в нашем исследовании не обнаружены фрагменты генома вируса диареи КРС. Необходимо отметить, что аналогичные исследования спермы, проводимые в Иране в 2010-2011 году, показали, что уровень контаминации вирусом диареи достигал 18,6% [20].

Результаты выявления фрагментов генома микроорганизмов в сперме КРС представлены в таблице 2.

Фрагменты генома вируса герпеса КРС 4 типа (Bovine Herpesvirus 4, BHV4) были обнаружены в 2-х образцах: одном образце из отечественного и в одном образце из иностранного племенного центра.

ДНК вируса герпеса 1 типа (Bovine Herpesvirus 1, BHV1) была выявлена в 2-х образцах из отечественных племенных центров как с использованием тест-системы "РИНОКОР" (Россия), так и с помощью набора реагентов LSI VetMAX™ IBR gB (Франция). Секвенирование участка ДНК вируса с использованием специфичных к 3’ области гена gC праймеров [22] показало 100% идентичность анализируемой

последовательности аналогичному участку изолятов и штаммов BHV1, представленных в базе данных GeneBank.

Таблица 2 – Результаты выявления ДНК микроорганизмов в сперме КРС

Происхождение образца	Количество образцов	Обнаружена ДНК											
		BHV1		BHV4		Mycoplasma spp.		Campylobacter spp.		C. jejuni		H. somni	
		N	%	N	%	N	%	N	%	N	%	N	%
Отечественные племенные центры	103	2	1.94	1	0.97	94	91,2	87	84,4	19	18,4	93	90,2
Иностранные племенные центры	114	-	-	1	0.87	69	60,5	83	72,8	5	4,38	78	68,4
N - количество образцов, в которых обнаружена ДНК микроорганизма													

ДНК вирусов герпеса КРС в сперме, предназначенной для искусственного осеменения, обнаруживали при проведении исследований в Аргентине [15], генетический материал вируса герпеса 1 типа выявляли при тестировании спермодоз из разных районов Украины [14].

При исследовании образцов спермы на присутствие ДНК *Campylobacter spp.* положительный результат был получен для 78,3% образцов. Поскольку основным возбудителем генитального кампилобактериоза КРС считается *C. fetus*, а также есть информация о влиянии некоторых штаммов *C. jejuni* на фертильность крупного рогатого скота [9], было проведено дополнительное исследование образцов на наличие ДНК *C. fetus* и *C. jejuni*. Фрагменты генома *C. fetus* выявлены не были, а ДНК *C. jejuni* была обнаружена в 11,05% образцов, полученных из отечественных и иностранных племенных центров. Возможно, присутствие в большом числе спермодоз ДНК *C. jejuni* является следствием контаминации образцов при заборе семени.

ДНК *Histophilus somni* в нашем исследовании была выявлена в 78,8% образцов. Положительный результат был подтвержден нуклеотидным секвенированием продуктов амплификации гена 16S рРНК *H. somni* с использованием специфичных праймеров [21]. Результаты подобного исследования спермодоз, используемых для искусственного осеменения в Иране выявили значительно меньшую обсемененность спермодоз - 21,62% [21]. Есть свидетельства, что *H. somni* может присутствовать в репродуктивном тракте здоровых животных, однако также оказывает негативное влияние на репродуктивные качества семени [13].

При исследовании образцов с помощью тест-системы «МИК-КОМ» фрагменты ДНК *Mycoplasma spp*. были выявлены в 94 образцах спермы из отечественных племцентров и в 69 образцах спермы из иностранных племенных хозяйств. Чтобы уточнить видовую принадлежность микоплазм, для 33 образцов было проведено секвенирование продуктов ПЦР. В пробах обнаруживали *M. bovigenitalium*, *M. californicum* и *Ureaplasma diversum*, при этом для большинства образцов было выявлено несколько сигналов чтения матрицы, что свидетельствует о наличии в образце нескольких видов *Mycoplasma*. Для исключения контаминации спермопродукции видом *M. bovis* образцы были дополнительно исследованы с помощью набора LSI VetMAX™ *Mycoplasma bovis*. Ни в одном из исследованных образцов ДНК *M. bovis* не была выявлена.

ЗАКЛЮЧЕНИЕ

Вопросы распространенности и контроля инфекций в племенных хозяйствах являются актуальными во всем мире. Отечественными специалистами широко обсуждалось значение выявления ДНК микоплазм в сперме КРС [3,4,5]. Поскольку ПЦР-исследование не говорит о жизнеспособности микроорганизма, для принятия решений о возможности использования спермы для искусственного осеменения необходимо создание схемы лабораторного контроля семенного материала, которая будет включать как метод ПЦР, так и бактериологические исследования с

использованием современных сред для выращивания труднокультивируемых микроорганизмов.

Проведенный анализ результатов ПЦР-исследований показал высокую частоту встречаемости *Histophillus somni*, микроорганизмов рода *Campylobacter* и *Mycoplasma* в стабилизированной сперме отечественного производства и поставляемой из других государств. В семени КРС обнаруживали вирусы герпеса 1 и 4 типов, что подтверждает необходимость совершенствования контроля племенного материала при организации мероприятий по обеспечению эпизоотического благополучия товарных хозяйств.

БИБЛИОГРАФИЯ

1. ГОСТ 26030 Средства воспроизводства. Сперма быков замороженная. Технические условия.
2. ГОСТ ISO 8607-2015 Средства воспроизводства. Сперма племенных быков замороженная. Подсчет живых аэробных микроорганизмов.
3. Манжурина О.А. Степанов А.В. Королькова А.О. Значение определения микоплазм в оценке качества спермы. Сборник трудов VIII Всероссийской научно-практической конференции «Молекулярная диагностика 2014» с.515.
4. Козлова А.Д., Горбачева Н.С., Клименкова О.В., Яралова Е.А., Яцентюк С.П. Применение метода ПЦР для выявления возбудителей инфекционных болезней в сперме крупного рогатого скота // Перспективы и актуальные проблемы развития высокопродуктивного молочного и мясного скотоводства: материалы Международной научно-практической конференции, Витебск, 25-27 мая 2017 г. / УО ВГАВМ; редкол: Н.И. Гавриченко (гл. ред.) [и др.]. – Витебск, 2017. – С 89-95.
5. Терлецкий В.П. Тыщенко В.И., Гайрабеков Р.Х., Шахтамиров И.Я., Усенбеков Е.С.З. Распространенность микоплазменной инфекции в племенных хозяйствах. Сборник трудов VIII Всероссийской научно-практической конференции «Молекулярная диагностика 2014» с. 491-492.
6. Afshar A., Eaglesome M.D. (1990). - Viruses associated with bovine semen. Vet. Bull, 60 (2), 93-109.
7. Bauermann F. V. et al (2013). HoBi-like viruses: an emerging group of pestiviruses Journal of Veterinary Diagnostic Investigation. 25(1) 6–15.
8. Bauermann, F.V. and Ridpath, J.F. (2015) «HoBi-like viruses – the typical “atypical bovine pestivirus», Animal Health Research Reviews, 16(1), pp. 64–69.
9. Eaglesome M.D. & Garcia M.M. (1992). - Microbial agents associated with bovine genital tract infections and semen. Part I. Brucella abortus, Leptospira, Campylobacter fetus and Tritrichomonas foetus. Vet. Bull, 62 (8), 743-775.
10. Eaglesome M.D., Garcia M.M. & Stewart R.B. (1992). - Microbial agents associated with bovine genital tract infections. Part II. Haemophilus somnus, Mycoplasma spp. and Ureaplasma spp., Chlamydia; pathogens and semen contaminants; treatment of bull semen with antimicrobial agents. Vet. Bull, 62 (9), 887-910.
11. Eaglesome M.D., Garcia M.M. (1997). Disease risks to animal health from artificial insemination with bovine semen. Rev. sci. tech. Off. int. Epiz., 16 (1), 215-225.
12. Hare W.C.D. (1985). - Diseases transmissible by semen and embryo transfer techniques. Technical Series No. 4. Office International des Epizooties, Paris, 117 pp.
13. González Altamiranda E, Manrique JM, Pérez SE, Ríos GL, Odeón AC, Leunda MR. (2015) Molecular Characterization of the First Bovine Herpesvirus 4 (BoHV-4) Strains Isolated from In Vitro Bovine Embryos production in Argentina. PLoS ONE 10(7): e0132212. doi:10.1371/journal.pone.0132212
14. Isakov M.M. Solodiankin O.S., Bolotin V.I., Gerilovych A.P. PCR detection of genital infections in bull semen from different regions of Ukraine, 2013 - 2016 Arhiv veterinarske medicine, Vol. 9, No. 2, 63 - 70, 2016

15. Morán P.E., Favier P.A., Lomónaco M., Catena M.C., Chiapparrone M.L., Odeón A.C., Verna A.E., Pérez S.E. (2013). Search for the genome of bovine herpesvirus types 1, 4 and 5 in bovine semen. Open Veterinary Journal, Vol. 3(2): 126-130.
16. Peña M.A, Góngora A, Jiménez C. (2011). Infectious agents affecting fertility of bulls, and transmission risk through semen. Retrospective analysis of their sanitary status in Colombia. Rev Colomb Cienc Pecu; 24:634-646.
17. Phillpot M. (1993). - The dangers of disease transmission by artificial insemination and embryo transfer. Br. vet. J., 149, 339-369.
18. Ponsart C., Pozzi N., and Vitour D. (2014). Evidence of excretion of Schmallenberg virus in bull semen Vet Res.; 45(1): 37.
19. Schulz C, Wernike K, Beer M, Hoffmann B. (2014) Infectious Schmallenberg virus from bovine semen, Germany Emerg Infect Dis. Feb; 20(2): 338–340.
20. Sharifzadeh A., Doosti A., and Dehkordi P.G. Reverse Transcriptase PCR Assay for Detection of Bovine viral diarrhea virus (BVDV) Infection in Iranian Bull's Semen SamplesMiddle-East J. Sci. Res., 9 (1): 132-139, 2011
21. Sharifzadeh A., Doosti A., and Dehkordi P.G. Frequency of Haemophilus somnus in the semen of bulls in Iran as determined by polymerase chain reaction Scientific Research and Essays Vol. 6(6), pp. 1458-1460, 2011
22. Sviland, S., Høgåsen, H.R., Mørk, T. (2014). Import risk assessment for frozen cattle semen from Norway to Iceland. Norwegian Veterinary Institute's Report Series 16-2014
23. Traesel CK, Sá e Silva M., Spilki F.R, Weiblen R., Flores E.F. Nucleotide sequencing and phylogenetic analysis of the 3' region of glycoprotein C gene of South American bovine herpesviruses 1 and 5. Res Vet Sci. 2013 Feb;94(1):178-85.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.48

РАСПРОСТРАНЕННОСТЬ ТОКСОПЛАЗМОЗА В ПОПУЛЯЦИИ КОШЕК МОСКОВСКОГО МЕГАПОЛИСА

THE PREVALENCE OF TOXOPLASMOSIS IN CATS' POPULATION OF THE MOSCOW METROPOLIS

Шабейкин А.А.*, кандидат ветеринарных наук, заведующий лабораторией
Shabeykin A.A., Candidate of Veterinary Sciences, Head of Laboratory
Дроздова Е.И., кандидат биологических наук, ведущий научный сотрудник
Drozdova E.I., Candidate of Biological Sciences, Leading Researcher
Степанова Т.В., **Тенянова В.А.**, **Гулюкина И.А.**, **Филимонова А.Д.**, научные сотрудники
Stepanova T.V., Tenjanova V.A., Gulyukina I.A., Filimonova A.D., Researchers
Всероссийский научно-исследовательский институт экспериментальной ветеринарии имени Я.Р. Коваленко, Москва, Россия
All-Russian Research Institute of Experimental Veterinary Medicine named after Y.R. Kovalenko, Moscow, Russia

*E-mail: viev@mail.ru

АННОТАЦИЯ
Частота встречаемости токсоплазмоза в популяции кошек московского мегаполиса составляет не менее 25%, что сопоставимо с распространенностью токсоплазм в других регионах. Однако, животные, содержащиеся в городских квартирах, крайне редко выделяют ооцисты с фекалиями и в большинстве случаев не представляют реальной угрозы для окружающих.

ABSTRACT
The incidence of toxoplasmosis in the population of the Moscow metropolis' cats is not less than 25%, which is comparable to the prevalence of toxoplasma in other regions. However, animals contained in urban apartments rarely singled out oocysts with feces and in most cases do not pose a real threat to others.

КЛЮЧЕВЫЕ СЛОВА
Toxoplasma gondii, жизненный цикл, распространенность токсоплазмоза, Москва.

KEY WORDS
Toxoplasma gondii, life cycle, prevalence of toxoplasmosis, Moscow.

Возбудителем токсоплазмоза является простейший анаэробный паразит вида Toxoplasma gondii, относящийся к типу Apicomplexa, классу Coccidia, отряду Eucoccidiorida, подотряду Eimeriorina, семейству Sarcocystidae, роду Toxoplasma [2].

Токсоплазма является одним из наиболее распространенных паразитов, входящих в группу Apicomplexa, обнаруживается почти у всех теплокровных животных и является частой причиной заболевания диких, сельскохозяйственных и мелких домашних животных [3,4]. Токсоплазмоз относится к зооантропонозным заболеваниям. Заболевание распространено повсеместно и считается, что токсоплазмами инфицировано до половины населения земного шара, причем в южных регионах распространение токсоплазмоза заметно выше [7]. Инфицированность людей в регионах с тёплым и жарким климатом может достигать 95%. В России, по данным медицинской статистики, носителями токсоплазм являются около 20% населения [10].

Комплекс жизненного цикла развития Toxoplasma gondii включает фазы полового и бесполого размножения. Половое размножение паразитов реализуется в эпителиальных клетках кишечника животных семейства кошачьих, которые являются

окончательными хозяевами токсоплазм. Бесполое размножение токсоплазмы проходит при инфицировании огромного круга промежуточных хозяев, с преимущественной локализацией паразита в мышечной и нервной ткани. Истинными промежуточными хозяевами являются различные виды грызунов, составляющие основную кормовую базу кошек, остальные животные и человек выступают скорее в роли нецелевых жертв. Токсоплазмы, находящиеся в цикле бесполого размножения, не выделяются во внешнюю среду, но при этом мясо пораженных животных представляет опасность при поедании в сыром или полусыром виде. Этот фактор имеет большое эпидемиологическое значение, так как считается, что около 25% проб мяса, идущего в пищу человеку, содержат цистозоиты токсоплазм [9].

Домашняя кошка в ходе эволюции токсоплазмы стала одним из важнейших хозяев паразита [6]. Кошки заражаются при поедании тканей промежуточного хозяина, в которых содержатся любые стадии токсоплазмы, а также при проглатывании ооцист с контаминированных объектов внешней среды [11].

При попадании в кишечник кошки, Toxoplasma gondii может дифференцироваться в гаметоциты и пойти по половому пути развития, либо сформировать тахизоиты с последующим бесполым циклом развития.

При половом цикле развития, гаметоциты токсоплазм, образующиеся в эпителии кишечника кошки, формируют после слияния и ряда преобразований неспорулированные ооцисты, которые вместе с фекалиями попадают во внешнюю среду и до окончания процесса споруляции в течение нескольких дней не являются инфекционно опасными. Споруляция происходит при +4ºС за 2-3 дня, при +11ºС — за 5-8 дней, при +15ºС — за 14-21 день [9]. После окончания процесса споруляции ооцисты приобретают способность к инфицированию и в таком состоянии могут сохраняться в почве до одного года и более.

Бесполый цикл развития Toxoplasma gondii является общим для всех теплокровных животных, и в том числе для кошек. Образующиеся тахизоиты обладают способностью к быстрому делению, и при условии недостаточно сильного иммунного ответа они преодолевают эпителиальный барьер кишечника, разносятся кровеносной системой, колонизируя ядерные клетки по всему организму хозяина. На этой стадии при проникновении в клетки организма тахизоиты образуют псевдоцисты, где продолжают интенсивно делиться до полного разрушения клетки.

По мере формирования активной иммунной реакции, токсоплазмы дифференцируется в медленнорастущие брадизоиты, находящиеся под прикрытием оболочки тканевой цисты. В таком состоянии паразиты могут находится практически всю жизнь промежуточного хозяина.

На основании характера иммунного ответа проводится оценка примерного времени заражения и стадии токсоплазмоза. Антитела класса М обнаруживаются преимущественно со 2 по 16 неделю после первичного инфицирования токсоплазмой. Специфические IgG начинают выявляться на 3-4 неделе и впоследствии могут сохраняться в течение длительного срока. Первоначально синтезируются антитела IgG с низкой авидностью. В дальнейшем, при контакте с антигенами токсоплазмы отбираются клоны В-клеток, синтезирующие антитела со всё большей специфичностью и организм начинает вырабатывать IgG с высокой авидностью.

Понимание данных процессов в значительной степени помогает в медицинской практике сформировать заключение при серологической диагностике о наличии или отсутствии у человека наиболее опасной формы токсоплазмоза с активно делящимися тахизоитами.

Однако в городской ветеринарии, подобные алгоритмы исследования не всегда могут быть использованы при оценке эпизоотологической и эпидемиологической опасности инфицированных токсоплазмой кошек [1]. Наибольшую опасность представляют животные, инфицированные токсоплазмами в стадии полового развития и выделяющие ооцисты с фекалиями. Как правило, это животные, находящиеся в начальной стадии болезни и продолжительность этого периода, для первично зараженных кошек, составляет 1-3 недели. Повторное заражение кошки с выделением

ооцист возможно не ранее чем через 4-6 месяцев [11]. Это связано с защитой, обеспеченной резидентными макрофагами, дендритными клетками и внутриэпителиальными лимфоцитами [2].

При повторном и последующем контактах кошки с токсоплазмой, в случае если одновременно животное не инфицировано вирусом лейкоза (FeLv) или иммунодефицита (FIV) [12], продолжительность периода выделения ооцист значительно сокращается и наблюдается с 1 по 3 день после поедания кошкой зараженной мыши [5]. Но эти данные показывают, что и при первичном, и при повторном заражении кошки токсоплазмой, серологическая диагностика не позволяет достоверно выявить животных, находящихся в стадии выделения ооцист. Специфические антитела класса IgG начинают выявляться к тому моменту, когда у кошки уже сформировался иммунный ответ, обеспечивший прерывание дальнейшей инвазии токсоплазм в кишечнике. Определение авидности антител IgG позволяет сделать только заключение, что перенесенный животным токсоплазмоз был первичным или наблюдается хроническая форма инфекции. Одновременно, примерно у 20% зараженных кошек специфические IgM к Toxoplasma gondii в лаборатории не выявляются, часто возможна запоздалая продукция или аномально долгая персистенция IgM, что значительно снижает диагностическую ценность и этого метода. Так же на протяжении длительного времени высокие концентрации IgG могут поддерживаться без повторных циклов заражений благодаря наличию у кошки тканевых цист, обеспечивающих непрерывное поступление антигенов во внеклеточное пространство и постоянную инициацию клеток памяти иммунной системы.

Результаты собственных исследований. Учитывая вышесказанное, нами для определения распространенности контактов кошек городского содержания с токсоплазмами было проведено серологическое исследование по определению титров антител IgG в ИФА, и параллельно, для определения потенциальных эпидемиологических рисков было проведено исследование, направленное на непосредственное выявление ДНК Toxoplasma gondii в фекалиях животных методом ПЦР. Работа проводилась в рамках выполнения госзадания по программе фундаментальных научных исследований государственных академий наук по теме № 0578-2014-0011.

Для исследования в ИФА титров специфических IgG, были использованы образцы сыворотки крови, полученные от кошек московского мегаполиса в период 2016 – 2017 гг. Полученные результаты были разбиты по уровню содержащихся антител на четыре группы:

- очень низкие титры IgG (менее 0,2), что позволяет предположить отсутствие у животных контакта с токсоплазмой
- средний уровень титров IgG (0,2-0,8), что позволяет предположить заражение животных токсоплазмой в отдаленном прошлом
- высокий уровень титров IgG (0,9-3,0), что позволяет предположить недавно перенесенное заболевание
- очень высокий уровень титров IgG (более 3,0), что позволяет предположить наличие заболевания в активной стадии, возможно с циркуляцией тахизоитов.

Таблица 1 – Уровень титров специфических IgG в крови кошек домашнего содержания московского мегаполиса

Уровень титров IgG	2016		2017	
Очень высокий	11	2%	6	1,73%
Высокий	72	13,11%	40	11,53%
Средний	55	10,02%	37	10,66%
Очень низкий	411	74,86%	264	76,08%
Всего	549	100%	347	100%

Как показало проведенное исследование, не менее 25% городских кошек в течение своей жизни хотя бы однократно были инфицированы Toxoplasma gondii. Это

можно признать достаточно высоким показателем, и более того, учитывая, что антитела не всегда длительно сохраняются на высоком уровне, реальное число животных, перенесших токсоплазменную инвазию, можно прогнозировать значительно больше.

Учитывая повсеместное распространение токсоплазмоза в популяции кошек московского мегаполиса, вторая часть проведенного исследования была направлена на определение степени рисков заражения для владельцев животных [8]. Для проведения исследования на наличие ооцист Toxoplasma gondii были использованы фекалии и смывы со слизистой оболочки кишечника, полученные от кошек в 2016 и 2017 гг. В 2016 году было исследовано 725 образцов, в 2017- 693 образца. Для обнаружения токсоплазм применяли метод ПЦР в реальном времени. Выделение нуклеиновых кислот проводилось коммерческими наборами на магнитных частицах с силикатной оболочкой. Данная методика повышает чувствительность ПЦР, т.к. в конечном препарате выделенной ДНК содержится минимум веществ, которые могут ингибировать ПЦР. Образцы фекалий перед исследованием стандартизировали, делая 5% суспензию образца в стерильном физ. растворе. Смывы со слизистых оболочек дополнительной подготовки не требовали. Выделение ДНК и проведение ПЦР проводилось согласно протоколу производителя наборов. В 2016 году из 725 полученных образцов не было выявлено ни одного случая токсоплазмоза. В связи с этим в 2017 году методику пробоподготовки каламодифицировали. Кал содержит большое количество примесей и ингибиторов ПЦР-реакции, которые могут приводить к ложноотрицательному результату. Для повышения концентрации ооцист в материале, образцы кала подвергали дополнительной подготовке седиментацией при помощи пробирок-концентраторов “Парасеп”. Для сравнения методик пробоподготовки было обработано 80 образцов кала, согласно протоколу производителя пробирок-концентраторов. Параллельно с этим, образцы готовили привычным способом, до получения 5% суспензии кала в физ. растворе. Обе группы образцов выделяли и амплифицировали согласно протоколу производителя наборов ПЦР. В результате проведенных исследований, токсоплазмы не были выявлены в обеих группах. Отрицательный результат наблюдался и в остальных 613 образцах, обработанных только по классической схеме.

Заключение. Частота встречаемости токсоплазмоза в популяции кошек московского мегаполиса составляет не менее 25%, что сопоставимо с распространенностью токсоплазм в других регионах. Особенности эпизоотологии этого паразита в условиях города, состоит в том, что преимущественное заражение животных происходит в период летних отпусков и вывоза кошек на дачные участки. После первичного контакта и заражения токсоплазмой, кошки непродолжительное время выделяют ооцисты, но это происходит непосредственно сразу после заражения и в период пока животное еще за городом. Далее кошки становятся на несколько месяцев невосприимчивы к повторному заражению и поэтому, когда животных возвращают в город их фекалии не содержат паразита и в большинстве случаев не представляют реальной угрозы для окружающих. Для минимизации эпидемиологических рисков можно придерживаться стандартных рекомендаций о своевременной уборке кошачьих туалетов, не допуская споруляции ооцист и исключении из рациона кошек сырого мяса для предотвращения поедания тканевых цист токсоплазмы.

БИБЛИОГРАФИЯ

1. Belimenko V.V., Gulyukin A.M., Novosad E.V., Shabeikin A.A. Prospects of application of geoinformational systems for veterinary geology. В книге: MedGeo 2017 Conference Materials of 7th International Conference on Medical Geology. 2017. С. 61.
2. Christopher A. Hunter L. David Sibley Modulation of innate immunity by Toxoplasma gondii virulence effectors [Журнал] // Nat Rev Microbiol. - Nov 2012 г. - стр. 766–778.
3. Dubey J P Toxoplasmosis of animals and humans [Статья]. - [б.м.]: CRC Press, 2010.

4. Kärt Must Marjo K. Hytönen, Toomas Orro, Hannes Lohi, Pikka Jokelainen Toxoplasma gondii seroprevalence varies by cat breed [Журнал] // PLoS One. . - 2017.
5. Marie-Lazarine Poulle 1,2,aMarie-Amélie Forin-Wiart, Émilie Josse-Dupuis, Isabelle Villena, and Dominique Aubert Detection of Toxoplasma gondii DNA by qPCR in the feces of a cat that recently ingested infected prey does not necessarily imply oocyst shedding [Журнал] // Parasite. - 2016. - Т. 23. - стр. 4.
6. Ricardo T. Gazzinelli Rondon Mendonça-Neto, Jingtao Lilue, Jonathan Howard, Alan Sher Innate resistance against Toxoplasma gondii: An evolutionary tale of mice, cats and men [Журнал] // Cell Host Microbe. - 2014. - стр. 132–138.
7. Veronesi F Santoro A, Milardi GL, Diaferia M, Morganti G, Ranucci D, Gabrielli S. Detection of Toxoplasma gondii in faeces of privately owned cats using two PCR assays targeting the B1 gene and the 529-bp repetitive element. [Статья] // Parasitol Res. – 2017. Т. 116. - стр. 1063-1069.
8. Белименко В.В., Гулюкин А.М. Риск-ориентированный подход при проведении мониторинга клещевых инфекций на территории мегаполиса. // В сборнике: Единый мир - единое здоровье Материалы конгресса. 2017. С. 281-285.
9. Васильев В. В. Токсоплазмоз: руководство по инфекционным болезням [Книга] / ред. Ю.В. Лобзин. - Санкт-Петербург: 2003. - стр. 661-672.
10. Григорьев К. И. и Харитонова Л. А. Токсоплазмоз у детей [Статья] // Медицинская газета. - 2016. - 96. - стр. 8-9.
11. Ермакова Н. А. Практическая медицина [Журнал]. - Казань: Общество с ограниченной ответственностью "Практика", 2012. - стр. 51-56.
12. Забережный А.Д., Костина Л.В., Южаков А.Г., Гулюкина И.А., Степанова Т.В., Стаффорд В.В., Полякова И.В., Дроздова Е.И. Современная таксономия вирусов. // Ветеринария и кормление. 2017. № 1. С. 4.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

DOI https://doi.org/10.18551/rjoas.2017-10.49

ОСОБЕННОСТИ ТЕЧЕНИЯ ПАРВОВИРУСНОГО ЭНТЕРИТА У СОБАК
PECULIARITIES OF PARVOVIRUS ENTERITIS IN DOGS

Ватников Ю.А.[1], **Сахно Н.В.**[2], доктора ветеринарных наук
Vatnikov Y.A., Sahno N.V., Doctors of Veterinary Sciences
Медведев И.Н.[1], доктор биологических наук
Medvedeva I.N., Doctor of Biological Sciences
Бяхова В.М.[1], кандидат ветеринарных наук
Byahova V.M., Candidate of Veterinary Sciences
Попова И.А.[1], аспирант
Popova I.A., Post-graduate student
Глаголева Т.И.[3], кандидат биологических наук
Glogoleva T.I., Candidate of Biological Sciences
[1]**Российский университет дружбы народов, Москва, Россия**
Peoples' Friendship University of Russia, Moscow, Russia
[2]**Орловский государственный аграрный университет, Орел, Россия**
Orel State Agrarian University, Orel City, Russia
[3]**Всероссийский научно-исследовательский институт физиологии, биохимии и питания животных, Боровск, Россия**
All-Russian Scientific Research Institute of Physiology, Biochemistry and Nutrition of Animals, Borovsk, Russia
*E-mail.: sahnoorelsau@mail.ru

АННОТАЦИЯ
В работе представлены особенности течения парвовирусного энтерита, а также результаты исследований динамики морфофункциональных изменений эритроцитов у собак. Установлено, что развитие данного заболевания вызывает выраженные негативные сдвиги в показателях эритроцитов, так структура эритроцитов подвергается значительной деформации при которой снижается количество дискоцитов и нормоцитов. В крови этих животных появляются эхиноциты, шизоциты, большое количество эритроцитарных агрегатов в виде «монетных столбиков». Полученные данные указывают на сложную функциональную перестройку эритрона. Парвовирусная инфекция вызывает увеличение разнородности популяции эритроцитов и ухудшение их реологических свойств, а, следовательно, затруднение перфузии капилляров.

ABSTRACT
The paper presents the features of parvovirus enteritis, as well as the results of studies of the dynamics of morphofunctional changes in erythrocytes in dogs. It is established that the development of this disease causes marked negative changes in the erythrocyte indexes, so the erythrocyte structure undergoes considerable deformation at which the number of discocytes and normocytes decreases. In the blood of these animals there are echinocytes, schizocytes, a large number of erythrocyte aggregates in the form of "coin pillars." The data obtained indicate a complex functional rearrangement of the erythron. Parvovirus infection causes an increase in the heterogeneity of the erythrocyte population and the deterioration of their rheological properties, and, consequently, the difficulty of perfusion of capillaries.

КЛЮЧЕВЫЕ СЛОВА
Собаки, парвовирусный энтерит, эритроциты, микрореологические свойства, патология.

KEY WORDS
Dogs, parvovirus enteritis, erythrocytes, microrheological properties, pathology.

Парвовирусный энтерит, тяжелое вирусное заболевание, сопровождающееся высокой летальностью молодых собак, причем в последнее время данное заболевание встречается достаточно часто и составляет около 7-8% от числа возникающих у них патологий. Эти обстоятельства требуют не только подробной оценки болезни, но и понимания ее патогенетических механизмов, что является важной основой для повышения эффективности лечения [1,2,15]. Несмотря на разработанные схемы лечения [3], развитие осложнений и гибель собак на фоне парвовирусного энтерита может достигать 30% [4]. Многие ученые утверждают, что значительное ослабление организма на фоне любой патологии связано с ухудшением реологических свойств крови [5,6,7]. Клинический контроль, базирующийся на анализе структурных и функциональных параметров эритроцитов, открывает большие перспективы в поиске механизмов, вызывающих осложнения и гибель организма [9] и пути по их снижению [10,11]. Большое значение в ухудшении состояния животных при парвовирусном энтерите также имеют негативные изменения цитоархитектоники и агрегации эритроцитов, которые не обладают видовыми и возрастными особенностями [8]. Именно поэтому структурные и функциональные изменения этих форменных элементов крови нуждаются в дополнительном изучении [12].

Цель исследования – выявить состояние морфофункциональных особенностей эритроцитов в период течения парвовирусного энтерита у собак.

МАТЕРИАЛЫ И МЕТОДЫ ИССЛЕДОВАНИЙ

Работа выполнена по материалам исследований, полученных при обследовании собак (n=9) средних пород в возрасте 7-9 месяцев с диагнозом парвовирусный энтерит. Пробы учитывали при подтверждении диагноза лабораторными исследованиями с помощью метода ПЦР. Коррекция состояния животных проводилась с помощью специфической, симптоматической и патогенетической терапии [13]. В пробах крови оценивали ряд эритроцитарных параметров [14]. Определяли число эритроцитов (RBC), концентрацию гемоглобина (HGB), уровень гематокрита (HCT), величину MCV (значение среднего объема эритроцита); показатель MCH (среднее количество гемоглобина в эритроците); величину MCHC (среднее количество гемоглобина в эритроците); уровень RDW (ширина распределения эритроцитов по объему). По объему распределение эритроцитов (RDW) определяли в процентах и указывает степень отклонения объёма эритроцитов от среднего его уровня, демонстрируя отличие между наиболее мелким эритроцитом и наиболее крупным. Наблюдение вели в течение 15 суток. Ни одно животное в ходе исследования не погибло. Статистическую обработку данных проводили при помощи программы MedCalc для Windows с применением t-критерия Стьюдента.

РЕЗУЛЬТАТЫ И ИХ ОБСУЖДЕНИЕ

Изучение научной литературы показало, что патофизиологическим особенностям развития инфекционного процесса относительно реологических свойств крови всегда уделялось недостаточно внимания. Однако практика показывает, что изменения эритроцитов при инфекционных процессах характеризуются выраженными нарушениями. Так, иммунные процессы неизбежно отражаются на мембранах эритроцитов. Было выявлено, что количество эритроцитов на момент первого обследования составило 5,2±0,64x10^6/мкл, на 3-и сутки оказался на уровне 5,3±0,07x10^6/мкл. На 7-е сутки после начала наблюдения показатель RBC продолжал повышаться, достигнув значения – 5,9±0,09 x10^6/мкл. На 11-е сутки число эритроцитов дополнительно возросло, а к 15-м достигло уровня 7,1±0,10x10^6/мкл (табл. 1). Найденное исходное снижение числа эритроцитов объясняется не только торможением гемопоэза, но и усилением их потребления в результате гиперагрегации и разрушения. Изменения структуры и обмена веществ эритроцитов ведут к ухудшению их структуры и раннему разрушению. В исходном состоянии концентрация

гемоглобина (HGB) равнялась 12,4±0,92 г/дл, к 7-м суткам было отмечено повышение его уровня до 13,7±0,47 г/дл, а к 15-м суткам наблюдения 15,8±0,42 г/дл.

Таблица 1 – Динамика морфофункционального состояния эритроцитов собак на фоне парвовирусного энтерита

Показатели крови	Норма	Начало заболевания	Наблюдение в динамике			
			3 сутки	7 сутки	11 сутки	15 сутки
Динамика функционального состояния эритроцитов						
RBC x10^6/мкл	7,2±0,22	5,2±0,64**	5,3±0,07**	5,9±0,09*	6,8±0,07	7,1±0,10
HGB, г/дл	16,0±0,47	12,4±0,92**	12,6±0,51**	13,7±0,47*	14,4±0,61	15,8±0,42
HCT, %	47,4±0,84	43,4±0,75*	44,0±1,02*	45,6±0,54	46,3±0,52	48,1±0,36
MCV, фл	65,8±0,77	83,5±2,12*	83,0±1,94**	77,3±2,04**	68,1±1,36*	67,7±1,22
MCH, пг	22,2±0,92	23,8±2,42	23,8±1,47	23,2±1,28	21,2±0,92	22,2±0,76
MCHC, г/дл	33,7±1,11	28,6±4,20	26,8±3,81	30,0±2,64*	31,1±2,05*	32,8±1,54**
RDW, %	12,8±0,62	10,1±2,27	10,8±2,00	11,3±1,71	11,8±1,40	12,4±1,32
СОЭ, мм/ч	3,2±0,19	17,4±0,36**	16,0±0,49**	12,1±0,23**	6,5±0,34*	4,5±0,30
Динамика структурных изменений эритроцитов						
Нормоциты	78,6±2,96	59,7±2,49**	64,5±3,27**	70,1±2,54**	75,0±2,21**	79,3±1,69*
Микроциты	12,4±0,57	18,0±2,40*	15,4±2,11*	13,2±1,36	12,6±1,06	11,7±0,86
Макроциты	9,0±0,63	22,3±1,74**	20,1±1,42**	16,7±1,26**	12,4±1,07*	9,0±0,99
Дискоциты	88,7±3,09	70,1±3,68**	72,8±3,48**	78,9±2,54*	81,7±2,20	85,6±1,80
Эхиноциты	7,5±0,42	16,1±0,89**	14,0±0,94**	11,5±0,88**	9,7±0,75*	7,6±0,68
Шизоциты	0	7,0±0,02**	6,0±0,03**	4,1±0,09**	1,5±0,12*	0,1±0,20
Монетные столбики	0	6,2±0,12**	4,0±0,27**	2,1±0,45**	0,4±0,61*	0,2±0,47
RBC с т Жолли	1,3±0,06	11,0±0,75**	3,3±0,62**	8,1±0,54**	4,3±0,63**	1,1±0,43

*Примечание: отличие показателей от нормы * - p<0,05; ** - p<0,01.*

Как видно из таблицы 1, по оценке величины гематокрита (HCT) можно судить о динамике процесса. В ходе первого осмотра гематокрит достиг 43,4±0,75, на 3-и сутки – 44,0±1,02%, на 7-е сутки – 45,6±0,54%. С 11-х суток (46,3±0,52%) наступало повышение этого показателя, который к 15-м суткам составлял 48,1±0,36%. Найденные изменения стоит связывать с усилением токсических влияний за счет действия вируса на ткани, накопления количества протеолитических ферментов и эндотоксинов [8, 13]. Серьезным элементом состояния животного считается оценка его гематологических показателей. Наличие патологии сказывается на числе эритроцитов и уровне гемоглобина в крови, снижая гематокритную величину и удельный вес крови [14].

Проведенная оценка среднего объёма эритроцита (MCV) выявила, что на 3-и сутки наблюдения увеличение его объема до 77,3±2,14 фл, после чего постепенно снижался, достигнув к концу наблюдения 67,7±1,22 фл. Уровень среднего количества гемоглобина (MCH) в эритроците на 3-и сутки наблюдения не отличался от контроля. В дальнейшем содержание гемоглобина колебалось незначительно. Концентрация гемоглобина (MCHC) возрастала в течение всего периода наблюдений, и максимум ее был отмечен к концу наблюдения 32,8±1,54 г/дл. Оценка RDW выявила плавное повышение показателя на 3-и сутки наблюдения до 10,8±2,00%, к 7-м суткам данный показатель возрос до 11,3±1,71%, а на 11-е - до 11,8±1,40%, а к 15-м суткам достигло 12,4±1,32%. Ясно, что гипоксия, сопровождающая тяжелое токсическое воздействие на ткани организма, приводит к повреждению эритроцитов, что создает условия для их гиперагрегации, ухудшения микроциркуляции, развития микротромбозов и углубления гипоксии [2,9]. Установлено, что скорость оседания эритроцитов на 3-и сутки составила 16,0±0,49 мм/ч., к 7-м СОЭ снизилась до 12,1±0,23 мм/ч, на 11-е сутки оказалась на уровне 6,5±0,34 мм/ч и к концу наблюдения достигла 4,5±0,30 мм/ч.

Морфология эритроцитов собак на фоне парвовирусной инфекции имела свои характерные особенности. Количество нормоцитов при первом осмотре было 59,7±2,49%, к 3-м суткам наблюдения составило 64,5±3,27%, в дальнейшем данный показатель четко нарастал и к последнему осмотру составил 79,3±1,69%. Количество микроцитов в исходе составляло 18,0±2,40%. В процессе наблюдений этот показатель снизился и на 15-е сутки составил 11,7±0,86% (табл.1). Количество макроцитов в крови животных также снижалось, достигая к концу наблюдения 9,0±0,99% при значении при первом осмотре 22,3±1,74%. Сходной была динамика количества эхиноцитов, которая

проявилась понижением их уровня (к 11-м суткам до 9,7±0,75%), а к концу наблюдений до уровня контроля (7,6±0,68%). Количество измененных форм эритроцитов, наличие которых можно объяснить агрегацией спектрина, вызванной избытком кальция и нарушением конфигурации и площади эритроцитарной мембраны [9,11], также прогрессивно снижалось, достигая к концу наблюдения минимальных значений.

Развитие изменений морфологии эритроцитов имеет большое диагностическое значение и способно нести дополнительные сведения вместе с их числом, цветовым показателем и содержанием гемоглобина. В норме основное количество эритроцитов является двояковогнутыми дисками, которые имеют большую пластичность и способны быстро деформироваться и восстанавливать свою обычную форму после продвижения через капилляры. Для реализации своих функций (в т.ч. дыхательной, пластической, транспортной, буферной) они должны четко обеспечивать свой собственный метаболизм, иметь сохранность функционального статуса и структур в условиях постоянного риска аутоиммунного или осмотического повреждения. Противостоять этому они могут благодаря состоянию их цитолеммы, обеспечивающей обмен кислорода и углекислого газа, уровень гидратации и электролитный статус, связывание на поверхности антител и антигенов. При этом эритроциты в своей массе достаточно дефектны по причине потери функций, принадлежащих ядру и обычным органеллам. Отсутствие ядер понижает уровень клеточной регенерации, степень их устойчивости к изменениям в показателях экстрацеллюлярной среды и к влиянию многих внешних факторов. Ухудшение энергетических, осмотических, иммунологических, онкотических и реологических параметров внутренней среды живого организма ведет к увеличению требований ко всем клеткам, которые для “функционально неполноценных” клеток оказывается чрезмерным, что ведет к нарушениям формы клеток.

Изменения микрореологических свойств эритроцитов часто возникают в ходе развития катаболических процессов в организме на фоне даже стихающего воспаления, когда характерна интенсификация процессов, направленных на катаболизм. Признано, что изменение морфологии эритроцитов наступает в условиях низкого pH, а также в присутствии белков острой фазы. Динамика показателей реологии крови углубляют дисфункцию микроциркуляции, усиливая риск ишемических поражений внутренних органов. При этом на поверхности эритроцитов могут адсорбироваться различные продукты метаболизма и ряд иммунных комплексов. Это позволяет считать эритроциты неспецифическими клетками, принимающими участие в иммунных процессах [14, 16]. В норме у собак в крови содержится ничтожное число «монетных столбиков» [9]. На момент первичного приема у собак в крови было обнаружено большое количество «монетных столбиков», которое в дальнейшем постепенно снижалось до минимального уровня. Данный процесс по сути является агрегацией эритроцитов, которая крайне негативно влияет на микроциркуляцию. Процесс истинной аутогемагглютинации эквивалентен положительной реакции Кумбса и является сигналом развития повреждения эритроцитов.

ЗАКЛЮЧЕНИЕ

Парвовирусный энтерит у собак сопровождается выраженными негативными сдвигами в состоянии эритроцитов. При этом состоянии эритроциты испытывают значительную деформацию, в крови понижается число дискоцитов, появляются эхиноциты и шизоциты, отмечается много «монетных столбиков». Это говорит о наличии сложной реакции эритрона на наличие вирусной инфекции в форме увеличения разнородности популяции эритроцитов. Повышается количество эритроцитов, имеющих тельца Жолли. Пойкилоцитоз сохраняется у этих животных длительно, что указывает на стойкое затруднение микроциркуляции в течение долгого времени.

БИБЛИОГРАФИЯ

1. Ватников Ю.А. Влияние посттравматической гипоксии на морфофункциональное состояние почек у собак / Ю.А. Ватников, Е.Б. Бажибина // Международный вестник ветеринарии. –2008. – №2. – С.28-33.
2. Завалишина С.Ю. Гемостатическая активность сосудистой стенки у новорожденных телят / С.Ю. Завалишина // Российская сельскохозяйственная наука. – 2012. – №1. – С.37-39.
3. Колестиков П.В. Сравнительные патоморфологические изменения при вирусных энтеритах у собак / П.В. Колестиков, Т.М. Давудова // Известия Нижневолжского агроуниверситетского комплекса: Наука и высшее профессиональное образование. – 2017.– №1(45). – С.126-131.
4. Макинтайр Д.К. Скорая помощь и интенсивная терапия животных / Д.К. Макинтайр, К.Д. Дробац, С.С. Хаскингз. – М.: «Аквариум-Принт», 2008. – 560с.
5. Никишов О.Н. Парворирусная инфекция – современная проблема в эпидемиологии и клинической медицине / О.Н. Никишов, А.А. Кузин, А.Ю. Антипова, И.Н. Лаврентьева // Эпидемиология и вакцинопрофилактика. – 2015.– Т.14, №4(83).– С.29-35.
6. Уиллард М.Д. Лабораторная диагностика в клинике мелких домашних животных / М.Д. Уиллард, Г. Тведтен, Г. Торнвальд. – М.: ООО «Аквариум БУК», 2004. – 432 с.
7. Decaro N., Desario C., Billi M., Lorusso E., Colaiannia M.L., V.Colao, Elia G., Ventrella G., Kusi I., Boe S., Buonavogli C. Evaluation of an in-clinic assay for the diagnosis of canine parvovirus // The Veterinary Journal. - Volume 198. - Issue 2. - November 2013, P. 504-507.
8. Gatidis S., Zelenak C., Fajol A., Lang E., Jilani K., Michael D., Qadri S.M., Lang F. MAPK activation and function following osmotic shock of erythrocytes // Cell Physiol Biochem. – 2011. -№28. – P. 1279-1286.
9. Gupta S.K. et al. Canine parvovirus NS1 induced apoptosis involves mitochondria, accumulation of reactive oxygen species and activation of caspases // Virus Res. -2016. - №213. – P. 46–61, doi: 10.1016
10. Hang Zhao, Yuening Cheng, Jianke Wang, Peng Lin, Li Yi, Yaru Sun, Jingqiang Ren, Mingwei Tong, Zhigang Cao, Jiawei Li, Jinliang Deng & Shipeng Cheng. Profiling of Host Cell Response to Successive Canine Parvovirus Infection Based on Kinetic Proteomic Change Identification // Scientific Reports. – 2013, - №6. - Article number: 29560
11. Jacobi J., Lang E., Bissinger R., Frauenfeld L., Modicano P., Faggio C., Abed M., Lang F. Stimulation of Erythrocyte Cell Membrane Scrambling by Mitotane // Cell Physiol Biochem. – 2014. – Vol. 33. - P. 1516-1526
12. Kempe D.S., Lang P.A., Eisele K., Klarl B.A., Wieder T., Huber S.M., Duranton C., Lang F. Stimulation of erythrocyte phosphatidylserine exposure by lead ions // Am J Physiol Cell Physiol. – 2005. –Vol. 288. –P. 396-402.
13. Molenaar-de Backer M.W.A., Russcher A., Kroes A.C.M., Koppelman M.H.G.M., Lanfermeijer M., Zaaijer H.L. Detection of parvovirus B19 DNA in blood: Viruses or DNA remnants? // Journal of Clinical Virology. - Volume 84. - November 2016. – P. 19-23
14. Nihei Y., Asai H., Ukai T., Marimoto H., Nakajima Y., Hanajiri T., Maekawa T. Detection of surface immunoreactions on individual cells by electrophoretic mobility measurement in a micro-channel // Sensors and actuators. 2008. № 131. P. 285–289
15. Stoltz J.F., Donner M. Red blood cell aggregation: measurements and clinical application // Jurk. j of med. sciences. 1991. Vol. 15. № 1. P. 26–32.
16. Zavalishina S.Yu. Platelet-Activity Dependence on the Age of Rats with Experimental Dyslipidemia / S.Yu. Zavalishina, N.V. Kutafina, Yu.A. Vatnikov, O.N. Makurina, E.V. Kulikov // Biol Med (Aligarh).–2016.–№ 8(6). 326. doi: 10.4172/0974-8369.1000326.

© 2017 by the authors. Licensee RJOAS, Orel, Russia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license: http://creativecommons.org/licenses/by/4.0/

ABOUT JOURNAL

Russian Journal of Agricultural and Socio-Economic Sciences (ISSN 2226-1184) is an interdisciplinary open access journal of agriculture and socio-economic studies. Topical coverage includes: agriculture and rural development, agricultural economics, management, agribusiness, agrarian policy, information systems, social economy and rural sociology.

The electronic publication is registered by the Federal Service for Supervision of Communications and Mass Media of Russian Federation. Registration certificate El No. FS 77-51446 of October 19, 2012.

Since December 1, 2015 RJOAS is considered to be included in the List of peer-reviewed scientific publications in which should be published basic scientific results of dissertations for the degree of Candidate of Science, for the degree of Doctor of Science (http://vak.ed.gov.ru/87) by the Order of the Ministry of Education and Science of the Russian Federation on July 25, 2014 №793, as amended by the Order of the Ministry of Education and Science of the Russian Federation on June 3, 2015 № 560 (registered by the Ministry of Justice of the Russian Federation on August 25, 2014, registration number 33863).

Editor-in-Chief:

- Researcher, Candidate of Agricultural Sciences **Sergey Plygun** (All-Russian Research Institute of Phytopathology, http://www.vniif.ru, Moscow Region, Russia).

Editorial Board:

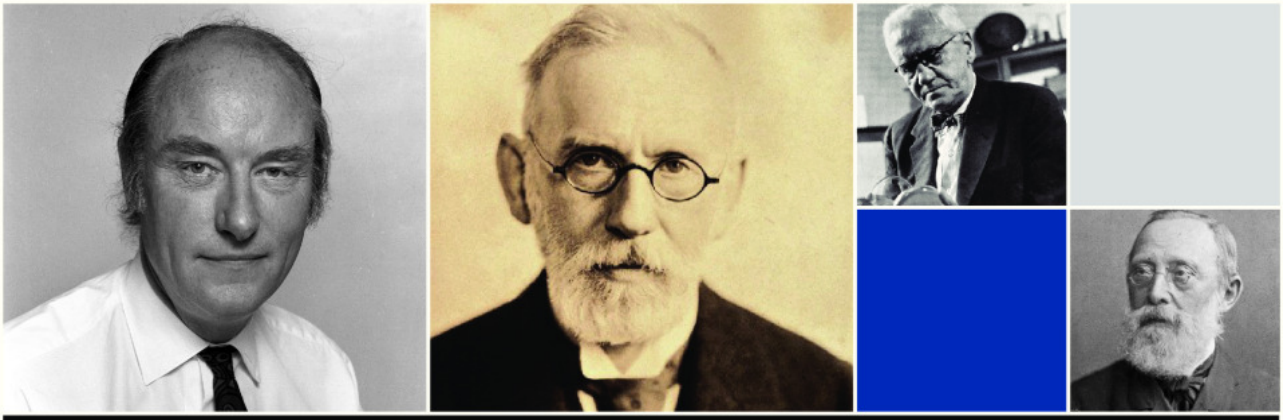
- Scientific officer, Doctor in biology **Andrei Orlinski** (European and Mediterranean Plant Protection Organization (EPPO/OEPP), http://www.eppo.int, Paris, France);
- Prof. Dr. **Wilhelm Windisch** (TUM Technische Universitat Munchen, http://lte.wzw.tum.de, Freising, Germany);
- Professor, Dr. **Sait Engindeniz** (Ege University, http://www.ege.edu.tr, Bornova-Izmir, Turkey);
- Professor, Russian Federation Honored Scientist **Vasily Lobkov** (Orel State Agrarian University, http://www.orelsau.ru, Orel, Russia);
- Professor, Russian Federation Honored Scienitist **Anatoly Stifeev** (Kursk State Agricultural Academy, http://www.kgsha.ru, Kursk, Russia);
- Professor **Yuri Kirichenko** (Moscow State Mining University, http://www.msmu.ru, Moscow, Russia);
- Professor **Nikolai Pimenov** (Moscow State Academy of Veterinary Medicine and Biotechnology named after K.I. Skryabin, http://www.mgavm.ru, Moscow, Russia);
- Dr. **Vikash Pratap Singh Bhadauria** (Eshan college of Engineering, http://www.eshancollege.com, 28-B Ramchandra Puri, India);
- Dr. **Rab Nawaz Lodhi** (Institute of Business and Management, University of Engineering and Technology, http://www.uet.edu.pk, Sahiwal, Pakistan);
- Researcher **Mohammad Ali Shariati** (Islamic Azad University, http://www.azad.ac.ir, Tehran, Iran);
- Researcher **Alexey Glinushkin** (All-Russian Research Institute of Phytopathology, http://www.vniif.ru, Moscow Region, Russia);
- Researcher **Andrey Polukhin** (All-Russian Research Institute of Agricultural Economics, http://www.vniiesh.ru, Moscow, Russia);
- Associate Professor **Igor Podkovyrov** (Volgograd State Agricultural Academy, http://www.volgau.com, Volgograd, Russia);
- Associate Professor **Dmitry Neuymin** (Michurinsk State Agrarian University, http://www.mgau.ru, Michurinsk, Russia);
- Associate Professor **Tatiana Sabetova** (Voronezh State Agrarian University named after Peter the Great, http://www.vsau.ru, Voronezh, Russia).

Official sites: http://www.rjoas.com, http://www.rjoas.ru

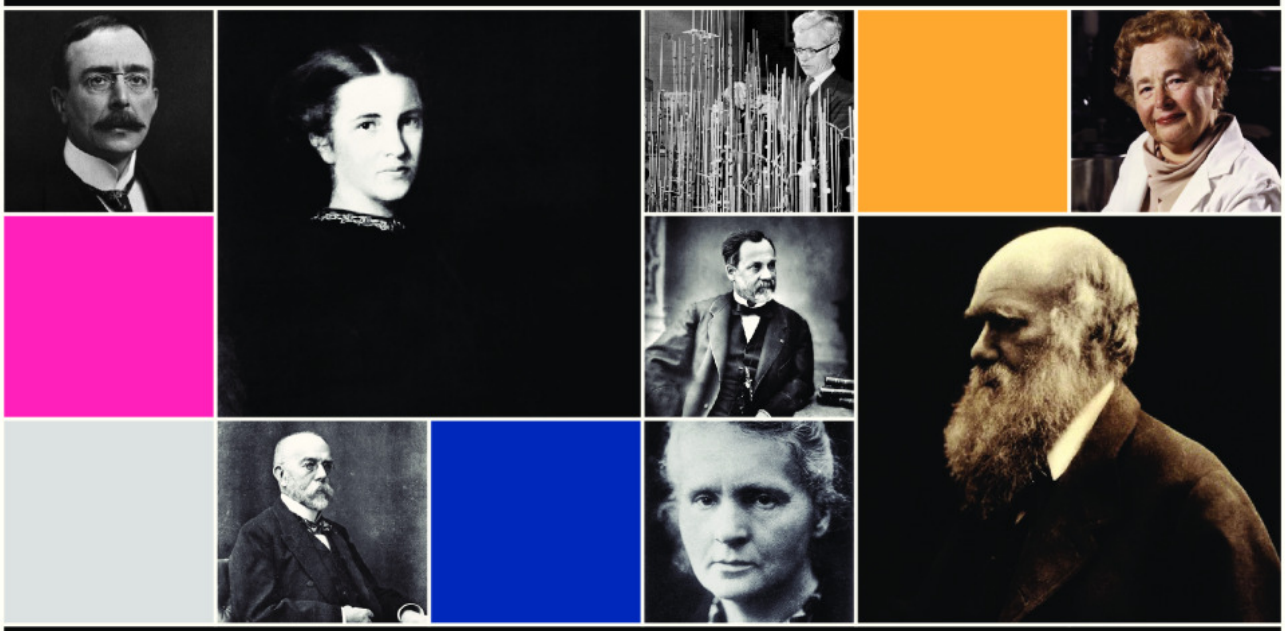
Current indexing includes: **AGRIS** (International Information System for the Agricultural Sciences and Technology); **DOAJ** (Directory of Open Access Journals); **CAB Abstracts**; Open Access Infrastructure for Research in Europe (**OpenAIRE**); Research Papers in Economics (**RePEc**); Bielefeld Academic Search Engine (**BASE**); **EBSCOhost**; AgroKnow Stem; OCLC WorldCat; Russian Science Citation Index; Cyberleninka; ELS of Publishing House "Lan"; ELS of Publishing House "Infra-M"; ELS "IPRbooks"; GlobalF5; SocioNet.

OPEN ACCESS

UK PUBMED CENTRAL
ukpmc.ac.uk



They didn't have it in their time...



...imagine what you could achieve with it now

Images of Francis Crick and John Kendrew courtesy of MRC Laboratory of Molecular Biology. All other images courtesy of Wellcome Library, London

UK PubMed Central

A unique, free, information resource for biomedical and health researchers

ukpmc.ac.uk

UK PubMed Central brought to you by: