"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..."
<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Abstract</th>
<th>Pages</th>
<th>DOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANALYSIS OF THE ROLE OF COMMUNITY IN THE DEVELOPMENT OF IRRIGATION NETWORKS IN LUWU TIMUR DISTRICT, INDONESIA</td>
<td>Muharif, Hakim A., Afandi A., Tamsil A.</td>
<td>Crossref DOI: 10.18551/rjoas.2019-04.01</td>
<td>3-11</td>
<td></td>
</tr>
<tr>
<td>THE EFFECT OF NON-FINANCIAL COMPENSATION ON WORK PRODUCTIVITY THROUGH WORK SATISFACTION AS INTERVENING VARIABLE IN EMPLOYEES OF REGIONAL GOVERNMENT BUSINESS AGENCY OF EAST JAVA PROVINCE</td>
<td>Thamrin A.S., Suaedi F., Windijarto</td>
<td>Crossref DOI: 10.18551/rjoas.2019-04.02</td>
<td>12-18</td>
<td></td>
</tr>
<tr>
<td>MULTI-AGE DUCK FARMING SYSTEM IN PONDS, COMPARING ITS PRODUCTION AND PROFIT: A CASE STUDY AT TAKALAR DISTRICT OF INDONESIA</td>
<td>Paly M.B.</td>
<td>Crossref DOI: 10.18551/rjoas.2019-04.04</td>
<td>26-32</td>
<td></td>
</tr>
<tr>
<td>A CRITICAL ANALYSIS OF INDIAN TEXTILE INDUSTRY: AN INSIGHT INTO INCLUSIVE GROWTH AND SOCIAL RESPONSIBILITY</td>
<td>Pankaj D., Lal R.C.</td>
<td>Crossref DOI: 10.18551/rjoas.2019-04.08</td>
<td>53-61</td>
<td></td>
</tr>
<tr>
<td>RURAL HIERARCHY OF PROSPERITY: LIVELIHOOD DIVERSIFICATION AND ITS IMPLICATIONS ON RURALITY</td>
<td>Pujiriyan D.W., Soetarto E., Santosa D.A., Agusta I.</td>
<td>Crossref DOI: 10.18551/rjoas.2019-04.10</td>
<td>70-77</td>
<td></td>
</tr>
</tbody>
</table>
Fakri S.R., Purwanti F., Haeruddin
STRUCTURAL EQUATION MODEL OF TOUR GUIDE SERVICE, TOURIST SATISFACTION AND REVISITING INTENTION IN GILI KETAPANG ISLAND OF EAST JAVA; pp. 78-84
Crossref DOI: 10.18551/rjoas.2019-04.11

Nugroho D., Purnomo M., Hermanto B., Maulina E.
SOCIAL ENTREPRENEURSHIP INTENTION: A SYSTEMATIC LITERATURE REVIEW; pp. 86-94
Crossref DOI: 10.18551/rjoas.2019-04.12

Farisa H.Y., Megawati S., Bagus S.
SHOPPING BEHAVIOR OF INDONESIAN CUSTOMER IN MODERN RETAIL; pp. 95-101
Crossref DOI: 10.18551/rjoas.2019-04.13

Safitri D., Novianti T., Sartono B.
ANALYSIS OF FINANCING RISK USING CREDIT SCORING ON MICROFINANCE: A CASE STUDY IN X ISLAMIC BANK; pp. 102-111
Crossref DOI: 10.18551/rjoas.2019-04.14

Rozana S.C., Zakiah, Agus N.
INPUT-OUTPUT ANALYSIS FOR AGRICULTURAL SECTOR IN THE ECONOMY STRUCTURE OF ACEH PROVINCE, INDONESIA; pp. 112-116
Crossref DOI: 10.18551/rjoas.2019-04.15

Butarbutar N., Syah T.Y.R., Anindita R.
THE EFFECT OF SERVICE QUALITY ON CUSTOMER SATISFACTION AT PT MULTI RENTALINDO: A CASE STUDY OF EMPLOYEES IN KAWAN LAMA WEST JAKARTA; pp. 117-125
Crossref DOI: 10.18551/rjoas.2019-04.16

Kriswidanto O., Partiwi S.G., Ambarwati R.
MEASURING THE PERFORMANCE OF XYZ GOVERNMENT AGENCY WITH THE BASIS OF MALCOLM BALDRIGE METHOD; pp. 126-137
Crossref DOI: 10.18551/rjoas.2019-04.17

Lenggono A., Syah T.Y.R., Negoro D.A.
THE RELATIONSHIP OF BRAND COMMUNICATION, BRAND IMAGE, AND BRAND TRUST TO BRAND LOYALTY OF SAMSUNG CELLULAR PHONE PRODUCT; pp. 138-143
Crossref DOI: 10.18551/rjoas.2019-04.18

Maswani, Syah T.Y.R., Anindita R.
THE RELATIONSHIP BETWEEN ORGANIZATIONAL CULTURE AND JOB SATISFACTION TOWARDS ORGANIZATIONAL COMMITMENT AND EMPLOYEE PERFORMANCE; pp. 144-152
Crossref DOI: 10.18551/rjoas.2019-04.19

Prihatiningsih R.T., Fitri A.D.P., Saputra S.W.
CONSTRUCTION ANALYSIS OF BOTTOM GILLNET AS AN ALTERNATIVE TO BOTTOM TRAWL IN PEKALONGAN WATERS; pp. 153-159
Crossref DOI: 10.18551/rjoas.2019-04.20

Folefack A.J.J., Meutchieye F., Tsafack P.P., Kamajou F.
CONSTRAINING RESOURCES PREVENTING THE OPTIMAL PROFITABILITY BY GOAT RAISERS IN CAMEROON; pp. 160-171
Crossref DOI: 10.18551/rjoas.2019-04.21
Idkhan A.M., Triyono M.B., Iskandar S., Anwar B.
OPTIMALISATION THE USE OF HOUSEHOLD-SCALE WATER PUMP MACHINES WITH THE ARDUINO NANO v3.0 CONTROL SYSTEM; pp. 172-177
Crossref DOI: 10.18551/rjoas.2019-04.22

Nawawi Z., Supriadi, Azizah, Wadjdi F., Har M.S., Sadikin A., Syaeful W.
THE INFLUENCE OF MANDIRI SHARIA BANK SAVINGS PROMOTION ON INTEREST SAVING PEOPLE OF PALEMBANG CITY; pp. 178-183
Crossref DOI: 10.18551/rjoas.2019-04.23

Manehat B.Y., Irianto G., Purwanti L.
THE OWNERSHIP RIGHTS OF THE ASSETS EXCHANGEED IN BRIDEPRICE (BELIS) ACCOUNTING PRACTICES IN BELU; pp. 184-193
Crossref DOI: 10.18551/rjoas.2019-04.24

Prajawahyudo T., Hidayat K., Yuliati Y., Cahyono E.D.
THE INFLUENCE OF THE EFFECTIVENESS OF FARMER GROUP ON INNOVATION ADOPTION OF INTEGRATED CROP MANAGEMENT MODEL OF THE NATIONAL STRATEGIC FOOD CENTER IN KAPUAS REGENCY, CENTRAL KALIMANTAN PROVINCE OF INDONESIA; pp. 194-208
Crossref DOI: 10.18551/rjoas.2019-04.25

Rahmawati R.
PLANTING OF RAMIN (GONYSTYLUS BANCANUS KURZ) WILDING IN PEAT SWAMP THICKET OF CENTRAL KALIMANTAN; pp. 209-213
Crossref DOI: 10.18551/rjoas.2019-04.26

Darung U., Soemarno, Dohong S., Prayogo C.
THE EFFECT OF MAIN CANALS ON CO2 EMISSIONS IN PALM OIL PLANTATIONS AT PEATLAND, CENTRAL KALIMANTAN OF INDONESIA; pp. 214-222
Crossref DOI: 10.18551/rjoas.2019-04.27

Feka W.V., Isnaini N., Susilawati T.
THE QUALITY OF LANDRACE PIG SPERMATOZOA DURING THE COLD STORAGE PROCESS USING BTS AND CEP-3 DILUENTS ADDED 10% EGG YOLK AT TEMPERATURES OF 2-5°C; pp. 223-228
Crossref DOI: 10.18551/rjoas.2019-04.28

Khoiriyah N., Anindita R., Hanani N., Muhaimin A.W.
ANIMAL FOOD DEMAND IN JAKARTA, INDONESIA: USING QUADRATIC ALMOST IDEAL DEMAND SYSTEM; pp. 229-235
Crossref DOI: 10.18551/rjoas.2019-04.29
DOI 10.18551/rjoes.2019-04.01

ANALYSIS OF THE ROLE OF COMMUNITY IN THE DEVELOPMENT OF IRRIGATION NETWORKS IN LUWU TIMUR DISTRICT, INDONESIA

Muharif 1,*, Hakim A. 2, Afandi A. 3, Tamsil A. 4
1Doctoral student, Environmental Science Program, Postgraduate School, University of Brawijaya, Indonesia
2 Department of Public Administrative Science, Faculty of Administrative Science, University of Brawijaya, Indonesia
3 Department of Agriculture, Faculty of Agriculture, University of Brawijaya, Indonesia
4 Faculty of Fisheries and Marine Sciences, Makassar Moslem University of Indonesia, Indonesia
*E-mail: jurnal.ppsub@gmail.com

ABSTRACT
National Food Security is one of the main objectives of agricultural development carried out by the government through increasing food production in both irrigated and rainfed land. Until now, there are still fundamental problems to achieve national food security, namely the availability of water resources and infrastructure for channeling irrigation water, while food needs are increasing. This condition causes various conflicts in the utilization of water resources. The control of this conflict requires handling in the form of the development of irrigation networks and improving the ability of human resources and management of water resources in a sustainable and equitable manner. Government policy in development is urgently needed to support the sector, including the management of irrigation systems at the farm level. Problem statement: The influence of participation, character, culture, and policy on the development of irrigation networks in Luwu Timur District. This research aims to analyze the factors of participation, character, culture, and policy towards the development of irrigation networks in Luwu Timur District. The method used to conduct this research is the statistical approach, Structural Equation Modeling- Amos (SEM-AMOS). The results of the analysis obtained that variable 1). Community participation has little role in developing irrigation networks in Luwu Timur District 2). Community characteristics play a role in the development of irrigation networks in Luwu Timur District. 3) Community culture has little role in the development of irrigation networks in Luwu Timur District and 4) Policies play a role in the development of irrigation networks in Luwu Timur District.

KEY WORDS
Participation, character, culture, policy.

National Food Security is one of the main objectives of agricultural development carried out by the government through increasing food production in both irrigated and rainfed land. Until today, there are still fundamental problems to achieve it, namely the availability of water resources and infrastructure for channeling irrigation water, while food needs are increasing. This condition causes various conflicts in the utilization of water resources. Control of this conflict requires handling in the form of the development of irrigation networks and improving the ability of human resources as well as management of water resources in a sustainable and equitable manner.

Irrigation is an important component of agricultural development in Indonesia, which is mostly in rural areas. Indonesia is a country where most of the population lives from agriculture with rice as its staple food. Government policy in development is urgently needed to support the sector, including the management of irrigation systems at the farm level.

Furthermore, there are many government policies that regulate water and irrigation resources in Indonesia, including those stipulated in two legal grounds, namely Law No. 7 of 2004 concerning water resources and government regulation number 20 of 2006 concerning irrigation.
But in reality, there are still many unclear things about the locus of the practice which must follow the rules of hydrological theory and in accordance with government structures which consist of macro-units on a regional basis (Kodoatie, and Sjarief, 2005).

Every construction development and irrigation management in each region must involve the participation of the surrounding community, especially the farmers. Farmers participation in the development and management of the irrigation system is stated in the Regulation of the Government of the Republic of Indonesia number 20 of 2006 concerning irrigation. Article 26 of the regulation mentioned that the farmers’ participation in irrigation development and management can be realized in initial thinking, decision making, and the implementation of activities in development, upgrading, operation, maintenance, and rehabilitation. Farmers’ participation can be realized in the form of donations of ideas, ideas, time, energy, material, and funds. This participation is also carried out individually or through water-use farmer associations based on the willingness and ability of the farming community as well as the spirit of partnership and independence and can be channeled through water-using farmer associations in their working area.

But in reality, the community has not been much involved in the development and management of irrigation in several regions in Indonesia. One of them is in Luwu Timur District which is a research study area. The construction of irrigation networks in Luwu Timur District has not involved the community in its management. Meanwhile, based on Law Number 20 of 2006 concerning irrigation, community participation in development and management of irrigation is very necessary so that development can be in accordance with the needs of the community and it can also be involved in the operation, maintenance and rehabilitation of irrigation networks. The absence of community involvement in the management of this irrigation network has caused them not to have empathy for the management of irrigation networks.

The community does not have space to participate in the operation, maintenance, and rehabilitation of irrigation networks because the community does not have adequate institutions for the community to manage irrigation networks. Whereas in Article 27, Law No. 20 of 2006 concerning irrigation states that the government, provincial government, or district/city government in accordance with their authority should encourage the participation of farmers in the development of irrigation system management to increase their sense of belonging and responsibility for the sustainability of the system. The conditions that occur in Luwu Timur District are a problematic policy that is different from the policies in Government Regulation No. 20 of 2006 concerning irrigation. Therefore, this research needs to be done to determine the strategy of managing irrigation networks based on community participation with the support of local government.

**LITERATURE REVIEW**

Definition of analysis in the Contemporary Great Dictionary of the Indonesian Language written by Peter Salim and Yenni Salim (2002), describes the analytical understanding as follows: “Analysis is a problem-solving process begins with the existence of hypotheses or perceptions/presuppositions until it is proven true through some certainty, including experiments and others. Furthermore, etymologically, the word of analysis, according to the Great Dictionary of the Indonesian Language is, "the breakdown of various parts and the study of the part itself, as well as the relationship between the parts to get the right understanding and the whole meaning."

According to Harahap, (2004) the notion of analysis is "solving or uniting something into the smallest unit."

Analysis is the decomposition of a subject over various parts and the study of the part itself and the relationship between the parts to obtain the right understanding and the overall meaning.

Whereas according to M. Kasiram, (2006), data is sourced from the results of data collection, if the collected data is not analyzed, it will be meaningless goods, dead data, soundless data. Therefore, data analysis here serves to give meaning, meaning, and value
contained in the data itself. Furthermore, Komaruddin (1991) states that analysis is an activity of thinking in order to describe a whole as a component so that the signs of components can be known, which are related to each other and functions in an integrated whole.

According to Koziar Barbara, a role is defined as a set of behaviors expected by others towards someone according to their position in a system. The role is influenced by internal and external social conditions and is stable. Therefore, the role is a form of behavior expected of a person in certain social situations.

According to Horton and Hunt (1993), the role is behavior expected of someone who has a status or position. For that reason, the various roles that are incorporated and connected to one status are called role sets, Merton (1968).

If the role is the behavior expected by someone at a certain status, then the role behavior is the actual behavior of the person who performs that role. Meanwhile, according to Abu Ahmadi (1982), the role behavior may be different from expected behavior due to several factors, thus defining a role as a complex to human expectations of the way individuals behave and act in certain situations based on their social status and function.

Community in English is a society derived from the word “socius” which means (friend). The term community is derived from the Arabic word “syarakayang” which means (participation). Community is a group of people who interact with each other. Society is possible to have infrastructure through the people who can interact with each other. Another definition, community is the unity of human life that interacts according to a certain system of customs that is continuous, and which is bound by a sense of shared identity. Continuity is a community unit that has four characteristics, namely: 1) Interaction between citizens, 2) Customs, 3) Continuity of time, 4) A sense of strong identity that binds all citizens (Koentjaraningrat, 2009: 115-118).

The farming community, in general, is often understood as a uniform and general social category. That is, it is often not realized that there are differences in various aspects contained in this farming community. For example, differentiation in the farming community will be seen based on differences in the level of development of the community, the types of plants they plant, the technology or tools they use, the farming systems they use, topography or other physical-geographic conditions. Generally, the differentiative features of the farming community are the difference between unpretentious farmers, who are also often called traditional farmers (including farmers or agricultural entrepreneurs).

According to the Regulation of Minister of Public Works No.32/PRT/M/2007, irrigation networks are complementary channels, buildings, and buildings which are a unit that is needed for the provision, distribution, allocation, use and disposal of irrigation water. There are several types of irrigation networks, namely:

- Primary irrigation network is part of irrigated network consisting of the main building, main/main canal, its drainage, building for tapping, tapping buildings, and complementary buildings;
- Secondary irrigation network is part of an irrigation network consisting of secondary canals, sewers, buildings for tapping, tapping buildings, and complementary buildings;
- Tertiary irrigation network is an irrigation network functions as an irrigation water service infrastructure in a separate plot consisting of tertiary canals, quarter channels and waster channels, tertiary boxes, quarter boxes, and complementary buildings.

Irrigation networks are channels, buildings, and its complementary is unity needed for the provision, distribution, allocation, use and disposal of irrigation water. Irrigation channels are infrastructure that distributes water originating from Dam/Embung (retention basin) to agricultural land owned by the community. With this irrigation channel, the need for water for the farmers’ fields will be guaranteed.

A lot of definition of participation have been expressed by experts, but in essence, they have the same meaning. Participation comes from English the word “participate” which means to take part (Willie Wijaya, 2004: 208). Whereas Fasli Djalal and Dedi Supriadi (2001: 201-202) define participation as an action made by decision makers to suggest groups or communities to be involved in the activity of submitting suggestions and opinions, goods,
skills, materials and services. Participation also means that groups recognize their own problems, examine their choices, make decisions, and solve their problems.

According to Soegarda Poerbakawatja participation is:A symptom of democracy where people are included in the planning and implementation of everything centered on interests and also takes responsibility in accordance with the level of maturity and level of obligations (Soegarda Poerbakawatja, 1981: 251)

The definition of participation is always associated or synonymous with participation, so it can be said that participation is not based on physical fitness in the work but involves one's involvement so that it will lead to greater responsibility and donations (Darmawi, 2014)

According to H.A.R. Tilaar (2009: 287), participation is a manifestation of the desire to develop democracy through a decentralization process which is sought, among others, the need for button-up by involving the community in the planning and development process of the community.

Participation of community members is their involvement in the development, including activities in the planning and implementation of development programs undertaken by the surrounding community (Adisasmita 2006).Ndraha (1982) referring to Cohen (1977) states that there is no satisfactory definition of the term participation, therefore they limit it to development participation meaning the participation (active) of the community in the field of rural development.

Nasdian (2014) explains that participation supports the community to be aware of the situation and problems it faces as well as try to find solutions that can be used to overcome their problems (having critical awareness)

The implementation of development covering all aspects of new life will succeed if it is an activity involving all members of the community. This is explicitly stated by Tjokroamidjodjo (1974) quoted by Supriyadi (2010) that participation is important for development and even becomes one of the goals of development itself.

Cohen and Uphoff, (1977) in Girsang (2011) divided participation into several stages, as follows:

- A decision-making stage is realized through community participation in meetings. The intended decision-making phase is planning activities;
- The implementation phase is the most important stage in development because the core of development is the implementation. The real manifestation of participation is classified into three, namely participation in the form of thought and material contributions, as well as being the member;
- The stage of enjoying the results, matters used as an indicator of the success of community participation is in the planning and implementation stages. In addition, by looking at the position of the community as the subject of development so the greater the benefits of the program felt, the more possibility to achieve the target;
- The Evaluation Phase is considered important because community participation is feedback that can provide input to improve the implementation of the next program.

Character means a person's nature or personality. Coon (Zubaedi, 2011: 8) defines character as a subjective assessment of one's personality related to personality attributes that can or cannot be accepted by society. Character is the whole natural and disposition that has been mastered stably defining an individual in the overall order of psychical behavior that differentiates the way of thinking and acting.

The word character comes from the Latin word "kharakter", "kharassein", "Kharax", and the Greek words “Character”, from charassein which means to make sharp. 25

According to the Indonesian general dictionary26, a character is interpreted as behavior; personality; psychological, moral or character traits that distinguish a person from others. While in the sociology dictionary27, a character is defined as a special feature of the basic structure of a person's personality (character; personality).

Griek, as quoted by Zubaedi argues that character can be defined as a guide to all permanent human characteristics so that it becomes a special sign to distinguish one person from another.
Suyanto and Masnur Muslich stated that character is an individual's way of thinking and behaving which become the specialty of each individual to live and cooperate, both in family, society, and country.

Based on some of the meanings above, it can be interpreted that character is a person's specialty in behaving that distinguishes himself from others. Definition of character, personality, and individuality is indeed often confused in its use. This is because the term has similarities, namely something original in an individual who tends to settle permanently.

There are several cultural meanings according to some experts, one of whom is a well-known Indonesian figure, Koentjaraningrat. According to Koentjaraningrat (2000: 181) cultural with culture as the basic words comes from sansakerta language "buddhayah", which is the plural form of buddhi that means "mind" or "reason". Therefore, Koentjaraningrat defines culture as "mind power" in the form of creativity, intention, and taste, while cultural is the result of creativity, intention, and taste.

Koentjaraningrat explained that basically there are many distinguish between culture and cultural, where culture is a pluralistic development of cultivation, which means the power of the mind. In Anthropology studies, culture is considered to be an abbreviation of cultural that has no difference from the definitions. For that matter, according to Koentjaraningrat, cultural is a whole system of ideas, actions and human works used as human property by learning.

For more details, Koentjaraningrat distinguishes three forms of culture, namely: (1) The manifestation of cultural as a complex of ideas, values, norms, regulations and so on. (2) The manifestation of cultural as a complex of activities and actions patterned from humans in a society. (3) The manifestation of cultural as objects produced by humans.

According to Liliweri (2003: 8) cultural is the view of life of a group of people in the form of behaviors, beliefs, values, and symbols that they receive unconsciously all of which are inherited through the communication process from one generation to the next.

Furthermore, Taylor, as quoted in Liliweri (2002: 62) defines culture as something composed of common categories of common phenomena called customs which include technology, knowledge, trust, art, moral, law, aesthetics, recreation and abilities and habits that humans get as members of society. In other words, cultural includes everything that humans get or learn as members of society.

Hawkins (2012) says that culture is a complex that includes knowledge, beliefs, art, morals, customs and other abilities and habits that humans have as part of society. Cultural is the whole way of life of society but is not only limited to it yet another part considered higher or more desirable by society. Linton, as quoted in Ihromi (2006: 18).

Therefore, cultural refers to various aspects of life including the ways of life, beliefs, and attitudes, and also the results of human activities that are unique to a particular community.

According to the Great Dictionary of the Indonesian Language, policy is a series of concepts and principles that become the outline and basis of the plan in the implementation of a job in achieving the goals or objectives. Etymologically, according to Dunn, the term policy comes from Greek, Sanskrit and Latin languages. Policy derives from the Greek language "polis" meaning "city-state" and from the Sanskrit "pur" meaning "city" from the Latin "politia" meaning state. 1 Some scientists explain various kinds of policies; Carl Friedrich, as quoted in Indiahono states that "policy is a direction of action proposed by a person, group or government in a particular environment that provides obstacles and opportunities for policies proposed to use and overcome in order to achieve a goal, or realize a goal or a specific purpose.

He also said that there are several main things in the policy, i.e. goals, objectives or purposes. Meanwhile, Jones defines policies as "Permanent and repetitive behavior relates to the business within and is through the government to solve common problems. This definition means that the policy is dynamic. This will be discussed specifically in other parts, in relation to the characteristic of the policy "3

According to Abidin, policies are generally divided into 3 (three) levels:
• General policy is a policy that becomes a guideline or instruction guide either positive or negative in nature covering the entire area or agency concerned;
• Implementation policy is a policy that sets out general policies. For the central levels the government regulations regarding the implementation of a law;
• Technical policy is the operational policies that are under the implementation policy.

METHODS OF RESEARCH

Judging from the type of data, this was qualitative descriptive research. What is meant by qualitative research is a study that intends to understand the phenomenon holistically experienced by research subjects and by means of descriptions in the form of words and language, in a special natural context and by utilizing various scientific methods (Moleong, 2007).

The type of research approach is descriptive. Descriptive research is a study that seeks to explain the problem solving that is now based on data. This qualitative descriptive research is intended to obtain information about the extent of community participation, character, behavior and culture in relation to the development of irrigation networks in Luwu Timur District.

In accordance with the problems studied, this study is classified into survey research. Kerlinger (2006: 660) states that survey research studies large and small populations by selecting and reviewing selected samples from the population to find relative incidence, distribution, and interrelation of psychological sociological variables. Surveys that include definitions are often called sample surveys. In line with that, Sugiono (2006: 7) states that survey research, in general, is carried out to take a generalization from in-depth observations, but the generalizations made can be more accurate if used a representative sample.

While from its nature, this research design is descriptive and correlational. Descriptive research is a study that seeks to obtain information regarding the phenomena observed today (Suharsimi, 1989). This study tries to describe data about objects or research variables that exist in the development of irrigation networks in Luwu Timur District.

Referring to the problems in the development of irrigation networks, this research is generally seen in terms of the samples to be targeted, the research is in the survey category. According to Kerlinger (2006: 660), survey research examines large and small populations by selecting and reviewing selected samples from the population to find the incidence, distribution, and relative interrelation of psychological sociological variables. This kind of survey can be said as a sample survey. This study will describe data about objects or research variables that exist for the research area, including endogenous variables or independent variables covering: Participation (X1), Character (X2), Culture (X3), Policy (X4), and Exogenous Variables or dependent variables namely Irrigation Development in Luwu Timur District (Y1).

Population is a collection of individuals with quality and characteristics that have been set (Nasir, 1988). Lin (1976) suggests that the whole group of people who have certain in accordance with the attention of researchers is called the population. Dalen and Debold (1973) argue that population is a group of people or something that really exists and is well formulated. Therefore, the opinions of the three experts can be concluded that the population is a group of individuals who have certain qualities and characteristics that have been well defined and formulated by researchers.

The population of this research is the community members in Kalaena irrigation area in Teromu Village, Mangkutana and Tomoni Sub-districts in Luwu Timur District South Sulawesi Province and involving 10 villages that were included in the irrigation/research area. Based on the data collection plan, which is in Mangkutana and Tomoni Districts, the targeted respondents are the community in the two sub-districts predicted to have and know descriptively the questionnaire material given.

The sample as a respondent is part of the population concerned (Lin, 1976). While according to Priyatno (2008), sample is a portion of the population to be studied. Based on
Roscoe, (1982) in Sugiyono (2006) sample sizes are as described below: If the study will do a multivariate analysis (correlation, or multiple regression for example), then the number of sample members are at least 10 times the number of variables studied. For example, the research variable is 5 (independent + dependent), then the number of sample members: 10x5 = 50.

Based on the provisions of the method of Structural Equation Modeling (SEM), the number of samples for 5 variables can be taken at least 200 respondents. The number of respondents for data surveys was 200 respondents, Roscoe, (1982) in Sugiyono (2006).

After data collected, It was then analyzed using a technique in accordance with the type of research. Data description used descriptive statistical analysis techniques. Data analysis used in inferential statistical methods was Analysis of Moment Structures (AMOS).

This study was analyzed using primary data collected through questionnaires using the survey method. The research questionnaire consists of questions about four variables or constructs measured by a number of indicators. Each respondent was asked to convey his perception of the indicators for these variables by choosing one number from a scale of 1 to 5. Therefore, every construct needs to be tested for validity and reliability.

Final analysis of this research is hypothesis testing. The analytical tool used to test the hypothesis is software Analysis of Moment Structures (AMOS).

This research was conducted at Kalaena irrigation development area in Mangkutana Sub-district, Luwu Timur District, South Sulawesi Province, and focused in Mangkutana sub-district.

As for what is meant by data sources in research is the subject from which data is obtained (Suharsimi Arikunto, 2002: 107). To get the correct data, it is necessary to determine the competent informants who are in accordance with the data needs (purposive). They are the people of Mangkutana and the surrounding society as well as all service workers of the city. This study describes how the community responds as an object, seen from the aspects of participation, character, culture, and policy related to the development of irrigation networks in Luwu Timur District.

RESULTS AND DISCUSSION

The results of regression weights are the output of statistical calculations using SEM AMOS 22.0. The results of the regression weight can be seen in table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peng.Jar.Irigasi:&lt;--Culture</td>
<td>-0.070</td>
<td>,046</td>
<td>-1.503</td>
<td>,133</td>
</tr>
</tbody>
</table>

Source: Output SPSS AMOS, 22.0, 2019.

Table 1 above results in the following structural equations:

\[ Y = 0.075X1 - 0.070X2 + 0.813X3 + 0.200X4 \]

Table 2 – The Result of Goodness-of-Fit

<table>
<thead>
<tr>
<th>Goodness-of-Fit Measure</th>
<th>Cut of Value</th>
<th>Result</th>
<th>Desc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>chi square</td>
<td>Expected to be not significant</td>
<td>5426.536</td>
<td>Fit</td>
</tr>
<tr>
<td>Significance Probability</td>
<td>≤0.05</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>RMSEA</td>
<td>Between 0.05 - 0.08</td>
<td>0.309</td>
<td>FIT enough</td>
</tr>
<tr>
<td>GFI</td>
<td>≥0.90</td>
<td>0.460</td>
<td>FIT enough</td>
</tr>
<tr>
<td>AGFI</td>
<td>≥0.90</td>
<td>0.353</td>
<td>FIT enough</td>
</tr>
<tr>
<td>TLI</td>
<td>≥0.95</td>
<td>0.285</td>
<td>FIT enough</td>
</tr>
</tbody>
</table>

Source: Output SPSS AMOS, 22.0, 2019.
The table above shows the results for goodness of fit. It can be seen that the chi-square value is 66.231, the chi-square table shows a quite higher value, but a high value of degree of freedom will reduce the chi-square value so that it will be fit. Furthermore, it can be seen that the value of significance probability is 0.000, which means that the value is significant because it is smaller than 0.005. Another criterion of goodness of fit which indicates that the model is worth investigating is the value of GFI, AGFI, and TLI where the three values are included in the criteria of good fit because it approaches a critical value or cut off where the GFI value is 0.460, AGFI is 0.353 and TLI is 0.285 while the cut off must be greater than 0.90. Because the AGFI, GFI, and TLI values are in the fit criteria so it is feasible to be followed up.

Table 3. The Result of Goodness-of-Fit

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
<th>Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>PJI &lt;---</td>
<td>Participation</td>
<td>0.075</td>
<td>0.104</td>
<td>0.725</td>
<td>0.469</td>
</tr>
<tr>
<td>PJI &lt;---</td>
<td>Culture</td>
<td>-0.070</td>
<td>0.046</td>
<td>-1.503</td>
<td>0.133</td>
</tr>
<tr>
<td>PJI &lt;---</td>
<td>Policy</td>
<td>0.813</td>
<td>0.089</td>
<td>9.122</td>
<td>***</td>
</tr>
<tr>
<td>PJI &lt;---</td>
<td>Characteristic</td>
<td>0.200</td>
<td>0.049</td>
<td>4.042</td>
<td>***</td>
</tr>
</tbody>
</table>

Source: Output SPSS AMOS, 22.0, 2019.

From the table above, it can be seen that of the four variables tested for their role in irrigation network development, i.e. participation, culture, policy and character, only the policy and character of the community proved to play a role in the development of irrigation networks in Luwu Timur District. This is based on the P value of the two variables smaller than 0.05. P value of policy variable is 0.000 (0.000<0.05) and P value of community character is 0.000 (0.000<0.05). Participation and community culture variable were not proven to have a role in determining the development of irrigation networks because the P value of those two variables was greater than 0.05. The P value of the participation variable is 0.469 (0.469> 0.05) and the P value of the culture variable is 0.133 (0.133> 0.05).

CONCLUSION

Based on the research results and discussion in the previous chapter, the conclusions of this study are as follows:

- Community participation has little role in developing irrigation networks in Luwu Timur District;
- Community characteristics play a role in the development of irrigation networks in Luwu Timur District;
- Community culture has little role in developing irrigation networks in Luwu Timur District;
- Policy plays a role in the development of irrigation networks in Luwu Timur District.

REFERENCES


DOI 10.18551/rjoas.2019-03.02

THE EFFECT OF NON-FINANCIAL COMPENSATION ON WORK PRODUCTIVITY THROUGH WORK SATISFACTION AS INTERVENING VARIABLE IN EMPLOYEES OF REGIONAL GOVERNMENT BUSINESS AGENCY OF EAST JAVA PROVINCE: A STUDY AT PT KASA HUSADA WIRA JAWA TIMUR

Thamrin Adam Syarief1*, Suaedi Falih2, Windijarto3
1Master of Human Resource Development, Postgraduate School, University of Airlangga, Indonesia
2Department of Public Administration, Faculty of Social and Political Science, University of Airlangga, Indonesia
3Department of Management, Faculty of Economic and Business, University of Airlangga, Indonesia
*E-mail: adamsyariefthamrin@gmail.com

ABSTRACT
The main objective of good human resource management within an organization or company is achieving optimal work productivity. So, to realize the goal of good human resource management is not just to provide wages in the form of money (financial), but the provision of good non-financial compensation also plays a fairly strong role in giving the impact of employee contributions in a company. So, this research was conducted to analyze and determine the effect of non-financial compensation on work productivity through job satisfaction as an intervening variable for employees of PT Kasa Husada Wira East Java. This research uses a quantitative approach involving 100 respondents who are employees of PT Kasa Husada Wira East Java. The results of this research are that there is an indirect influence between non-financial compensation on work productivity through job satisfaction variables as an intervening variable as indicated by the indirect effect value of 0.097 (<0.5), which means that job satisfaction is an intervening variable that influences the relationship between compensation non financial to work productivity. so, in this study, the variable of job satisfaction as an intervening variable has a full effect (total).

KEY WORDS
Non-financial compensation, work, productivity, job, satisfaction.

The main problem that is of concern in profit organizations such as companies is the problem of 'work productivity'. Work productivity is the result of a good human resource management process. In good management of resources, high productivity will certainly be followed. Work productivity problems are a hot topic when industry and business competition is getting tighter and more competitive. Managing human resources as a strategy for determining the pace and growth of companies has a goal of increasing work productivity.

Anoraga (1992) explains, there are factors that are considered influential in the company's work productivity, these factors are: (1) Interesting work; (2) Good or decent wages; (3) Security and protection in work; (4) appreciation or self-actualization in work; (5) A good working environment and atmosphere; (6) Promotion in a career; (7) A sense of involvement in organizational activities; (8) Management's understanding and sympathy for personal problems; (9) Leadership loyalty to the worker, and; (10) Work discipline. So, to achieve work productivity, financial compensation is not the main key, there are many things that workers in the company must obtain and have a stronger psychological and emotional influence as explained by Anoraga. Non-financial compensation has a strong role in increasing work productivity, as explained by Handoko (2011, p. 155) which states that one way of management to improve work performance, motivation and job satisfaction is through providing compensation, both financial and nonfinancial.

Handoko (2011) also explained that job satisfaction is an indicator that also influences and experiences an increase when the implementation of non-financial compensation is
done well. Job satisfaction has a strong enough role in achieving work productivity. Job satisfaction is interpreted as a comfortable feeling of employees in carrying out or facing their work within the company, job satisfaction itself is also an important factor in human resource management activities because it deals directly with employee behavior such as stress, depression, turnover, and attendance (Brown, 2010, p. 923). The compensation system, especially non-financial compensation is a full policy of company management. But, consideration and policy decisions for granting compensation must be considered as something that is important and supports work productivity.

Work productivity problems are experienced by almost all companies, not least by PT Kasa Husada Wira East Java (PT KHWJ) which is a subsidiary of PT Panca Wira Usaha, one of the holding companies which are also a Regional Owned Enterprise of East Java Province. PT KHWJ's productivity experienced a fairly volatile dynamic from year to year, from the data gathered, the company's total sales in 2017 (IDR 20,156,321) decreased significantly compared to 2016 (IDR 22,624,271), the year 2017 is 25% below the company's target and 11% below the 2016 achievement. In previous years, the sales figure also moved quite volatile, in 2014 for example, which was at IDR 23,491,740 then decreased in 2015 in the position of IDR 20,739,239. The productivity problem which is also moving quite dynamically can also be seen in the data compiled from the Production Department of PT KHWJ which states that in 2017 it produces 43 tons of cotton, far enough below the achievement of cotton production in 2016 which reached 57 tons. The gauze production in 2017 is in the number 737,937 m² (non-sterile) and 921,134 m² (sterile). This is also below the production value in the previous year which reached 1,538,905 m² (non-sterile) and 829,067 m² (sterile). The decline in productivity in the company PT KHWJ can be caused by several things such as; factors beyond the control of the company such as market conditions, but can also be caused by human resource problems within the company. PT KHWJ itself is a medical equipment company that has the main production of cotton and sterile or non-sterile gauze, this company is one of the companies with the best performance and contribution among other subsidiaries under PT Panca Wira Usaha, therefore, PT Panca Wira Usaha successively also ranked third in BUMD with the highest contribution to East Java Province’s Original Revenue after Bank Jatim and Bank Perkreditan Rakyat UMKM Jatim.

This research has several research questions which are referred to as the formulation of the problem in the research, including (a) Is there an effect of non-financial compensation on job satisfaction ?; (b) Is there an effect of job satisfaction on work productivity ?, and; (c) Is there any effect of non-financial compensation through job satisfaction on work productivity? Meanwhile, this research was conducted to test, analyze and determine the effect of non-financial compensation on work productivity through job satisfaction as an intervening variable.

LITERATURE REVIEW

Effect of Non-Financial Compensation on Work Productivity. One of the things that are quite influential and contributes to work productivity is the provision of compensation, in this case, non-financial compensation which according to Anoraga (1992) has several factors other than merely providing financial wages or compensation. The worker will issue the ability and a large amount of effort he has if he feels that what he has done before has produced appropriate rewards or rewards (John and Smith, 2014). In addition to salaries, bonuses and incentives, various other things such as work environment, work equipment, opportunities and opportunities for promotion, reward, or relationship between superiors and subordinates are important things that have a strong role for the emotional and psychological workers themselves. the things related to non-financial compensation have a strong enough impact and role on the contribution of workers to the company (Filippo: 1984), then automatically, non-financial compensation as one of the strategies in managing human resources within the company. The research that was conducted by Roihatul Musyafi (2017) with the title "The Effect of Financial and Non-Financial Compensation on Work Productivity
of PT PLN employees in the Service Area and Malang Network” shows that employee work productivity is significantly affected by non-financial compensation. The results of this research are reinforced by the data on respondents' characteristics which are dominated by the productive age workforce, which is 20 to 30 years with a percentage of 61% of the total population. The non-financial compensation that is quite influential, among others, is the factor of the work itself (suitability, interest, etc.) and the work environment that is quite dominant among the variables used. This research also concluded that at the productive age of work employees are considered more in need of decent and good work facilities to support their work so that employee work productivity can increase.

The Effect of Non-Financial Compensation on Job Satisfaction and the Effect of Job Satisfaction on Work Productivity. In terms of human resource management and efforts to increase work productivity, in addition to compensation that has been properly obtained by workers, job satisfaction factors should also get the attention of the company. Job satisfaction itself is an important factor in increasing work productivity in the company as explained by Hasibuan (1994: 222) which explains that job satisfaction is the psychological and emotional attitude of workers in the face of the work they do. Luthans (2006) explains, there are several indicators that are described as dimensions of job satisfaction, among others: the work itself; payment; promotion opportunity; supervision or leadership (boss), and; colleagues or colleagues. Some previous studies have shown that there is an influence between the implementation of non-financial compensation on job satisfaction, such as the research conducted by Recha Putri Etichasarie, et al (2016) with the title "Effect of Non-Financial Compensation on Job Satisfaction and Intention To Leave Java Bali Gresik Generation unit" which shows the results that Non-Financial Compensation has a significant effect on Job Satisfaction in accordance with the path test results coefficient value 0.671 and significance 0.000 which means there is a significant effect between non-financial compensation on job satisfaction.

Then, several previous studies also showed a significant relationship between job satisfaction and work productivity, including research conducted by Caffery Geraldo Supit, FAO Pelleng and Kalangi with the title "The Effect of Job Satisfaction on Employee Productivity at PT Astra International Daihatsu - DSP Malalayang ". The results of their research stated that from the number of respondents as many as 30 people concluded that, Job Satisfaction has a minimum value of 45, and a maximum value of 59 with an average value of 51.97 and has a standard deviation of 3.926. Then, for work productivity variables has a minimum value of 36 and a maximum value of 42, with an average value of 39.03 and standard deviation of 1.991. Based on the results of the statistical calculation, it is known that between job satisfaction and work productivity has a significant relationship and the existing relationship is considered to be quite strong.

METHODS OF RESEARCH

This research uses a quantitative approach that is applied to test theories and hypotheses through measurement of variables using statistical counts and data analysis, the population in this research are all employees of PT Kasa Husada Wira Jatim totaling 130, and the sample set is a total of 130 employees, then sample determination applies the total sampling method which, according to Sugiyono (2007) is a sampling technique that is the same as the total population of the object under research. There are several research variables that are measured, including independent variables namely non-financial compensation (X) or also called the independent variable, the dependent variable is work productivity (Y) or also called the dependent variable, and the intervening variable namely jobs satisfaction.

There are data collected in this research, the data are primary data and secondary data. Primary data according to Sani and Maharani (2013: 183) are data obtained directly from respondents, in this research the data are in the form of questionnaires or questionnaires with data collection techniques in the form of distribution of questionnaires arranged in a structured manner so that answers and accurate responses can be obtained.
from respondents. Then, secondary data according to Sani and Masyhuri (2010: 194) is research data obtained indirectly or through media and other intermediaries, in this research, the data is in the form of company documents and information and other literature relating to the company and research conducted.

RESULTS AND DISCUSSION

The results of the instrument test, including validity test and reliability test are known to be valid, to test the validity of this is indicated by the acquisition of a correlation value that is greater than r-table (0.195) so that all items from each variable are declared valid, this is similar to stated by Augusty Ferdinand (2006) which explains that if r-count is positive and r-count is greater than r-table, then the variable is valid. Whereas, for reliability testing, according to Nunnally (in Imam Ghozali, 2006) explaining a variable can be said to be reliable if it provides a Cronbach Alpha value> 0.60. In the reliability test in this research, it is known that the value of Cronbach Alpha for each variable tested includes variable X of 0.902 (Valid), variable Z of 0.914 (Valid) and variable Y of 0.863 (Valid).

In this research, the characteristics of respondents involved in the research process, among others, on the aspect of sex, there were 52 male respondents involved or equivalent to 40% and there were 78 female respondents involved or equivalent to 60% with data on the age of respondents divided into 4 (four) clusters, the first cluster aged 26-30 years which amounted to 27 people or equivalent to 21%, the second cluster aged 31-45 years which amounted to 57 people or equivalent to 44%, the third cluster with a number of 46-50 years amounted to 30 people or equal to 23% and the fourth cluster is the age above 50 years with a number of 16 years or equivalent to 12%. The majority of employees at PT Kasa Husada Wira Jatim have a working period of over 10 years with a number of employees working over 10 years totaling 95 people or 73%, while employees with a period of 5 to 10 years amount to 35 people or 25% with placement of organizational units divided into production units of 92 people or 71% and non-production units totaling 38 people or 29%. The descriptive analysis in this research of the three variables shows the average value that represents the respondent's response to the question item which is a derivative of the per-variable indicator. Meanwhile, the results of the descriptive analysis can be seen in the table below:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Indicator</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Financial Compensation (X)</td>
<td>Level of work facilities</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>Level of program and policies</td>
<td>4.09</td>
</tr>
<tr>
<td></td>
<td>Level of the environment and work comfort</td>
<td>4.11</td>
</tr>
<tr>
<td></td>
<td>Level of management-employee relationship</td>
<td>3.95</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4.03</td>
</tr>
<tr>
<td>job satisfaction (Z)</td>
<td>Level of job</td>
<td>3.94</td>
</tr>
<tr>
<td></td>
<td>Personality</td>
<td>3.99</td>
</tr>
<tr>
<td></td>
<td>Wages and opportunity of career promotion</td>
<td>3.80</td>
</tr>
<tr>
<td></td>
<td>Supervisor</td>
<td>3.72</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3.86</td>
</tr>
<tr>
<td>Work Productivity (Y)</td>
<td>Quality</td>
<td>3.96</td>
</tr>
<tr>
<td></td>
<td>Quantity</td>
<td>4.17</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4.07</td>
</tr>
</tbody>
</table>

*Source: Primary Data, 2018.*

The data presented in Table 1 above illustrates the results of descriptive analysis carried out on three variables, in the non-financial compensation variable having an average value of 4.03 with indicators of the level of facilities, work facilities and infrastructure (4.00), program level and company policy (4.09), level of work comfort or environment (4.11), level of supervisor and subordinate relations (3.95). In this nonfinancial compensation variable, the indicators that get the highest score are environmental indicators and work convenience,
employees provide a fairly good response to the current work environment conditions, colleagues who support work solutions and work environment conduciveness. Whereas, for the job satisfaction variable, the average value is 3.86 with employment level indicators (3.94), indicators of personality or personality (3.99), wage indicators and promotion opportunities (3.80) and supervision or supervisors (3.72). The response is quite good in this variable seen in the personality or personality indicators of employees who feel they can get the chance of self-actualization in the job well, while the promotion and supervision opportunity indicators or supervisors get a response that is not too good, this is due to opportunities for employees to get opportunities promotion tends to have a long waiting period and is quite complicated, on supervisory indicators or supervisors, the majority of employees assess supervisors' technical skills and competencies need to be improved. In the work productivity variable, it is known that the average value at 4.07 with three indicators includes quality (3.96), quantity (4.17) and, timeliness (4.1). In this variable, the average respondent believes that what they have done is sufficient to meet the quality standards of the company, the value of the quantity and timeliness set.

Data analysis using path analysis models to test the research hypothesis on the three variables. In this research there are two hypotheses that will be tested and proven, the two hypotheses include: (1) Non-Financial Compensation has an influence on Work Productivity (X - Y), and, (2) Non-Financial Compensation has an influence on Work Productivity through Satisfaction Work (XZY). So, it can be seen that path analysis models are as follows:

![Pathway analysis model](image)

In the picture above, it can be seen, e1 is in the job satisfaction variable (Z) which shows the number of variance variables of job satisfaction that are not explained by non financial compensation variables (X), while for e2 is in the work productivity variable (Y) which shows the variance work productivity variables that are not explained by non-financial compensation variables. From the application of path analysis model, it is known that the results of the influence path coefficient values between variables are as follows:

<table>
<thead>
<tr>
<th>n/h</th>
<th>Direct Effect</th>
<th>In-direct effect</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>P value</td>
<td></td>
</tr>
<tr>
<td>X -&gt; Y</td>
<td>0.133</td>
<td>0.188</td>
<td>-</td>
</tr>
<tr>
<td>X -&gt; Z</td>
<td>0.732</td>
<td>0.000</td>
<td>-</td>
</tr>
<tr>
<td>Z -&gt; Y</td>
<td>0.224</td>
<td>0.025</td>
<td>-</td>
</tr>
<tr>
<td>X – Y – Z</td>
<td>-</td>
<td>-</td>
<td>0.097</td>
</tr>
</tbody>
</table>

Source: Primary Data, 2018.

Based on the table of the results of the path coefficient value influence between the variables above, the results of the influence between variables are as follows: (1) The value of the path coefficient of non-financial compensation (X) on work productivity (Y) is 0.133 with a significance value of 0.188 (> 0.5), this shows a negative sign, meaning that there is no unidirectional change in the non-financial compensation variable on work productivity; (2) The non-financial compensation variable (X) path coefficient value on job satisfaction (Z) is 0.732 with a significance value of 0.000 (<0.5), this indicates a positive sign which means...
there is a change in the direction of explanation if the non-financial compensation variable increases, then Job satisfaction variables also increase, as well as vice versa; (3) The value of the path coefficient of work satisfaction variable (Z) on work productivity (Y) is 0.224 with a significance value of 0.025 (<0.5). This indicates a positive sign which means there is a change in direction with the explanation if job satisfaction increases. also increases, and vice versa; (4) The non-financial compensation variable (X) path coefficient value on work productivity variable (Y) through job satisfaction variable (Z) which is the result of multiplying the path coefficient value of X to Y and Z to Z is 0.097 (<0.5) which show a positive sign. This means that there are unidirectional changes to these variables.

So, from the analysis and discussion above we can know that the first hypothesis which states that non-financial compensation has a significant effect on work productivity is not proven. Whereas, the second hypothesis which states that non-financial compensation significantly influences work productivity through job satisfaction is proven. Meanwhile, the explanation is illustrated by a complete path analysis model as presented in the figure below:

![Complete Path Analysis Model](image)

Figure 2 – Complete Path Analysis Model

Figure 2 above shows that non-financial compensation cannot directly influence work productivity, this is indicated by a fairly small number of direct effects on the two variables which are equal to 0.133 and sig values 0.188 (> 0.5). whereas, unidirectional changes are indicated by the non-financial compensation variable on the job satisfaction variable with a value of 0.732 and the sig value. 0.000 (<0.5) and job satisfaction variables with a value of 0.224 and sig. 0.025 (<0.5). Thus, we can know together that the variable X which is non-financial compensation does not have a direct influence on the variable Y which is work productivity, but non-financial compensation has an influence on work productivity through the variable Z namely job satisfaction. So, job satisfaction (Z) is proven to be an intervening variable.

**CONCLUSION AND SUGGESTIONS**

This research was conducted to determine the effect of non-financial compensation on work productivity and job satisfaction as an intervening variable. So, after the research, data analysis process, and discussion of research results, the results of the research can be concluded: (1) There is no direct influence between non-financial compensation variables (X) on work productivity (Y) at PT Kasa Husada Wira East Java, p. This is indicated by the significance value of 0.188 (> 0.5), which means that this explains that non-financial compensation provided by the company does not directly influence the work productivity of the company’s employees. So, thus the first hypothesis which states non-financial compensation has an influence on the work productivity of employees of PT Kasa Husada Wira East Java is not proven, and; (2) There is an indirect influence between the non-financial compensation variable (X) on work productivity (Y) through the job satisfaction variable (Z) indicated by the indirect effect value of 0.097 (<0.5) which means that there is a significant effect of non-financial compensation (X) towards work productivity (Y) through job
satisfaction (Z) as an intervening variable. So, thus the second hypothesis which states there is an influence between non-financial compensation on work productivity through job satisfaction as a proven intervening variable. Non-financial compensation variable on work productivity according to this research can only be said to have an effect if there is an intervening variable, in this case, is job satisfaction.

Based on the conclusions of the research, the management of the company should pay attention to several important things which are the most important aspects of good human resource management activities. The application of non-financial compensation, especially on indicators of facilities and completeness of supporting work, is considered important enough to create a climate and a good working atmosphere within the company for employees both physically and psychologically. The attitude, behavior, and feelings of employees in doing work are considered to have sufficient influence on the achievement of expected work productivity (Hasibuan: 1990). So if you look at the results of the research, there is a close relationship between giving non-financial compensation to job satisfaction, Luthans (2006) describes the dimensions of job satisfaction as an aspect that plays a fairly strong role in achieving good work performance and productivity.

REFERENCES

THE EFFECT OF CASH FLOWS OF OPERATION AND LIQUIDITY ON PROFITABILITY: A STUDY IN PROCESSING AND MANUFACTURING INDUSTRY SECTOR’S COMPANIES IN PT BANK BRISYARIAH, TBK

Bobihoe Arjanto*, Syah Tantri Yanuar Rahmat, Anindita Rina
Faculty of Economics and Business, University of Esa Unggul, Indonesia
*E-mail: abobihoe99@gmail.com

ABSTRACT
This study aims to determine the effect of operating cash flow as measured by AKO and liquidity as measured by the current ratio to profitability as measured by return on equity in the Manufacturing companies on the PT BRISyariah, Tbk. Data used in this research is secondary data, i.e. annual financial statements in 2014 until 2017 while the samples used in this study was determined by clustered sampling method, so that the company obtained 6 samples. The analytical method used is descriptive analysis by describing the tables of Cash Flow Ratio (Operating Cash Flow), Liquidity (Current Ratio) and Profitability (Return on Equity) and inferential analysis using multiple regression analysis. The results of this study concluded: (1) Operating cash flow has a positive and significant impact on profitability with a significance level of 0.013 <0.05, (2) liquidity has a negative influence but not significant to profitability with a significance level of 0.254> 0.05.

KEY WORDS
Operating cash flow, liquidity, profitability, industry.

A company’s financial statements are an important medium in the economic decision-making process. In principle, financial statements are information that can help managers, creditors and investors in interpreting the performance of a company. One important part of financial statements is the cash flow statement.

Cash is the most current element of assets, or in other words cash is the most liquid working capital, so that with sufficient cash available, the company will not have any difficulties in fulfilling the obligations that are due. Every company needs cash to carry out its operations, such as buying raw materials, paying wages and salaries, paying off short-term obligations and distributing dividends to shareholders. The Management in order to improving the company's financial structure, is responsible in maintaining the company’s liquidity to create profitability in the company’s operational activities. The Management should try to increase revenue or business profits to finance all company activities. The management must determine the amount of cash available so that the company is able to fulfill its obligations when it is due, because cash shortages are the initial symptom of possibility bankruptcy company. The success of a company in managing finances will support it in maintaining and developing its business and being able to compete with competitors and obtain the profits the company wants to achieve.

The Management in determining and assessing the level of liquidity and profitability of the company, in addition to requiring balance sheet information and income statement, also requires other financial information, namely cash flow statements.

The research results of Rena Kurniawati (2012) found that net cash flow had a significant effect on liquidity, the magnitude of the effect of cash flow and liquidity simultaneously had no significant effect on profitability. Wael Mostafa (2015) found that income and cash flows have relevance to each other. While Erni Nuraeni (2011) found that cash flow has a strong positive relationship to profitability and working capital has a low negative relationship to profitability, but simultaneously Cash Flow and Working Capital have a significant effect on profitability. The results of Anggi Maharani’s study (2010), cash flow does not significantly influence the level of profitability of the company in terms of Net Profit Margin. While the results of Shopi Guspiati (2008) study show that the LTA variable (ratio of
liquid assets to total assets) has a positive and significant effect on profitability, LAD (ratio of liquid assets to deposits) has a negative and significant effect on profitability, and FDR (ratio of financing to deposits) does not have a significant effect on profitability, but simultaneously the independent variables influence the dependent variable. While the research results of Sri Nurdianti (2013), show that liquidity has a significant negative effect on profitability. The results of the study by Inta Budi Setyanusa (2013) show that Liquidity has a significant positive effect on profitability. The findings of Sutarti and Adi Sulaeman (2011) show that Operating Cash Flow has a significant influence on Net Profit generated by the company.

The findings of Khemala Febriani Mardhika (2012), show that simultaneously da n partial Inventory Turnover and Cash Flow (Operating Cash Flow) b erpengaruh significant to profitability (ROA). The findings of Lisna Riany Silaen (2012) shows that The current ratio have that real effect on ROA and ROE. Findings of Defri (2012), to show that Influential CAR positive and not significant to ROA, Influential LDR positive and not significant to ROA, and influential BOPO has negative effect and significant to ROA at banking companies listed on the IDX. The problem of this research can be identified as follows:

(1) How is the influence operating cash flow against profitability company and, (2) How is the influence of liquidity to profitability company.

**LITERATURE REVIEW**

Skousen (2009: 284), defines: "Cash flow statement (statement of cash flow) is a financial report that reports the amount of cash received and paid by a company for a certain period". Sofyan Syafri Harahap (2010: 257), argues that "Cash flow reports provide relevant information about cash receipts and expenditures of a company in a given period, by classifying transactions in activities: operations, funding and investment". (Jaworski and Czerwonka 2016) argued that "there is a significant relationship between profitability and liquidity of companies listed on the Warsaw stock exchange. The positive impact is on the profitability of the company’s capacity and negatively impacts the company’s debt. So, the bigger the company, the greater the profitability. The greater the involvement in debt, the lower the profitability.

Current cash report that used in this study are Cash Flow from Operating Activities. Cash flows from operating activities is on indicators that are determine is from its operation company can produce cash that can be used to pay off loans, maintain ability operation company, pay dividends and do investment b aru without relying on external funding sources. So that current cash operating activities could be signal for investors regarding the condition of the company. "Current Cash Operation (operating activities ) include cash generated and issued in determination of determining net income. Cash flows from operating activities include cash flows arising from the delivery or production of goods for sale and the provision of services, as well as the effects of transactions and other events on cash that affect income "(Suriani ginting, 2012).

PSAK No. 2 paragraph 12 (IAI: 2012) states that: The amount of cash flows originating from operating activities is the main indicator to determine whether the entity's operations can generate sufficient cash flows to repay loans, maintain the entity's operating capabilities, pay dividends and make new investments without relying on outside funding sources. Information about certain elements of historical cash flows along with other information is useful in predicting future operating cash flows. In general, the cash flow comes from transactions and other events that affect the determination of profit or loss clean.

Liquidity is one of the important financial aspects to analyze because liquidity is one of tools that can be used to measure the success of a company as seen from how much the company's ability to fulfill its current obligations. "Liquidity is the company's ability to fulfill obligations that are due" (Agnes Sawir, 2005). Munawir (2007: 31) argues that: "liquidity indicates the ability of a company to fulfill its financial obligations that must be fulfilled immediately, or the company's ability to fulfill financial obligations when billed". Sutrisno (2009: 215) define, "Liquidity is the company's ability to pay its obligations that are immediately fulfilled".
Safdar (2015) argues that: "Positive and significant liquidity has a relationship with profitability".

A company can be said to be liquid if the company is able to pay off short-term financial obligations and long-term obligations that are due in the year concerned. Conversely, if a company is not able to pay off its financial obligations are classified into the company liquid.

The liquidity ratio used in this study is the Current Ratio. Sutrisno (2009: 216) revealed that, "Current Ratio is a ratio that compares the current assets that have a company with short-term debt. Current assets include cash, accounts receivable, securities, inventories and other current assets. While short-term debt includes trade payables, notes payable, bank loans, salary debt and other debts that must be paid immediately".

This current ratio shows the level of short-term creditor security or the company's ability to pay off these debts. But a company with a high current ratio does not necessarily guarantee that it will be able to pay company debt due because the proportion or distribution of current assets is not profitable.

The main goal for companies is to get optimal profits. Nevertheless the problem of profitability is more important than the problem of profit, because large profits are not yet a measure for the company has worked efficiently. New can be efficient known by comparing the company's operating profit or in other words is calculating its profitability. "Profitability is the company's ability to generate profits. Profitability shows the success of a business entity in generating returns to the owner " (Soefyan Syafri Harahap, 2010). Sutrisno (2009) defines: "Profitability is the result of the wisdom taken by management. The profit ratio to measure how much the profit level shows is better management in managing a company. "Brigham and Houston (2010), put forward that: "profitability is the end result from a number of policies from decisions made by the company. Ratios that have been discussed so far it can provide useful clues in assessing the effectiveness and operation of a company, but the profitability ratio will show a combination of effects of liquidity, asset management, and debt on operating results. Munawir (2007), explained that "Profitability is a ratio used to assess a company's ability to make a profit".

Return On Equity (ROE) is one of the profitability ratios used to measure the company's ability to make profits based on capital (Houston and Brigham, 2010). The greater the ratio, the greater the increase in the net profit of the company concerned, then it will increase the company's stock price and the greater the dividends received by investors. ROE is a very important indicator for shareholders and prospective investors to measure the company's ability to obtain net income associated with dividend payments. PSAK No. 21 paragraph 03 (IAI: 2012) states that: "Basically equity comes from the owner's investment and results business company. Equity will decrease especially with the withdrawal of ownership by the owner, profit sharing or due to losses. In PSAK No. 21 paragraph 04 (IAI: 2012) stated that: "Equity consists of the owner's deposit which is often called capital or principal savings of members for cooperative legal entities, retained earnings, and other elements. Sutrisno (2009) stated that, "Return on equity is often referred to as the rate of return on net worth, which is the ability of companies to generate profits with their own capital, so that there is ROE that refers to the profitability of their own capital. This ratio shows the ability of owner's capital invested by the owner or investor to generate net income which is part of the owner. The higher the ratio, the higher the investor's profit because the more efficient the capital is invested. Thus, this ratio is used to measure the ability of own capital for generate profits for all shareholders, both ordinary shares and preferred shares".

Cash has a very important role in the continuity of company activities, so that special attention is needed in its management special ones. Poor cash management can cause cash operations to be less effective. Companies that are able to generate sufficient cash from their operating activities are likely to have a sound financial condition because they do not depend on funding sources from outside the company. A healthy company will be able to fulfill its term obligations in short.

In addition to operating cash flow and liquidity, profitability is one of the important things in the company. The success or failure of a company in carrying out its business, can be
seen from the level of profit obtained by a company. In this case whether the operating cash flow and liquidity can have an effect on profitability.

The hypothesis can be formulated in this study:

H1: Operating cash flow has a positive effect on profitability;
H2: Liquidity has a positive effect on profitability.

METHODS OF RESEARCH

The population observed in this study is a Manufacture companies customer at PT Bank BRISyariah, Tbk with a population of 20 companies. The sample in this study are 6 companies engaged in the Processing Industry (Manufacturing) and the selection of samples using Clustered Sampling, which is the selection of samples based on certain groups or clusters. The Criteria to be used is to classify similar companies and have audited financial statements for 2014 - 2017, with the criteria that such companies have the positive operating cash flow conditions and profitability positive.

The data obtained in this study are secondary data (financial statements) of companies engaged in the Processing Industry (Manufacturing). The analysis technique used in this study is: Descriptive Analysis and Inferential Analysis using multiple regression analysis techniques using the formula J. Supranto (2014):

\[ Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \ldots + \beta_nX_n + \text{is} \]

To test significance two tests were carried out, namely: F test (model test) and hypothesis testing using t-test.

RESULTS AND DISCUSSION

From the 6 companies engaged in the Manufacturing Industry (Manufacturing) sector which are customers at PT Bank BRISyariah, Tbk, only 2 companies which have cash flows and have a positive trend, namely PT Pindo Deli Pulp Paper and PT Bio Farma. PT Pindo Deli Pulp Paper has a trend of positive cash flow and has increased by Rp 239 trillion in Des Bucket 20 14 to become Rp 356 trillion De position as of 20 17. Then for PT Bio Farma also has a positive but declining operating cash flow trend which is amounting to Rp 613 trillion in the position of the Des bucket 20 14 becomes IDR 105 Trillion Des bucket position 20 17. Thus have good abilities in fulfill the company's operational activities, such as payment of taxes, payments employee salaries, interest payments, and fulfillment of operational activities others.

The level of liquidity of these 6 companies is in good condition, this is due to the condition of the company’s liquidity in a positive value with an average of 146.91%. From the 6 companies engaged in the Manufacturing Industry (Manufacturing) sector in PT Bank BRISyariah, the largest liquidity is PT Bio Farma, with a percentage of 302.81%. This is because the current assets owned by the company have a very large value of Rp. 1.75 trillion compared to the current debt owned by the company, which is only Rp. 686 billion, although the company's operating cash flow is very small, but the company obtains a substantial loan some of which are also used to repay loans both long-term and short-term loans, with the amount of cash flows obtained from funding activities, so that the funds used by companies to cover current liabilities come from other activities, namely cash flows from financing activities. In addition, current assets owned by the company are sufficient big.

The level of profitability owned by 6 companies has varied values. The average profit achieved by the company is amounting to 18.02%. The company that can achieve the highest profit among the 6 companies is PT Sinar Agung Always Success (SASS) which is equal to 44.88% where profit after tax is Rp 111 billion. This is because the company's operating cash flow is quite good and its liquidity is very good at 121.82% so that it can be seen that the company's operations are in good condition and can fulfill its short-term obligations very well.
The data normality test results show the significance values obtained from the Kolmogorov-Smirnov One-Sample test of 0.16 greater than the 5% (0.05) slope rate, so it is concluded that the regression model is normally distributed. The multicollinearity test results found that the value of Variance Inflation Factors (VIF) operating cash flow and liquidity of 1.320 is still smaller than 9 and greater than 1 so that it can be concluded that there is no multicollinearity between the two independent variables. The autocorrelation test is used to obtain the Durbin-Watson (DW) = 1.654 statistical value because the Durbin-Watson regression model (1.654) is between du (1.5464) and 4-du (2.4536), which is an area where there is no positive autocorrelation or negative, it can be concluded that there is no autocorrelation in the regression model. Heteroscedasticity test shows the significance value of each correlation coefficient of the two independent variables with absolute error (RES2) which is 0.379 and 0.414 is still greater than 0.05. hetero.

The results of the multiple regression equation in this study, $Y = 0.218 + 0.065 X_1 - 0.0021 X_2$. This means that every increase in operating cash flow by 100%, it is predicted to increase the company's profitability by 6.5% assuming constant company liquidity and every increase in liquidity by 100%, it is predicted to decrease the company's profitability by 0.2% with cash flow assumptions constant company operations and a constant value of 0.218 or 21.8% indicate the predicted value of the company's profitability if the cash flow statement and liquidity are the same as zero.

Test model (F statistic test) shows that the coefficient of determination or $R$ square is 0.487% and significant value is 0.021 <0.05, which means that the regression model is feasible. Hypothesis testing the effect of operating cash flow on profitability shows that the regression coefficient is 0.065 and the significance value of operating cash is 0.013 <α = 0.05 means that it can be concluded that operating cash flows have a positive and significant effect on profitability in companies engaged in the industrial sector Processing (Manufacturing) at PT Bank BRISyariah, Tbk. Direction marked positive effect shows that if the cash flow the company increased the profitability will increase and vice versa. These results are in accordance with the findings of Erni Nuraini (2011) and Khemala Febriani Mardhika (2012), but not in accordance with the findings of Anggi Maharani (2010) and Sutarti and Adi Sulaiman (2011). The hypothesis test of the effect of liquidity on profitability shows that the regression coefficient of -0.0021 and the significance value of liquidity of 0.025 means that liquidity has a negative but not significant effect on profitability in companies engaged in the Manufacturing Industry (PT) BRISyariah, Tbk. The results are in accordance with the findings of Sri Nurdianti (2013), Shopi Guspiati (2008), but not in accordance with the findings of Inta Budi Setyanusa (2013) and Lisna Riani Silaen (2012).

**CONCLUSION AND SUGGESTIONS**

This study can be concluded as follows: Average Operating Cash Flow (AKO Ratio) owned by 6 companies engaged in the Manufacturing Industry (Manufacturing) sector in PT Bank BRISyariah, Tbk, which is quite low at 22.65%, this means 77. The remaining 35% consists of other activities used to cover the company's current liabilities.

The average level of liquidity (Current Ratio) of 6 companies engaged in the Manufacturing Industry (Manufacturing) sector in PT Bank BRISyariah, Tbk is quite good at 146.91%, which means that current assets owned by the company can meet company short-term obligations. The average profitability (Return on Equity) obtained by 6 companies engaged in the Manufacturing Industry (Manufacturing) sector in PT Bank BRISyariah, Tbk for the period 2014-2017 is 18.02%. Operating and liquidity cash flows can explain profitability of 48.7%, while the remaining 51.3% is explained by other variables not examined. The operating cash flow has a positive and significant effect on profitability in 6 companies engaged in the Manufacturing Industry (Manufacturing) sector at PT Bank BRISyariah, Tbk. Liquidity has a negative but not significant effect on profitability in 6 companies engaged in the Manufacturing Industry (Manufacturing) sector at PT Bank BRISyariah, Tbk.
For further research, namely (1) Dividing and extending the study period in a semester so that it can see trends that occur in the long term so that it will describe the actual conditions that occur, (2) The ratio used to measure independent variables does not only consist of two ratios, so the results obtained can be better and more spacious than the current study and (3) may use other independent variables that affect the profitability of a company, such as the Working Capital, Net Cash Flow, Cash Flow of activity Financing, Cash Flow of activity Investments, Solvency, Operational Costs, Capital Turnover, and others so.

REFERENCES


MULTI-AGE DUCK FARMING SYSTEM IN PONDS, COMPARING ITS PRODUCTION AND PROFIT: A CASE STUDY AT TAKALAR DISTRICT OF INDONESIA

Paly Muhammah Basir
Department of Animal Sciences, Faculty of Science and Technology, Alauddin State Islamic University, Makassar, Indonesia
E-mail: basirpaly@gmail.com

ABSTRACT
The study was aimed to draw a comparison between the production and profit of duck eggs in the multi-age duck farming in brackishwater ponds. Multi-age is defined as layer ducks in two or three age group (level 2 or 3) that is farmed collectively in one cage. Evaluative method was applied to 110 ducks in each level. The ducks in level 2 consist of two age groups: 6-14 and 15-23/24 months, 36 ducks each. Level 3 has three age groups: 6-11, 12-17 and 18-23/24 months containing 36, 38 and 36 ducks, respectively. Each level was contained in a 20m² cage in the same pond with a 100m gap between cages. The ducks are allowed a natural environment to freely swim in the pond and rest in the cage. The ducks are kept for four months. The t test statistics was used to compare the production and profit of duck eggs in level 2 and 3. The result showed a non-significant difference in egg production between level 2 and 3 (p<0.05); however, ducks in level 2 produced more eggs than those in level 3 by 1.80%. A significant difference in profit (p>0.05) was identified where level 2 gave a higher profit by IDR 308,000 (USD 21.63) than level 3. Based on the comparison in egg production and profit, it is concluded that the multi-age duck farming level 2 and 3 deserves perpetuation or development.

KEY WORDS
Multi-age, farming system, pond, duck.

Farming ducks in brackishwater pond is one of the integrated fish-based farming systems/aquatic farming (Latifa and Rini, 2014; Munjunatha, 2014; Renie and Budi, 2015; Madry et al., 2016). In this system, fish is the main product and the ducks are the byproduct. Duck feces functions as the fertilizer for the brackishwater pond and stimulate the growth of zooplankton and phytoplankton (Dritan and Bejo, 2014; Mehedeti et al., 2015). Ducks farming in brackishwater pond can benefit the fish by improving the fertility of the pond and providing feed source for the ducks from the pond biota that grows well from the ducks‘ feces (Popp et al., 2018). The study of duck farming in brackishwater pond has been done in Bangladesh (Latifa et al, 1993, Mehedeti et al., 2015), Egypt (Ramdhani, 2007), Uttarakhand, India (Mishra, 2007; Soliman et al, 2000; Gangwara et al., 2013; Singh, 2013; and Satyaprakash et al., 2014), Hungary (Popp et al., 2016), France (Broyer and Laurence, 2012) and Nigeria (Nnaji, 2014). However, the studies have not discussed the multi-age duck farming system—layer ducks categorized in two or three age groups (level 2 or 3) that are farmed collectively in one cage. In Indonesia, especially Takalar regency, the system has been applied by the brackishwater pond farmer for 15 years as a diversification venture. The system was planned purposively by the farmers to maintain the amount of egg supply to the market. The type of ducks for the farming system is the local duck—crossbreed of several duck strains that have long been bred (Budaiharjo, 2014).

The farmers initially practiced one age group while hatching and breeding the young ducks as the replacement to the previous ducks. When the first ducks have to be culled for being unproductive (usually over 24 months old), the substitute ducks have been 5-6 months old and started laying eggs. One age group-system then evolved into multi-age system. To date, some farmers apply and maintain the multi-age systems; 2 age groups (level 2) and 3 age groups (level 3). Level 2 includes age groups 6-14 months and 15-23/24 months, and level 3 includes 6-11, 12-17 and 18-23/24 months.
The drawback of this multi-age system is the difficulty to tell production stage I from stage II that are physiologically connected to the level of egg production. Stage I starts at 5-6 months of age with 10-15% production, then peaks (80-90%) at 8-12 months and diminishes on average 40% at 13-14 months. (Palmer, 2007; Triana et al., 2012). Stage II starts at 15-16 months with production under 40% and lasts until 23-25 months (Purba et al., 2005). The production stage was closely related to molting—common among poultries. Molting occurs at 14 to 15-month old and lasts for 1.5 to 2 months (Triana, 2015). Egg production drastically declines even ceases completely during molting (Palmer, 2007). Besides molting, the ducks undergo production stage II with as low as 40% egg yield (Purba et al., 2005; Palmer, 2007; Margono, 2015); therefore, deemed inefficient to maintain.

In other words, multi-age system discovers the combination between the high-producing ducks (Stage I) and low-producing ducks (Stage II). The impact is on the duck-day production, operational costs and profit. Accordingly, this study aims to compare the level of egg production and profit between the multi-age brackishwater-farmed ducks in level 2 and level 3. The result of the study is expected to provide additional information for further study and for the farmers to evaluate the long-existing multi-age duck farming system.

**MATERIALS AND METHODS OF RESEARCH**

The study was conducted for four months (June – September 201) in Takalar regency, South Sulawesi Province, Indonesia. The study used evaluative method which calculates the benefits of multi-age duck farming level 2 and level 3 using the criteria of production and profit. Previous studies reported that the number of farmers that breed multi-age ducks at level 2 and 3 was 200 and 165, respectively, and each level evaluated 20 farmers as the sample. From each level, 100 layer ducks and 10 drakes were taken based on the age group as presented in Table 1.

**Table 1 – Sample criteria based on level and age group**

<table>
<thead>
<tr>
<th>Multi-age</th>
<th>Age group</th>
<th>Sex</th>
<th>Total sample</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Female</td>
<td>Male</td>
<td></td>
</tr>
<tr>
<td>Level 2</td>
<td>6-14 months</td>
<td>50</td>
<td>5</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>15-24/24 months</td>
<td>50</td>
<td>5</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100</td>
<td>10</td>
<td>110</td>
</tr>
<tr>
<td>Level 3</td>
<td>6-11 months</td>
<td>33</td>
<td>3</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>12-17 months</td>
<td>34</td>
<td>4</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>18-23/24 months</td>
<td>33</td>
<td>3</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100</td>
<td>10</td>
<td>110</td>
</tr>
</tbody>
</table>

Ducks in level 2 and 3 were allotted to one brackishwater pond area with two 20m² cages. Between cages for level 2 and 3 was a 100 m-gap. The ducks were freely swimming in the pond and resting around the cages to be exposed to the natural environment. The ration was composed of the regular feedstuff for daily feeding such as ricebran, corn and fish waste (all minced) using 50:40:10 ratio. Result of proximate analysis of the ration’s nutrient content is presented in Table 2. Feed was offered two times—in the morning prior to open range in brackishwater area, and in the afternoon before the ducks were caged. The average feed consumption was 150g/duck/day.

**Table 2 – Result of proximate analysis of nutrient content in the ration for multi-age ducks.**

<table>
<thead>
<tr>
<th>Rations for multi-age duck (Level 2 and 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
</tr>
<tr>
<td>Water (%)</td>
</tr>
<tr>
<td>Ash (%)</td>
</tr>
<tr>
<td>Crude Fat (%)</td>
</tr>
<tr>
<td>Crude Protein (%)</td>
</tr>
<tr>
<td>Gross Energy (Kcal)</td>
</tr>
</tbody>
</table>

*Result of proximate analysis in laboratory of feed, Department of Animal Science, UIN-Alauddin Makassar.*
According to Ketaren (2002), the ration for adult layer ducks requires 19-20% protein and 2700-2900 kcal per kg; therefore, the protein content in the ration in this study (Table 2) was below standard. However, free ranging ducks during the day is expected to meet protein and other nutrients requirements. Previous study reported that brackishwater pond provided natural feeding habitat for the ducks such as phytoplankton, zooplankton, low-level vegetation including grass, moss and water hyacinth, and high-level vegetation like mangrove (Tia, et al., 2012; Popp, et al., 2018). Ducks are omnivorous animal so the entire biota in brackishwater pond ecosystem provides source of nutrients for ducks.

Daily egg production (DD) in percentage (%) was calculated (1) (Margono, 2015). Daily profit was calculated using equation (2) (Hanafi and Halim, 1995).

\[
\text{Duck Day (DD)} = \frac{\text{Total egg production}}{\text{(total live duck) x (days)}} \times 100 \quad \text{(Margono, 2015 (1))}
\]

\[
\text{Profit} = \text{TR-OC} \quad \text{(2)}
\]

Where: TR is Q (P) where Q is egg production and P is selling price/transaction; OC is the total production cost (feed, medicine, labour, depreciation rates of cage and equipments).

Data were subject to t test using SPSS version 16 to see the different production (DD) and profit between duck farming in multi-age level 2 and level 3. Significant difference is p<0.05.

RESULTS AND DISCUSSION

This section contains the statistical summary and the result of normality and homogeneity test as the prerequisite for t test. The summary of the variables in t test is presented in Table 3.

<table>
<thead>
<tr>
<th>Table 3 – Statistical summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>Duck day (%)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Profit (million IDR)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Mortality (duck)</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

The average egg production and profit in level 2 were higher than those in level 4. The smaller standard deviation from the same variables indicates that the majority DD or OC value (profit) from the same multi-age level are almost similar to the mean value. In contrast, the highest standard deviation showed a significant difference from one farmer to another. The unit for egg production is duck-day (DD) calculated by the formula: daily egg production divided by the total live layer duck. The unit for profit in Indonesian Rupiah (IDR) is calculated using the formula (2). Total mortality during the span of study was 4 and 7 for level 2 and 3, respectively.

Normality test is the prerequisite of t test in order to ensure the data being normally distributed and representative to the population. Since dependent variables measured were derived from 2 groups of independent sample, the normality test used in this study was adalah Kolmogorov Smirnov and Shapiro Wilk (Ghazali, 2014). The criteria established by Kolmogorov-Smirnov and Shapiro Wilk stated that if p-value >0.05, the data were normally distributed and representing the population. Table 4 shows that duck day or profit from level 2 and level 3 had Kolmogorov-Smirnov and Shapiro Wilk value >0.05 (p>0.05). Therefore, the data from both groups (level 2 and level 3) are normally distributed or representing the population.

Homogeneity test is also the prerequisite of t test to whether a different variant exists in both level of data (level 2 and level 3). In t test, quality data have a minuscule difference of
variance (Ghozali, 2014). The test is using Levene’s Test that categorized homogenous data if p-value >0.05. Table 5 shows p-value>0.05 in both duck day and profit, indicating data homogeneity between groups.

### Table 4 – Normality test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Multi-age</th>
<th>Kolmogorov-Smirnov</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>df</td>
<td>p-value</td>
</tr>
<tr>
<td>Duck Day (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 2</td>
<td>.151</td>
<td>34</td>
<td>.047</td>
</tr>
<tr>
<td>Level 3</td>
<td>.211</td>
<td>31</td>
<td>.001</td>
</tr>
<tr>
<td>Profit (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 2</td>
<td>.305</td>
<td>34</td>
<td>.000</td>
</tr>
<tr>
<td>Level 3</td>
<td>.363</td>
<td>31</td>
<td>.000</td>
</tr>
</tbody>
</table>

### Table 5 – Test of Homogeneity of Variance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Levene Statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duck Day (%)</td>
<td>Based on Mean</td>
<td>1.751</td>
</tr>
<tr>
<td>Profit (%)</td>
<td>Based on Mean</td>
<td>8.316</td>
</tr>
</tbody>
</table>

*Homogeneity of p-value>0.05.*

---

**Figure 1** – Box-plot egg production, duck day

**Figure 2** – Box-plot profit (million IDR)
Homogeneity also translates into data without outlier—a set of data that distinguish themselves from other data due to error during data measurement or data collection. Outlier can be visually detected using box-plot (Figure 1 and 2). Both graphs do not show the upper plots or under the box plot; therefore, outlier is non existent. Therefore, the data of this study showed homogeneity that is qualified for comparison using independent t test.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Levene’s Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>p-value</td>
</tr>
<tr>
<td>Duck Day (%)</td>
<td>1.751</td>
<td>.390</td>
</tr>
<tr>
<td>Profit (million IDR)</td>
<td>2.316</td>
<td>.405</td>
</tr>
</tbody>
</table>

Note: P-value of Levene’s Test for Equality of Variances for duck day (0.390) and profit (0.405) are both (p>0.05), indicating homogeneity with the previous homogeneity test.

T test result showed that the difference of duck-day in level 2 and level 3 was non-significant (p>0.05); however, the mean difference showed that DD level 2 was slightly higher (1.80%) than that of level 3. The difference may due to production cycle or the hatching period. Young ducks (6-12 months) generally have a production cycle that lasts from 6 to 8 months which declines to 4-5 months when reaching 12-13 months of age (Margono, 2015). Level 2 includes two age groups; 6-12 and 13-24 months, each with 50 ducks. Level 3 includes three age groups; 6-11, 12-17 and 18-23/24 months, with 33, 34 and 33 layers, respectively (Table 1).

According to the researcher’s note, from 34 ducks in level 2, there are 3 ducks in 12-17 months age group, 11 in 12-month group and 23 in over 12-month group. Therefore, the number of 6-12 months old ducks in level 3 is 44 ducks (33+11) and 56 are over 12 months old. In other words, 44 ducks are 6-8 month of production cycle and 56 are in low production cycle (under 6 months). It is evidenced that there are more layers in level 2 that survive in long production cycle (50) than those in level 3 (44). The different cycle resulted in a slightly higher egg production in level 2 than that in level 3.

Previous studies have evaluated duck farming system in brackishwater pond with additional feed that resulted in egg production as much as 66.67% in khaki Campbel (Latif et all. 1993), 55.67% in Bangladesh nageswari duck (Bhuiyan, et.al., 2017) and 60-70% in Indonesian local duck anas javanicus sp (Widiyaningrum et all. 2016). The current study on local ducks reported average egg production 65.56% and 57.75% in level 2 and level 3, respectively.

Table 6 also showed a significantly different profit in level 2 and level 3 (p<0.05) where level 2 is IDR 0.308 million higher than level 3. The difference is due to a slightly higher mean of egg production (duck day) in level 2 (1.80%) that yields higher revenue and thus affects profit gap. It was in line with Majhi (2018) that Integrated Duck-cum-Fish Farming in India gained profit as much as 29290/month, equal to IDR 6,058,503. ICAR (2018) reported that duck farmers’ average income in India is Rs 20000/month, equal to IDR 4,101,404.80. Adzitey and Adzitey (2011) stated that duck production has a potential to reduce poverty among rural households in Asian communities. It is difficult to compare the profit across regions because it involves price and cost. However, the experts have agreed that ducks farming in brackishwater pond shows a promising profit. Therefore, multi-age duck farming (level 2 and 3) in brackishwater that have long been existing is considered worthy of perpetuation or development.

CONCLUSION

It is concluded that egg production in level 2 and level 3 is non-significant (p>0.05); however, mean difference showed that level 2 had a slightly higher egg production (1.80%) than that of level 3. Profit comparison between level 2 and 3 is significant (p<0.05), mean
difference showed that profit level 2 is higher by IDR 308,000 (USD 21.63) than that of level 3. The difference may due to the slightly higher duck day in level 2 which resulted in a higher revenue that affects profit gap. Based on the rates of egg production and profit, multi-age duck farming (level 2 and 3) in brackishwater pond in the location of the study is deemed sustainable and developable.

ACKNOWLEDGMENTS

The authors express gratitude to LITAPDIMAS of Ministry of Religious Affairs Indonesia for the research funding, and to the community of duck farmers in Takalar regency for the participation in the study.

CONFLICT OF INTERESTS

The authors certify that they have no “conflict of interest” in the research, from undertaking the field research to writing the manuscript.

REFERENCES


ANALYSIS OF FISHING TOOLS BUSINESS ON GT-BOATS AS THE ALTERNATIVE OF CANTRANG IN PPP BAJOMULYO, PATI REGENCY OF INDONESIA

Wibowo Tri Wahyu*, Wijaya Suradi, Boesono Herry
Master’s Program in Coastal Resource Management, University of Diponegoro, Indonesia
*E-mail: wahyumayla@yahoo.com

ABSTRACT
The cantrang boat with a size above 30 GT in Juwana Pati District has replaced fishing gear to gillnet, purse seine and bottom longline. The fleets of ships that have switched these fishing gears get permission and carry out fishing operations in the Banda Sea (WPP 718). The problem faced by some fishermen and ship owners who have not switched now is that they still have the body to switch from cantrang to several other fishing gears. See the conditions above, so it is necessary to review further the aspects of business feasibility. The purpose of this study was to determine the income and analyze the value of NPV, the value of B/C Ratio, IRR (Internal Rate of Return) and payback period (PP) on ships that have switched to gillnet, purse seine and bottom longline. The economic aspect is based on research from the income variable with a value of Rp.6,825,000,000 / year for bottom longline vessels, Rp.3,450,000,000 / year for gillnets vessels and Rp.5,130,000,000 / year for purse seine vessels. The results of the financial analysis of the business of fishing the Ship bottom longline using discounted criterion calculations can be said to be feasible and can be continued because the NPV value is Rp.729,476,021. (NPV = positive), the IRR is 25.88%. (IRR> i), B / C ratio of 1.21 (> 1), PP for 2 years, 3 months, 18 days, while financial analysis of fishing businesses Ship purse seine can also be said to be feasible and can be continued because the NPV value is Rp.860,746,527 (NPV = positive), IRR of 30.15% (IRR> i), B / C ratio of 1.29 (> 1), PP for 2 years, 3 months, 18 days. For the business of catching Gillnets, they suffered losses and were not feasible to continue their business.

KEY WORDS
Business, analysis, fishing, Juwana sub-district.

Indonesia is an archipelago with vast territorial waters reaching 5.8 million km² or three quarters of Indonesia's territory. With a coastline of 81,000 km, Indonesia has around 7,000 fish species and the potential of marine fish resources reaches 6.52 million tons per year (Damayanti, 2015). The fisheries sector has a strategic role in national development. Natural resources potential is very big since Indonesia is known as the largest maritime country in the world. (Triarso, 2012). Pati Regency is one of the regencies in Central Java that relies on special fisheries sector, specifically capture fisheries as one of the sources of regional income. Pati Regency has a 60 km coastline length and sea territory reaches 432 km². The fishing tool used by Central Java fishermen is trawl nets, trawl bags, trawl rings, gill nets, fishing rods and other fishing gear (Kisoworo, 2015).

National marine fisheries produced 23.26 million tons in 2017 (KKP, 2018). Central Java is one of the provinces that contributed to national marine fisheries production. For marine fisheries production in Central Java in 2018, it amounts to 446,197,807 tons (DKP of Central Java Province, 2018). One of the contributions of Central Java itself is supported by the fishery products from Pati Regency, which is equal to 50,478,991 tons or 11.33% (DKP of Central Java Province, 2018). The government through the Ministry of Marine Affairs and Fisheries (KKP) issued Minister of Marine Affairs and Fisheries Regulation No. 2 of 2015 concerning the prohibition on the use of trawl and seine nets made fishing boat owners have to replace their fishing tool. KKP re-measures cantrang boat and divide them into three categories, boat under or <10 GT, between 10 and 30 GT, and above or> 30 GT.

As for the policy stipulated for boat over 30 GT, the KKP provided licensing facilities and relocation of fishing areas to Fisheries Management Areas (WPP) 718. In 2016, several
cantrang boat with a size above 30 GT in Juwana, Pati Regency had replaced their fishing tool into Bottom Longline, Gill Nets, and Purse Seine. The fleet of boats that have switched into these fishing tools got permission and carried out fishing operations in the Banda Sea (WPP 718). The problem faced by some fishermen and boat owners who have not switched yet is that they still hesitate to switch from cantrang to several other fishing tools. Therefore, a further study of fishing business with replacement fishing tools is needed, by analyzing the economy, namely comparing between the production level or the number of catch (output) and the number of inputs i.e. investment and total costs of the Bottom Longline, Gill Nets and Purse Seine boat to find which is more efficient between these boats. This research would help PPP Bajomulyo fishermen to compare feasible business to develop. Seeing the above conditions, it is necessary to review the aspects of business feasibility. The purpose of this study was to determine the revenue and analyze the value of NPV (Net Present Value), B/C Ratio, IRR (Internal Rate of Return) and payback period (PP) on boats that have switched to Bottom Longline, Gill Nets and Purse Seine.

MATERIALS AND METHODS OF RESEARCH

The method used in this study is a descriptive method based on case study. According to Nasir (2009), a case study is a research method that aims to provide a detailed description of the background, typical traits and characteristics of a case or status of an individual, then it will be made into something general. The sampling method is snowball sampling or snowball samples. According to Umar (2004), this sampling method is a technique for determining samples that are initially small in number, then this sample was asked to choose other respondents to be sampled again, and so on until the number of samples continue to increase. Some considerations in determining respondents, namely fishermen who were used as respondents were cantrang fishermen who had switched fishing tools to Bottom Longline, Gill Nets and Purse Seine > 30 GT in Bajomulyo PPP and operating in WPP 718 (Banda Sea).

The method of data collection uses primary data and secondary data. Primary data is obtained directly from respondents through observation, questionnaire, and direct interviews with fishermen. Direct observation is a means to retrieve data using the eyes without the help of other standard tools for this purpose. Interview is the process of obtaining information for research purposes, face to face conversation between the questioner or the interviewer and the respondent using a tool called the interview guide. Questionnaires are a list of fairly detailed and complete questions (Nasir, 2009). Primary data collected economic aspects which include capital, costs (depreciation, supplies, maintenance, licensing, labor, and distribution), and income.

Secondary data is obtained by evaluating the source, the state of the secondary data, and also the limitations of the data, which is needed to obtain data about the past (Sugiyono, 2009). Secondary data was obtained from Central Java Fisheries Statistics, Fisheries and Marine Services of Central Java Province, Bajomulyo Beach Fisheries Port (PPP) which included data on the number of fishermen, number of fish production, number of business and number of fishing tools; and profile of Pati Regency, the general condition of the study area along with a map of the Pati Regency. The data analysis method used is included in discounted criteria because the economic life of the project is more than 5 years. The indicators used are Net Present Value (NPV), the value of Benefit Cost Ratio (B/C), Internal Rate of Return (IRR) and Payback Period (PP).

RESULTS AND DISCUSSION

Capital or business investment acts as the main technique for smooth production processes that aim to get maximum profit with minimal costs. Capital can be considered successful if it can provide economic benefits for business owners. The capital needed in a fishing business is a boat, and a boat’s engine.
Table 1 – Average investment capital for fishing business of Bottom Longline, Gill Nets and Purse Seine

<table>
<thead>
<tr>
<th>No</th>
<th>Component</th>
<th>Cost per Type of Fishing Business (Rp)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bottom Longline</td>
<td>Gill Nets</td>
</tr>
<tr>
<td>1</td>
<td>Boat</td>
<td>1,300,000,000</td>
</tr>
<tr>
<td>2</td>
<td>Catching tool</td>
<td>550,000,000</td>
</tr>
<tr>
<td>3</td>
<td>Cooler Machine</td>
<td>900,000,000</td>
</tr>
<tr>
<td>4</td>
<td>Boat Machine</td>
<td>520,000,000</td>
</tr>
<tr>
<td>5</td>
<td>Navigation Tool</td>
<td>180,000,000</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3,450,000,000</td>
</tr>
</tbody>
</table>

According to the table above, the investment capital needed are boats, fishing tools, cooler machines, boat engines and navigation tools. The biggest investment capital among these is bottom line with a total investment of Rp3,450,000,000. Details of the capital cost component to buy a boat is Rp1,300,000,000 with an economic life of 15 years. The investment capital to purchase fishing tools is Rp550,000,000; while to purchase a cooler machine is Rp900,000,000 and to purchase boat’s machine is Rp520,000,000 and Rp180,000,000 for navigation tool.

The production costs used in this study are divided into two, namely fixed costs and variable costs. Fixed costs consist of maintenance costs (boats, fishing tools, cooler machines, boat’s engines, lights and navigation equipment), depreciation, licensing, PHP and profit sharing. Fixed costs must be calculated by business owners to carry out their business. Fixed costs consist of maintenance costs, depreciation costs, and licensing fees. Fixed costs obtained from the results of research on Bottom Longline, Gill Nets and Purse Seine boats in PPP Bajomulyo Juwana is that the boat’s economic life is 20 years, the engine’s economic life is 5 years and the fishing tools economic life is 5 years. Depreciation costs represent the loss of fixed assets because they are used in the production process. Fixed assets are durable production factors that do not run out in one production process but will gradually run out after several production processes. From the results of the study it is known that the economic life of Bottom Longline, Gill Nets and Purse Seine boats in PPP Bajomulyo Juwana is 20 years, the machine is 5 years and the fishing tools is 5 years.

Table 2 – Details of average fixed costs per year for Bottom Longline, Gill Nets and Purse Seine

<table>
<thead>
<tr>
<th>No</th>
<th>Component</th>
<th>Cost per Boat Business Type (Rp)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bottom Longline</td>
<td>Gill Nets</td>
</tr>
<tr>
<td>1</td>
<td>Boat Maintenance</td>
<td>61,200,000</td>
</tr>
<tr>
<td>2</td>
<td>Fishing Tools Maintenance</td>
<td>12,600,000</td>
</tr>
<tr>
<td>3</td>
<td>Cooler Machine Maintenance</td>
<td>28,800,000</td>
</tr>
<tr>
<td>4</td>
<td>Boat’s machine Maintenance</td>
<td>18,720,000</td>
</tr>
<tr>
<td>5</td>
<td>Lamp and Navigation Tools</td>
<td>2,880,000</td>
</tr>
<tr>
<td>6</td>
<td>Depreciation</td>
<td>359,000,000</td>
</tr>
<tr>
<td>7</td>
<td>License</td>
<td>6,175,000</td>
</tr>
<tr>
<td>8</td>
<td>PHP</td>
<td>682,500,000</td>
</tr>
<tr>
<td>9</td>
<td>Profit Sharing</td>
<td>2,730,000,000</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3,901,875,000</td>
</tr>
</tbody>
</table>

Based on table 2, it was found that the fixed costs of fishing business for Bottom Longline boats were Rp3,901,875,000/year, while the fixed costs of fishing business on Gill Nets are Rp2,417,000,000/year. Furthermore, the fixed cost of fishing business on Purse Seine boats is Rp2,952,250,000/year. Maintenance costs are fixed costs incurred by the production agent to repair the investment goods to reduce the severe damage to the investment goods. Non-fixed costs are incurred by business actors which numbers for each trip and year vary. Non-fixed costs are influenced by the amount of production. Non-fixed costs include fuel, lubricant, rations, freshwater, etc. The total variable cost on a Bottom Longline boat is Rp1,446,060,000 per year. Furthermore, the total variable costs on Gill Nets are Rp1,080,060,000 per year and variable cost on Purse Seine boats is Rp828,360,000 per year.
Table 3 – Details of the average non-fixed costs per year for the Bottom Longline, Gill Nets and Purse Seine fishing business

<table>
<thead>
<tr>
<th>No</th>
<th>Component</th>
<th>Bottom Longline</th>
<th>Gill Nets</th>
<th>Purse Seine</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fuel</td>
<td>916,000,000</td>
<td>870,000,000</td>
<td>633,600,000</td>
</tr>
<tr>
<td>2</td>
<td>Oil</td>
<td>24,800,000</td>
<td>38,800,000</td>
<td>36,000,000</td>
</tr>
<tr>
<td>3</td>
<td>Ration</td>
<td>130,000,000</td>
<td>160,000,000</td>
<td>147,500,000</td>
</tr>
<tr>
<td>4</td>
<td>Freshwater</td>
<td>15,260,000</td>
<td>21,260,000</td>
<td>11,260,000</td>
</tr>
<tr>
<td>5</td>
<td>Bait</td>
<td>360,000,000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1,446,060,000</td>
<td>1,090,060,000</td>
<td>828,360,000</td>
</tr>
</tbody>
</table>

Table 4 – Average total costs per year for Bottom Longline, Gill Nets and Purse Seine fishing tools

<table>
<thead>
<tr>
<th>Description of Total Costs</th>
<th>Average Total Cost Per Year (Rp/Year)</th>
<th>Bottom Longline</th>
<th>Gill Nets</th>
<th>Purse Seine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fixed Cost</td>
<td>3,901,875,000</td>
<td>2,417,000,000</td>
<td>2,952,250,000</td>
<td></td>
</tr>
<tr>
<td>Total Non-fixed Cost</td>
<td>1,446,060,000</td>
<td>1,090,060,000</td>
<td>828,360,000</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5,347,935,000</td>
<td>3,507,060,000</td>
<td>3,780,610,000</td>
<td></td>
</tr>
</tbody>
</table>

The total fixed and non-fixed costs for the Bottom Longline are Rp5,347,935,000 per year. Furthermore, the Gill Nets is Rp3,344,942,000 per year and the Purse Seine is Rp3,780,610,000 per year.

Income obtained from the sales of fish production which is influenced by the size of the fish caught when landed. Income is derived from every kilogram of fish captured multiplied by the average price of each type of fish per kilogram. The amount of income is influenced by the productivity of fishing tools, seasons, and fluctuations in fish prices.

Table 5 – Average Operating Income for Fishing Business using Bottom Longline, Gill Nets and Purse Seine

<table>
<thead>
<tr>
<th>Fishing Season</th>
<th>Income (Rp/year)</th>
<th>Bottom Longline</th>
<th>Gill Nets</th>
<th>Purse Seine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
<td>6,100,000,000</td>
<td>2,400,000,000</td>
<td>1,630,000,000</td>
<td></td>
</tr>
<tr>
<td>Max</td>
<td>7,550,000,000</td>
<td>4,500,000,000</td>
<td>3,500,000,000</td>
<td></td>
</tr>
<tr>
<td>Average/Year</td>
<td>6,825,000,000</td>
<td>3,450,000,000</td>
<td>5,130,000,000</td>
<td></td>
</tr>
</tbody>
</table>

Based on the table above, it can be seen that the Bottom Longline fishing income is around Rp6,100,000,000 - Rp7,550,000,000 per year, with an average income of Rp6,825,000,000 per year, with the average yield per trip Rp1,137,500,000. For the Gill Nets is around Rp2,400,000,000-Rp4,500,000,000 per year, with an average income of Rp3,450,000,000 per year, with the average yield per trip Rp575,000,000. Whereas Purse Seine boats are in the range of Rp1,630,000,000 - Rp3,500,000,000 per year, with an average income of Rp5,130,000,000 per year, with the average trip per year Rp855,000,000.

Table 6 – Profit for Bottom Longline, Gill Nets and Purse Seine fishing boat

<table>
<thead>
<tr>
<th>Description</th>
<th>Value (Rp)</th>
<th>Bottom Longline</th>
<th>Gill Nets</th>
<th>Purse Seine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>6,825,000,000</td>
<td>3,450,000,000</td>
<td>5,130,000,000</td>
<td></td>
</tr>
<tr>
<td>Total Cost</td>
<td>5,347,935,000</td>
<td>3,507,060,000</td>
<td>3,780,610,000</td>
<td></td>
</tr>
<tr>
<td>Profit/Loss per Year</td>
<td>1,477,065,000</td>
<td>-57,060,000</td>
<td>1,349,390,000</td>
<td></td>
</tr>
</tbody>
</table>

Based on the table above, it can be seen that the fishing business of Bottom Longline makes a profit of Rp1,477,065,000 per year and Purse Seine has a profit of Rp1,349,390,000. However, the fishing business using Gill Nets suffered a loss of Rp 57,060,000.

This calculation of financial analysis uses an interest rate of 14% according to the current average bank interest rate, inflation of 2.57% of the three fishing businesses using Bottom Longline, Gill Nets and Purse Seine.
The NPV value of the Bottom Longline boat is Rp729,476,021. Whereas the Purse Seine is Rp860,746,527. Both have a positive NPV value and this indicates that the fishing business of Bottom Longline and Purse Seine is worth to continue. For Gill Nets fishing, it has a negative value of -Rp.1,907,451,501 so that Gill Nets is considered not feasible. The higher the Net Present Value (NPV) of a business, the better the business and business that can increase profits will have bigger Net Present Value (NPV). According to Umar (2003), NPV is the difference between the Present Value of investment and the current value of net cash receipts (operational cash flows and terminal cash flows) in the future. The NPV is also the difference between the investment market value and the costs incurred. Discounted cash flow valuation is the process of evaluating investments through a cash flow discount rate in the future. The feasibility of a business can be seen from the results of NPV calculations. If the NPV value is positive then the investment is feasible, otherwise, if negative, the investment will be rejected or not feasible and if the value of NPV = 0 then the business can be feasible.

<table>
<thead>
<tr>
<th>No.</th>
<th>Business Type</th>
<th>NPV Value (Rp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bottom Longline</td>
<td>729,476,021</td>
</tr>
<tr>
<td>2</td>
<td>Gill Nets</td>
<td>-1,907,451,501</td>
</tr>
<tr>
<td>3</td>
<td>Purse Seine</td>
<td>860,746,527</td>
</tr>
</tbody>
</table>

The IRR value on the Bottom Longline boat is 25.88%, while the Purse Seine is 30.15%. This means that the business is able to provide a profit rate of 30.15% per year from all investments invested during the 5-year fishing period. Fishing business Bottom Longline and Purse Seine have a value that exceeds the discount factor value which is worth 14% so, it can be said that it’s worth continuing. As for Gill Nets fishing businesses, it has a negative value of -23.51% so the business can be considered not feasible. According to Umar (2003), if the IRR value of the discount rate value means it is feasible, if the IRR < from the discount rate then the business is not feasible, and if the IRR = discount rate means it is in BEP.

<table>
<thead>
<tr>
<th>No.</th>
<th>Business Type</th>
<th>IRR Value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bottom Longline</td>
<td>25.88</td>
</tr>
<tr>
<td>2</td>
<td>Gill Nets</td>
<td>-23.51</td>
</tr>
<tr>
<td>3</td>
<td>Purse Seine</td>
<td>30.15</td>
</tr>
</tbody>
</table>

The B/C ratio of the Bottom Longline boat obtained from the above data is 1.21. This means that every rupiah spent will result in the income of 1 rupiah 21 cents. Whereas in the Purse Seine, the value is 1.29, which means that every rupiah of the costs incurred will gain an income of 1.29 cents. On the results of the study, the value of B/C is greater because the income obtained per year is also greater. It can be seen that the B/C ratio in the Bottom Longline and Purse Seine fishing business more than 1 therefore it means that the business is feasible to run and can be continued. The B/C ratio is assessed by comparing the benefits and costs within 5 years. For Gill Nets fishing business, it has a value below 1, which is 0.41 so that the business cannot be considered feasible. If the B/C ratio is more than one, then the business is feasible and can be continued, if the B/C ratio is equal to one then the business is at break-even point and if the B/C ratio is less than one then the business is not feasible and cannot be continued.
Table 10 – B/C value on Bottom Longline, Gill Nets and Purse Seine fishing business

<table>
<thead>
<tr>
<th>No.</th>
<th>Business Type</th>
<th>PP Value (Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bottom Longline</td>
<td>2.50</td>
</tr>
<tr>
<td>2</td>
<td>Gill Nets</td>
<td>6.50</td>
</tr>
<tr>
<td>3</td>
<td>Purse Seine</td>
<td>2.30</td>
</tr>
</tbody>
</table>

The Pay Back Period (PP) value of the Bottom Longline fishing business obtained from the above data for 2 years 6 months 0 days. While in the Purse Seine business for 2 years 3 months 18 days. If the value of PP is less than 3 years, it means that the rate of return on the Bottom Longline boats can be considered fast. The period is used to recoup investment expenses (initial cash investment) using cash flow. In other words, the Payback Period is the ratio between the initial cash investment and the cash inflow which results are units of time. According to Ernaningsih (2008), Payback Period is the rate of return on capital or the length of time used to cover up the original investment costs. The faster the return on investment in a business, the better the business pattern because the capital flows more smoothly. The return period is usually expressed in per year span.

CONCLUSION

Economic aspects based on research from income variables with a value of Rp6,825,000,000/year for Bottom Longline boats, Rp3,450,000,000/year for Gill Nets boats and Rp5,130,000,000/year for Purse Seine boats.

The results of the financial analysis of Bottom Longline fishing business using discounted criterion calculations can be considered feasible and can be continued because the NPV value is Rp729,476,021. (NPV = positive), the IRR is 25.88%. (IRR> i), B/C ratio 1.21 (> 1), PP for 2 years, 3 months, 18 days, while financial analysis of Purse Seine fishing businesses can also be said to be feasible and can be continued because the NPV value is Rp860,746,527 (NPV = positive), IRR of 30.15% (IRR> i), B/C ratio of 1.29 (> 1), PP for 2 years, 3 months, 18 days. For the Gill Nets, they suffered losses and considered not feasible to continue their business.

REFERENCES

DOI 10.18551/rjoas.2019-04.06

STATUS AND MANAGEMENT OF SENGGARINGAN FISH (MYSTUS SINGARINGAN) AS FISHERIES RESOURCES: A CASE STUDY AT THE KLAWING RIVER, PURBALINGGA DISTRICT, CENTRAL JAVA OF INDONESIA

Pramono Taufik Budhi*
Faculty of Fisheries and Marine Sciences, University of Jenderal Soedirman, Purwokerto, Indonesia

Arfiati Diana, Widodo Maheno Sri, Yanuhar Uun
Faculty of Fisheries and Marine Science, University of Brawijaya, Malang, Indonesia

*E-mail: tb1pram@yahoo.com

ABSTRACT
This study aims to find out the status and management of Senggaringan fish as resources in the Klawing River, Purbalingga District, Central Java, Indonesia. Research method employed was in-depth interview method using open questionnaires related to the use of aquatic and fish resources. The results have showed that there was a conflict of interest in the utilization and management of the Klawing River by various parties including farmers, fishermen, industry, and local/central government. Conflicts of interests that are not managed properly are a threat to existing aquatic ecosystems and fish resources. Senggaringan fish has potential of benefits for the surrounding community, both for the economic benefit and nutrients benefit. However, senggaringan fish are often exploited by unsustainable and environmentally unfriendly consumption. Various activities on the Klawing River are thought to cause water conditions and the senggaringan fish population to deteriorate. Considering the status and the potential of senggaringan fish, various co-management efforts, monitoring water quality, fishing method at regular intervals, restocking, and domestication need to be done.

KEY WORDS
Mystus singaringan, Klawing river, management, water.

The Klawing River is one of the tributaries of the Serayu River located in Purbalingga District, Central Java Province, Indonesia. The Klawing River reaches 55.5 km in length, the width reaches 15.6-47.3 m and the depth is 0.65-2.16 m (Suryaningsih et al., 2018). Currently, the Klawing River is undergoing functional changes for various activities, such as agriculture, fisheries, tourism, mining, and industry. Agricultural activities are facilitated by the construction of dam in Slinga Village, which is located near the middle part of the Klawing River, in 2010-2012 to irrigate 6696-hectare paddy fields. In addition, sand and stone mining activities, traditionally and modernly, are increasingly intensive using sand suction pumps. Other various types of industries have also established in the downstream along the river. Fishing activities have become more intensive as well.

Activities that utilize river waters certainly have a negative impact, directly or indirectly, on the aquatic ecosystems and fish diversity (Fithra and Siregar, 2010; Samitra and Rozi, 2018). In the meantime, ichthyofauna diversity in the Klawing River is still very limited. Suryaningsih et al (2018) have reported that from upstream to downstream area, there are 18 species and 11 families in the Klawing River. Whereas, Pramono et al. (2018) have reported that there are 13 species, 7 families, and 13 genus in the downstream area of the Klawing River. Moreover, species found are invasive alien species, such as gourami (Osphronemus gouramy), suckermouth catfish (Hypostomus plecostomus) (Pramono et al., 2018), tilapia (Oreochromis mossambicus, Oreochromis niloticus), and guppy (Poecilia reticulata) (Suryaningsih et al., 2018). This scientific information is a database of diversity of fish resources in the Klawing River.
One of fish species that has economic value in the Klawing River is senggaringan fish (Mystus singaringan) from Bagridae family (Pramono et al., 2018). Senggaringan fish catch (Mystus singaringan) in the Klawing River has been recorded since 2012 to 2016, reaching 98.56 tons (38.80%) of the total catch of 254 tons (Fisheries and Food Security Agency of Purbalingga Regency, 2018). However, based on the interview with fishermen, senggaringan fish is currently very difficult to catch in the Klawing River. The consumption of fish from the genus Mystus, from small to large size, also occurs in several places, such as the consumption of Mystus Cavasius in India (Garg et al., 2013) and Mystus Bleekeri (Naeem and Ishtiaq, 2011; Naeem et al., 2012). Mystus tengra, and Mystus Cavasius in Pakistan (Akhter et al., 2017). The ongoing fishing activity of senggaringan fish is feared to cause population extinction in nature.

Seeing the condition of Klawing River and considering the importance of senggaringan fish as resources, it is necessary to conduct a study on the status and management of senggaringan fish in the Klawing River. This study is expected to help the course of senggaringan fish management and conservation and its sustainable consumption in the future.

**METHODS OF RESEARCH**

This research was conducted in Purbalingga District, Central Java Province, Indonesia. The focus of the research study is the Klawing river area which is administratively included in the districts of Purbalingga.

This research was conducted using qualitative methods and the data were obtained through literature study, field observation, and in-depth interview. In-depth interview employed open questionnaires to informants who master the issue in the management of aquatic and fish resources in the Klawing River. Contributing stakeholders were still limited to the Fisheries and Food Security Agency of Purbalingga District and river users including fishermen, fishing communities, sand and stone miners, and community leaders.

The main components in the open questionnaire included (1) legal or regulatory system implemented in resources management; (2) business systems and resources utilization; (3) conservation efforts and activities: (4) local wisdom; (5) management model and (6) conflicts of interest.

**RESULTS AND DISCUSSION**

Study on senggaringan fish has been conducted both in terms of ecology, habitat, eating habits, genetics, and reproduction. Senggaringan fish generally live in slow-flowing rivers (0.08-0.16 m/s), in the bottom of shallow waters or deep waters. The basic substrate is usually a mixture of sand, gravel, and rocks, sometimes overgrown with moss (Sulistyo and Setijanto 2002). Heltonika (2009) has reported that there is a close relationship between the composition of food types and the level of gonadal maturity. For reproduction process in nature, senggaringan fish tend to choose foods such as Gastropod because it contains cholesterol, although the amount of cholesterol is unknown. Energy deposits for gonadal maturation are stored in several organs, such as dorsal muscles, adipose fin, liver, and viscera. Senggaringan fish experience gonadal maturation for the first time when their size reaches 14.89 cm.

Pramono (2010) has also made a report on the reproductive profile of senggaringan fish for one year in which there were four peak values of the Gonad Somatic Index (GSI) in January, July, August, and November. The potential of ovum to be ovulated in July and August was marked by an increase in reproductive hormones. Taxonomic confirmation has been conducted by Pramono et al., (2017) as well. Scientific name of senggaringan fish, which was used to be Mystus nigriceps, now becomes Mystus singaringan (Figure 1). The result of preliminary research on genetics have showed that senggaringan fish in the Klawing River have no polymorphism or in other words, have low diversity (Pramono et al., 2018). The absence of genetic diversity is thought to affect the stability of the population.
The legal and regulatory instruments and other instructions implemented by the Fisheries and Food Security Agency of Purbalingga Regency in the management of natural resources both in waters and fisheries are:

- Law Number 4 of 1982 concerning Basic Provisions for the Management of the Living Environment;
- Law Number 5 of 1990 concerning Conservation of Natural Resources and Ecosystems;
- Law Number 31 of 2004 concerning Fisheries;
- Republic of Indonesia Government Regulation Number 29 of 1986 concerning Analysis of Environmental Impacts;
- Instruction of The Governor of Central Java No 523/173/1986 dated to May 26, 1986 regarding Prevention/Prohibition of Businesses/Actions that result in Pollution/Damage to Fish Resources in Public or Marine Waters in Central Java Province;
- Instruction of The Regent of Purbalingga No 523-575/1993 dated to October 19, 1993 concerning Prevention/Prohibition of Businesses/Actions that result in Pollution/Damage to Fish Resources in Public Waters in Purbalingga District.

Table 1 – Excerpts of Resources Management Laws and Regulations

<table>
<thead>
<tr>
<th>Laws and Regulations Implemented</th>
<th>Excerpts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter XV Article 84 paragraph 1 of Law Number 31 of 2004</td>
<td>A person who intentionally catches and/or cultivates fish in the fisheries area of the Republic of Indonesia by using chemicals, biological materials, explosives, tools and/or their environment as referred to in article 8 paragraph 1, shall be sentenced to imprisonment not to exceed 6 (six) years and a fine not to exceed Rp. 1,200,000,000 (one billion two hundred million rupiahs)</td>
</tr>
</tbody>
</table>
| Chapter VII Article 22 of Law Number 4 of 1982 | Anyone who intentionally commits an act that causes damage to the environment which is regulated in this Law or other Law, may be imprisoned for a term not exceeding 10 (ten) years and/or fined not exceeding Rp. 100,000,000 (one hundred million rupiahs) (Paragraph 1).
Whosoever, because of negligence, commits an act which causes damage to the environment which is regulated in this Law or other Law, shall be punished by imprisonment not exceeding 1 (one) year and/or a fine not exceeding Rp. 1,000,000 (one million rupiahs) (Paragraph 2) |
| Chapter VII Article 27 of Law Number 4 of 1982 | Whosoever violates the provisions stipulated in the article 4 (Fish Resources Management) shall be punished by a fine not to exceed Rp. 25,000,000 (twenty-five million rupiahs) (Paragraph 1).
Whosoever violates the provisions stipulated in the article 20 (Prohibition of Exports and Imports of Fish Species) shall be punished by a fine not to exceed Rp. 5,000,000 (five million rupiahs). (Paragraph 2). |

The implementation of laws and regulations relating to the utilization of the aquatic environment, natural resources, and fish resources has been persuasively introduced to the public. In the laws and regulations implemented, there are clearly punishments, sanctions, or criminal provisions for proven actions. Table 1 is list of excerpts of punishments / sanctions/criminal provisions in the laws and regulations implemented.
Commercial fishing is run by fishermen on their own, either using fish traps, fishing rods, or cast nets. The fish caught are sold to collectors or restaurants that provide specific menus for freshwater fish and sold to other parties or markets in ready-to-eat form. The price of fish varies. For cyprinid fish or fish from the Cyprinidae family, the price ranges from Rp. 20,000-25,000/kg. The price of baung fish (*Mystus nemurus*) and senggaringan fish from Bagridae family ranges from Rp. 30,000 to 40,000 / Kg.

Other commercial activities that utilize the Klawing River are sand and stone mining. Sand and stone miners are companies or individuals who have obtained mining permits from relevant agencies for 3 years. However, there are also illegal mining activities. On average, one village on the riverbank of the Klawing River has 2 to 5 mining mines. Many fishermen change profession as sand miner. The mining itself is run traditionally. Sand is taken from the Klawing River in a boat (± 4 m³) and sold for Rp. 80,000 to the depot on the riverbank of the Klawing River.

Conservation efforts that have been made by Fisheries and Food Security Agency regarding the use of aquatic and fish resources are campaign to community, especially fishermen community, by holding activities to foster management of capture fisheries. The campaign provided includes the prohibition on the use of explosive devices, chemical and electrical shock, and the use of other fishing gears that may endanger the conservation of biological resources in public waters. Fisheries and Food Security Agency also campaigns for laws and regulations related to the utilization of aquatic and fish resources. In addition, the community is also given an understanding of damage and pollution of the environment of fish resources.

The damage of the environment of fish resources is an environmental condition of fish resources in a particular water body that has undergone physical, chemical and biological changes, so that it does not function as a place to live, forage, breed, or shelter for fish resources, because it has experienced interference in such a way as a result of the actions of a person or legal entity. Meanwhile, environmental pollution of fish resources is emphasized on the penetration or inclusion of living things, substances, energy and/or other components into the environment of fish resources so that the environmental quality of fish resources declines to a certain level and causes the environment of fish resources to be unable to function according to its designation.

Another effort by Fisheries and Food Security Agency is to restock fish in the river with fish from cultivation. The types of fish restocked into the rivers are bonylip barb, silver barb, and tilapia. Restocking activities is funded by the Agency of Marine and Fisheries of Central Java Province.

Local people usually catch fish according to seasonality calendar and *wetonan* cycle, a cycle which superimposes the five-day *pasaran* cycle in the Javanese calendar with the seven-day week cycle in the Gregorian calendar. The fishermen already know that the first seasonality in the Javanese calendar, or from July to August, is the spawning season. During those times, almost all fish, including senggaringan fish, spawn. Fishermen will not catch fish on *Selasa* (Tuesday) *Kliwon* and *Jumat* (Friday) *Kliwon*. Other local wisdom is the annual the Klawing Festival, held in Kedungbenda Village in the downstream before the meeting point of Klawing River and Serayu River. The activity during the festival is to do *larung perahu*, in which all households of Kedungbenda Village donate one *ketupat* (rice cake) and a small bag of fish from the catch in the Klawing River to eat together and to be served to visitors.

Management model developed by the Fisheries and Food Security Agency is to form *Kelompok Pengawas Masyarakat* (*Pokwasmas*) or Community-based Supervisory Group. This supervisory group is actually a group of fishermen in each village along the Klawing River. There were 31 supervisory groups listed. The model developed is co-management (joint management) where supervisory groups are given trust in maintaining, utilizing, and managing waters. The Fisheries and Food Security Agency also grants supervisory groups business capital assistance in the form of boats and cast nets.

The supervisory groups are asked to monitor and report the events or practices of environmental destruction and illegal fishing. The level of participation of supervisory groups is relatively high. The occurrence of deaths of several types of fish in the Klawing River have
been once reported to the Fisheries and Food Security Agency. At first the fish swam down slowly, then they floated in the waters. The supervisory groups suspect that there is waste pollution in the river, because if it is due to fishing activity with poisons, the fish will not show such symptoms. Unfortunately, the report has not been followed up by the agency. This is understandable as supervisory groups know about limited cross-sectoral scope and inter-sectoral conflicts of interest within the regional government.

Cross-sectoral conflicts of interest occur within regional and central government agencies. The construction of the Slinga dam in the central part of the Klawing River to irrigate paddy fields, which was funded by state budget, resulted in habitat fragmentation. This habitat fragmentation will inevitably prevent fish from looking for food and affect the distribution, reproductive behavior, and colonization of various fish species. In long term, it will accelerate the extinction of the remaining species.

The value system developed in the management of fish resources in the Klawing River includes 3 aspects:

- Economic Value. Conservation of fish resources is expected to practically provide many possible economic values that can be realized as income for fishermen and the fulfillment of sustainable sources of protein;
- Educational Value. Conservation of fish resources can provide future generations an access to learn more about biodiversity, ecosystems, and aquatic biota communities;
- Scientific Value. Public water ecosystems that are maintained are expected to be utilized for scientific research and other scientific purpose in the future. The results of scientific research are expected to provide ecological guidance that can be used as a basis for policy in environmental management.

DISCUSSION OF RESULTS

Statistically, the status and potential of senggaringan fish are relatively large, reaching 98.56 tons in 2012-2016 period. Based on primary observation, the abundance of senggaringan fish is very low and according to the fishermen, senggaringan fish have also begun to be rarely caught. Suryaningsih et al. (2018) have caught 5 senggaringan fish in the middle part of the Klawing River and 7 senggaringan fish in the lower part. The research result of Pramono et al. (2018) has showed that senggaringan fish have no polymorphism or genetic diversity. This is suspected to affect the stability of its population in the Klawing River.

In general, legal protection for the management of fish and water resources is adequate. However, those legal protections, such as Law Number 45 of 2009 concerning amendments to Law Number 31 of 2004 and Government Regulation Number 60 of 2007 concerning Conservation of Fish Resources, lack renewal. The management of aquatic and fish resources is no longer centralized in the central government, but has been decentralized as an obligation for regional or municipal government, although the latest local regulations and regulatory systems that characterize decentralized sustainable management are still not perceptible. The implementation of the laws and regional regulations of Purbalingga Regency, especially at institutions or agencies that support the management of aquatic and fish resources, still needs to be studied scientifically.

Excavation type C mining, which is sand and stone mining, is increasingly damaging senggaringan fish habitat in the Klawing River because senggaringan fish are very fond of shallow or deep water habitat protected by sand, gravel, and rocks as basic substrates. Sand and stone mining activities also occur in the Kampar River in Riau (Fithra and Siregar, 2010) and the Kelingi River in Lubuklinggau (Samitra and Rozi, 2018). Indeed, type C mining activities change and decrease fish diversity. This is evident in the Kampar River in Riau, in which there were 160 species of fish in 1995, but then the number of species reduced by 52% and left only 83 species in 2003 (Agency of Marine and Fisheries of Riau Province, 2003). Economic valuations due to damage to resources is likely need to be done. Damage to aquatic resources does not only cause the extinction of a population but also results in the loss of sources of protein and community income (Wargasasmita, 2005).
Conservation of fish resources through restocking has been relatively good to increase fish production in the Klawing River. However, restocking actually contradicts the Regulation of the Minister of Maritime Affairs and Fisheries Number 41 of 2014. The contradiction lays on types of tilapia which are stocked in the waters. The Regulation of the Minister of Maritime Affairs and Fisheries Number 41 of 2014 states that tilapias (*Oreochromis niloticus*, *O. mossambicus*) are invasive alien species. The categorization of tilapia as invasive alien species has been also stated earlier by Wargasasmita (2005), Rachmatika, and Wahyudewantoro (2006). Wargasasmita has stressed that the increase in fish production in a water body is very much determined by the productivity of the waters, not by the introduction of alien fish. Purwono (2001) has reported that article 8f of biodiversity convention states that each country is obliged to avoid the introduction of invasive alien species which will cause environmental impacts and damage to the biodiversity of native species.

The presence of tilapia which is stocked in the waters has the potential to impact native fish species in the Klawing River in term of space, food, and others. Sentosa et al. (2013) have reported a risk potential assessment of tilapia stocked in Lake Beratan in Bali which reached a value of 13 from a maximum value of 16. The impact of risk reached a value of 41 from a maximum value of 61 and ecological risk reached a value of 54 from a maximum value of 77. Wargasasmita (2005) has stated that the greatest risk is feeding and habitat competition between native fish species and introduced fish species. However, in general, any type of fish that is introduced into public waters has significant ecological value. The thing that sets it apart is the level of risk. Sentosa and Wijaya (2013) have also emphasized that the introduction of fish should not be carried out without prior research concerning the potential impact of the introduction of fish on native fish in an aquatic area. Some of the factors that cause declining diversity and communities of fish in public waters include habitat change, over-exploitation, introduction of invasive alien species, pollution, competition for water use, and global warming (Dudgeon, 2000).

The local wisdom of the fishermen is relatively good. They do not catch fish during the spawning season and it is really a wise practice from the fishermen. Other forms of local wisdom that can help the fishermen to catch fish with certain size may need to be initiated. This is because small fish, which are called *ikan lembutan* by local people, are often unintentionally caught while catching certain target species and target sizes of fish.

The development of the co-management of aquatic and fish resources in the Klawing River which was initially instructive from the local government has now developed into a community-based participation in the form of the Community-based Supervisory Group. Co-management between the beneficiary community and the Fisheries and Food Security Agency in the case of Klawing River is still far from the concept, practice and sustainability, because there is still an imbalance in the role distribution. On the one hand, the community has been active in supervising and reporting the death of large number of fish, but on the other hand the, the Fisheries and Food Security Agency of Purbalingga Regency has not been able to follow up the report. This is because there is still a conflict of interest between the Fisheries and Food Security Agency and other agencies and the private sector in the utilization of resources.

The implementation of co-management must be extended to the participation of other stakeholders (Partomo et al., 2011). Nasution et al. (2014) have stated that in developing a co-management system for fish resources, it is necessary to involve broader stakeholders, such as central government, local governments, companies, and fishing communities. Borrini-Feyerabend et. Al. (2000) have defined co-management as a situation where more than one party negotiate to define and guarantee the distribution of roles between them in managing and take responsibilities for an area or system of resources.

**CONCLUSION AND RECOMMENDATIONS**

The population of *M. singaringan* fish has declined. However, they have the potential to be domesticated in the context of restocking and conservation. Resource management
of *M. singaringan* in Klawing River needs to involve stakeholders according to their level of importance and influence.

**ACKNOWLEDGEMENTS**

We would like to thank the Ministry of Research, Technology and Higher Education of the Republic of Indonesia for the scholarship support.

**REFERENCES**


DOI 10.18551/rjoas.2019-04.07

STUDY OF THE DURATION AND IMMERSION DEPTH OF PURSLANE WEEDS AT GERMINATION TEMPERATURES OF 30C AND 40C AGAINST THE VIABILITY OF PURSLANE (PORTULACA OLERACEA L.) SEEDS

Abdullatif Zauzah*, Melati Rima
University of Khairun, Ternate, Indonesia
*E-mail: zauzahlatif@gmail.com

ABSTRACT

Purslane weeds growth control can be conducted preventively since germination stage. This study aims to determine the duration and immersion depth of purslane weeds to find information about the seeds’ viability at different germination temperatures. The research observed two factors, namely the durations of immersion at 2, 4, 6, And 8 weeks, and the depths of immersion at 0, 5, 10, and 15 cm. The experiment method and germination test used randomized factorial design with three repetitions and were continued with least significance difference (LSD) test. The results of the research showed that the interaction between the duration and the immersion depth of purslane weeds significantly affected the germination percentage, germination rates, and germination synchronization at the temperatures of 30C and 40C. The longer and the deeper the seeds immersed, the lower the viability of the purslane weeds seeds was. The growth control of purslane weeds can be conducted by reducing the seeds germination.

KEY WORDS

Purslane, immersion, seeds, viability.

Weeds pose as competitors for cultivated crops in the acquisition of nutrients and can threaten the productivity of crops by as much as 16-80%. Weed growth control needs to be performed to minimize the decrease of crop productivity. Weed control can be carried out by considering the composition, the density, and the immersion of weed seeds (Siahaan et al., 2014). In addition, the ecology and biology of weeds and their effects are the basis for the study in weed control, requiring thorough observation (Paiman, 2012). A study on the immersion duration and depth of purslane seeds needs to be done to determine the potential of germination as the initial growth of weeds.

Purslane is a dry land weed that grows well in open areas and can decrease the productivity of local Topo onion (Soamole et al., 2018). One of the properties possessed by weeds in general is the ability to survive and regenerate. Purslane's survival strategy is characterized by the production of many seeds and vegetative organs that are able to grow and develop in critical environmental conditions (Proctor et al., 2011). Purslane weeds can produce approximately 135,917 seeds from one individual plant in one season with 50% water availability. Purslane has succulent stems that have the ability to survive in water shortage (Abdullatif, Z., 2016). The abundance of seed production makes this plant spread quickly and can easily control agricultural land. In addition, the dormant seeds of purslane seeds last a short period of time which means they only require three days to germinate again.

The study of purslane weed's ability in utilizing existing resources to complete their life cycle, starting from the viability of seeds and growth, as well as the influence of other factors that interfere with their growth is necessary. The essence of purslane weed control is to suppress the growth of purslane seeds during germination, so that it can inhibit growth. One method of preventive control is to assess the depth of the purslane seed bank, assuming that the deeper the seeds are embedded the more the chance for purslane growth to be inhibited. As explained by Munthe et al. (2016), the more Eleusine indica L. Gaertn weed seeds are immersed, the fewer the number of seeds grow. Eleusine indica L. Gaertn weed seeds are resistant biotypes and paraquat sensitive biotypes at different depths, which tend to show
decreasing amounts of sprouts at deeper depth (Tampubolon et al., 2014). Seed plants growing around secondary forest in Unmul Samarinda are classified as weed plants which commonly thrive more at 0-5 cm depth compared to other types of weed seeds growing at 5-15 cm depth (Azizah et al., 2015).

Purslane also has a different range of germination temperatures like any other weeds. Cressocephalum crepidioides, Conyza canadensis, and Ageratum conyzoides have a temperature range that allows high germination percentage, which are between 15°C and 30°C, with germination for A. Conyzoides inhibited at 35°C (Yuan and Wen, 2018). Increasing the temperature from 25°C to 35°C improves the percentage of germination of T. portulacastrum from 65% to 85% (Tanveer et al., 2013). Meanwhile, Abutilon theophrasti germinates at temperatures between 10C to 40C and the germination is significantly affected by the immersion depth with germination percentages of 78.1-85.6% and planting depth of 1-4 cm (Xiong et al., 2018).

MATERIALS AND METHODS OF RESEARCH

The experiment was carried out in the experimental garden of the Faculty of Agriculture at Khairun University and the germination test was conducted at the Laboratory of the Faculty of Agriculture, Khairun University, from August to December 2018. The treatment consisted of two factors. The first factor was the duration of planting of purslane seeds in the soil (W), which was divided into 2, 4, 6 and 8 week periods and the second factor was the depth of the soil surface (K), consisting of 0, 5, 10 and 15 cm depth observations. The combinations of treatment were 16 treatments which were repeated 3 times using randomized factorial design. Analysis of variance was used to determine the real effect of each combination of treatment and was continued with the smallest real difference using the GenStat software 12.1. The material used was purslane seeds that had been prepared in the experimental garden with a criterion of the seeds being ripe, marked by the shiny black color of the seeds. Other important materials in this study were the seed bags and filter papers for sprout test. The tools used were germinator, thermometer, Petri dishes, and tweezers.

The soil was hoed according to the immersion depth treatment. The seeds were immersed according to the treatment marked with treatment labels tied to the end of the seed bags. The germination test was carried out periodically according to the treatment treated previously at 30C and 40C germination temperatures. Germination was tested using the Paper Test method. Petri dishes with a diameter of 12 cm were coated with 3 sheets of round shaped filter papers. A hundred (100) seeds were spread in each cup and repeated 3 times. The petri dishes were closed and placed inside a germinator. The observed variables consisted of percentage of seed germination (%), germination rates, and germination simultaneity/synchronization (%) using formulas based on Sutopo (2014).

Germination percentage calculated from day 3 to day 14.

\[
\text{Germination Percentage} = \frac{\text{Total normal germination}}{\text{Total tested seeds}} \times 100\%
\]

Total days until the appearance of radicle or plumule:

\[
\text{Germination rate} = N_{1T1} + N_{2T2} + \ldots \ldots \ldots \ldots N_{iT_i} \text{ Total germinating seeds}
\]

Where: \(N=\) Total germinating seeds in a certain time measurement; \(T=\) Total time between the beginning of test to the end of certain interval in an observation.

The ability of a seed to germinate simultaneously after a certain period of germination and is calculated by the percentage of normal sprouts growing vigorously in a day between observation times 1 and 2 in the germination level test, which are the first observation time (3 days after planting) and the second observation time (11 days after planting). Criteria for sprouts with perfect growth were characterized by well-developed roots, stems, cotyledons of
leaves, and shoot buds which are stronger than normal seeds, with formula as follow (Sadjad, 1993).

\[
\text{Simultaneous germination rate} = \frac{\text{Total strong germination}}{\text{Total germinated seeds}} \times 100\%
\]

**RESULTS AND DISCUSSION**

The results showed that the immersion duration and depth of purslane seeds had a significant effect on the percentage of germination, germination rates, and synchronization/simultaneity of germination on purslane seeds. Germination at 30°C is presented in Table 1.

Table 1 – The interaction between Immersion Duration and Depth of Purslane Seeds in Soil Germinated at 30°C Temperature and Germination of Purslane Seeds

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Immersion Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>K1 (0 cm)</td>
</tr>
<tr>
<td>Immersion Duration</td>
<td>Germination Percentage</td>
</tr>
<tr>
<td>W1 (2 weeks)</td>
<td>7.00</td>
</tr>
<tr>
<td>W2 (4 weeks)</td>
<td>22.00</td>
</tr>
<tr>
<td>W3 (6 weeks)</td>
<td>40.33</td>
</tr>
<tr>
<td>W4 (8 weeks)</td>
<td>96.67</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td>8.11</td>
</tr>
<tr>
<td>Immersion Duration</td>
<td>Germination Rates</td>
</tr>
<tr>
<td>W1 (2 weeks)</td>
<td>7.07</td>
</tr>
<tr>
<td>W2 (4 weeks)</td>
<td>8.37</td>
</tr>
<tr>
<td>W3 (6 weeks)</td>
<td>8.94</td>
</tr>
<tr>
<td>W4 (8 weeks)</td>
<td>9.76</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td>1.30</td>
</tr>
<tr>
<td>Immersion Duration</td>
<td>Simultaneous Germination (%)</td>
</tr>
<tr>
<td>W1 (2 weeks)</td>
<td>4.00</td>
</tr>
<tr>
<td>W2 (4 weeks)</td>
<td>9.00</td>
</tr>
<tr>
<td>W3 (6 weeks)</td>
<td>19.67</td>
</tr>
<tr>
<td>W4 (8 weeks)</td>
<td>43.33</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td>5.22</td>
</tr>
</tbody>
</table>

Notes: Average figures in the same column followed by the same upper-case letters and in the same row followed by lower-case letters showed no significant difference in the LSD 0.05 test.

The 2 and 4 week immersion durations did not show any significant difference against the percentage of germination of purslane seeds in all immersion depths, while the lowest percentage of germination was at 2 weeks immersion duration and all immersion depths. The 6 and 8 weeks immersion durations gave a different effect compared to the other depths, reaching the highest percentage at 40.33% (6 weeks) and 96.67% (8 weeks). The deeper the immersion, the smaller the percentage of germination. Conversely, the longer the duration, the greater the percentage of germination at a depth of 0.5, and 10 cm. Purslane seeds in 15 cm depth and 2 weeks of immersion gave the lowest percentage (3.33%), while the germination rate in 5 cm depth with 4-6 weeks immersion was not significantly different. However, there was a significant difference between seeds with 2 week immersion and 0 cm depth with the lowest value. Seeds in 10 and 15 cm depths showed the highest germination rates. Seeds with 4 week immersion at all depth levels showed the same effect in both treatments. Seeds in 6 week immersion at a depth of 5 cm showed the highest germination rate and it was different with the seeds immersed at the depth of 15 cm which had the
smallest germination rate. Seeds in 8 week immersion showed the same germination rate at all immersion depth levels. The longer the seeds were buried at 0-15 cm depth, the longer the time needed to germinate. Likewise, the rate of germination would be fast if the seeds were in the depths of 10 cm with a shelf life of 2 weeks (Table 1).

The duration and the depth of immersion showed that purslane weeds exposed above the ground at 0-5 cm depth for 8 weeks and germinated at 30C had a high germination percentage at 90-95% with a fast germination rate (germination time of about 9 days) and synchronization level of 43-56% at depths of 0 and 5 cm. The synchronization of germination below 40% was less vigorous, while that of above 70% had high vigor. The greatest synchronization level was at 4 weeks immersion on the ground surface of 0 cm (43.33%), and 10 cm depth (56%). Seeds with simultaneous germination at a temperature of 30C were classified as seeds with less vigor.

Purslane seeds that were stored for a long time in the soil have higher viability which was characterized by percentage, rate, and simultaneity of germination. The length of immersion in soil was influenced by the viability of germination of weeds at 30C. Purslane seeds have a long dormant nature when immersed in the soil for a long period of time. This condition occurs because other germination factors such as light and oxygen are not met. This study is similar to previous studies on Cereus pernambucensis seeds that cannot germinate maximally when germinated in dark conditions (Socolowski et al., 2010). The seeds with the highest germination rate was Moringa oleifera seeds at night/day temperatures of 20/30C (Muhl et al., 2011).

The results of variance test showed that there was a significant effect on the previous treatment and the immersion depth of purslane weed seeds at 40C temperature to germination percentage, germination rates, and germination simultaneity.

Purslane seeds that were planted at 40C temperature with a duration of 2 weeks in 10 cm and 15 cm depths showed the lowest percentage of germination, respectively at (13.67%) and (11.33%). The highest percentage of germination was yielded by seeds planted for 8 weeks in 0 cm (98.67%), 5 cm (98.33%), and 10 cm (98.00%) depths. Contrastingly, in 15 cm depth and 4 week duration, the germination rate was not different from that of 8 weeks. The germination rate at 40C showed that 2 weeks of immersion with a depth of 5 cm treatment resulted in the lowest germination rate. Immersions at 2, 4 and 8 week durations in the depth of 0 cm were not different from that of 15 cm depth. Seeds at 15 cm immersion depth resulted in the longest lasting germination rate (12.18). The deeper the immersion of seeds in the soil, the longer the germination rates, which was indicated by the significant number of germination rates (Table 2).

The lowest rates of germination synchronization were obtained from seeds with immersion duration of 2 weeks in all immersion depths. Most of the synchronization rates were above 40% synchronization value. The biggest simultaneous germination rate was above 70% at 8 weeks of immersion duration with 5 cm (80.33%) and 10 cm (73.67%) depths. Simultaneous germination rates with value above 70% showed that seeds had strong growth vigor. Thus, it can be stated that the temperatures affected and could increase the germination of purslane seeds.

Germination at a temperature of 40C resulted in increased percentage of germination rate by 98% in the depth of 0-10 cm and 69% in the depth of 15 cm. Considering that purslane seeds have a planting depth limit to germinate, any increase in the depth of precipitation can potentially reduce the percentage of germination, the rate of germination, and the simultaneity of germination. The depth of seed immersion causes secondary dormancy because of germination factors such as light and soil temperature are not fulfilled. There are similar studies, such as the study on Crotalaria brevidens seeds which showed that each increase in planting depth caused a decrease in the number of seeds appearing per day (Opande et al., 2017), the depth of the immersion in Convolvulus arvensis L. (Asgharipour, 2011), and germination of Ceratocarpus arenarius with a minimum system/without immersion could accelerate germination (Ebrahimi and Esami, 2011).

The germination rate increased in all treatments which showed that the longer the seeds were planted, the higher the increase of germination rate was. Therefore, it can be
concluded that purslane seeds are seeds that have a long lasting dormant ability in the soil. The dormant phase will end if the seed is on the ground up to 15 cm deep. Purslane seeds can last long and are viable in soil and above the ground. However, the storage/immersion duration in the soil is influenced by the temperature at the time of germination with an indicator of increasing germination viability. Thus, it can be said that purslane seeds exposed to sunlight with weather fluctuations that change day and night, while the soil temperature on the surface ranges from 29-45C for 0-8 weeks are still able to germinate with sprouts percentage of 7% at temperature (30C) and will be able to reach an increase in germination rate to 45.33% at 40C temperature.

Table 2 – Interaction between Immersion Duration and Depth of Purslane Seeds in Soil Germinated at 40C Temperature and Germination of Purslane Seeds

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Immersion Duration</th>
<th>K1 (0 cm)</th>
<th>K2 (5 cm)</th>
<th>K3 (10 cm)</th>
<th>K4 (15 cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1 (2 weeks)</td>
<td>45.33</td>
<td>b</td>
<td>36.33</td>
<td>b</td>
<td>13.67</td>
</tr>
<tr>
<td>W2 (4 weeks)</td>
<td>71.33</td>
<td>a</td>
<td>87.67</td>
<td>b</td>
<td>90.00</td>
</tr>
<tr>
<td>W3 (6 weeks)</td>
<td>97.00</td>
<td>c</td>
<td>96.67</td>
<td>c</td>
<td>72.33</td>
</tr>
<tr>
<td>W4 (8 weeks)</td>
<td>98.67</td>
<td>b</td>
<td>98.33</td>
<td>b</td>
<td>98.00</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td>13.52</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Germination Rates

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Immersion Duration</th>
<th>K1 (0 cm)</th>
<th>K2 (5 cm)</th>
<th>K3 (10 cm)</th>
<th>K4 (15 cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1 (2 weeks)</td>
<td>10.17</td>
<td>c</td>
<td>7.58</td>
<td>a</td>
<td>8.75</td>
</tr>
<tr>
<td>W2 (4 weeks)</td>
<td>11.35</td>
<td>c</td>
<td>10.55</td>
<td>ab</td>
<td>9.98</td>
</tr>
<tr>
<td>W3 (6 weeks)</td>
<td>10.88</td>
<td>a</td>
<td>10.75</td>
<td>a</td>
<td>10.96</td>
</tr>
<tr>
<td>W4 (8 weeks)</td>
<td>11.71</td>
<td>a</td>
<td>13.26</td>
<td>b</td>
<td>12.71</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td>0.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Germination Percentage (%)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Immersion Duration</th>
<th>K1 (0 cm)</th>
<th>K2 (5 cm)</th>
<th>K3 (10 cm)</th>
<th>K4 (15 cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1 (2 weeks)</td>
<td>10.33</td>
<td>a</td>
<td>10.00</td>
<td>a</td>
<td>4.67</td>
</tr>
<tr>
<td>W2 (4 weeks)</td>
<td>40.33</td>
<td>a</td>
<td>46.00</td>
<td>a</td>
<td>47.33</td>
</tr>
<tr>
<td>W3 (6 weeks)</td>
<td>59.00</td>
<td>c</td>
<td>61.00</td>
<td>c</td>
<td>39.33</td>
</tr>
<tr>
<td>W4 (8 weeks)</td>
<td>60.33</td>
<td>b</td>
<td>80.33</td>
<td>c</td>
<td>73.67</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td>7.59</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Average figures in the same column followed by the same upper-case letters and in the same row followed by lower-case letters showed no significant difference in the LSD 0.05 test.

The higher the temperature, the greater the absorption of water by the seeds and the higher the work of enzymes that remodel carbohydrates and stimulate the acceleration of germination, which affect the simultaneity of germination. The increased germination rates and simultaneity of germination make the purslane control the agricultural land quickly. The purslane seed’s immersion duration is different from the seeds of Toona sureni which only last for four weeks in the soil and after reaching 46% simultaneous germination, and after a period of two weeks immersion, seed's viability decreases by 20% (Nurhasybi, 2016).

CONCLUSION

The immersion duration and depth of purslane seeds could affect seed’s viability. The seeds which were immersed for two months in the soil still germinated with germination percentage of 98% if the seeds were to be immersed in the depth of 0-10 cm, while the viability of the seeds began to decrease at immersion depth of 15 cm. In addition, germination was also influenced by temperatures, in which at a temperature of 40C the germination rates, percentage, and simultaneity were higher than those at 30C. Because of
this, soil cultivation by reversing the soil to the surface and maintaining the temperature of the soil can accelerate the growth of purslane weeds.

REFERENCES

4. Ebrahimi, E and S. V. Eslami, 2012. Effect of Environmental Factors on Seed Germination and Seedling Emergence of Invasive Ceratocarpus arenarius, Article in Weed Research, Faculty of Agriculture, Birjand University, Birjand, Iran.
A CRITICAL ANALYSIS OF INDIAN TEXTILE INDUSTRY: AN INSIGHT INTO INCLUSIVE GROWTH AND SOCIAL RESPONSIBILITY

Pankaj Dixit*, Assistant Professor
Department of Accounting and Finance, Lebanese French University, Erbil, Kurdistan (Iraq)

Lal R.C., Professor, Dr.
Multanimal Modi College, Modinagar & Chaudhary Charan Singh University, Meerut, India

*E-mail: pdixit2989@gmail.com

ABSTRACT
Textile industry has been a symbol of India's cultural heritage, which has worked to connect the people and played an important role in their economic interests. This sector is mainly divided into several disciplines at the unorganized level, it has made its identity as a cottage industry in every state of India. In the present paper, the textile industry has been focused on inclusive development and social obligations. The main purpose of this paper is to see how the textile sector is contributing in inclusive development. In order to reach the conclusions, both primary and secondary data has been analyzed in qualitative analysis. Finding of this research reveals that the textile is contributing towards employment generation and inclusiveness but in terms of social responsibility it is not playing positive role because of its unorganized structure.

KEY WORDS
Textile industry, inclusive growth, corporate social responsibility, unorganized sector, cottage industry.

The Indian Textile Industry represents a rich and diverse spectrum of activities with the hand-woven sector on with the hand-woven sector on one end and the capital intensive mill sector on the other. The spectrum includes activities in the decentralized power looms, hosiery and knitting sectors, the handicrafts segments and also covers a wide range of fibers which include man-made fibre, cotton, silk, jute and wool. The Indian textile sector is unique in comparison to that of other countries owing to the close linkage of the industry to agriculture and also due to linkage with the culture and traditions of the country. India is the largest producer of jute in the world. It contributing India has a long tradition and culture integrated with textile. Our civilization which had progressive through vast phases has an immense contribution of textile and cottage industry. India so called a “golden bird” before foreign invaders. The reason itself lies in inclusive societies that have economic equity.

The main cause of economic inequality is rapid growth of population. Textile sector is providing employment to the people at a very large level in facing the challenges of inclusive growth in countries like India. It is one of the oldest industries in the Indian economy, which has been making its identity in the form of cottage industries for many centuries. India's aggregate textile exports in the fiscal year 2017-18 were US $ 39.2 billion. This industry is basically dependent on the raw materials produced from agriculture. India is the second largest producer of textile in the world and is the third largest producer of cotton and also the largest consumer of cotton consumption after US and China. It is providing the highest employment after agriculture sector.

In the world's leading exporters, the Indian textile sector has made a unique identity. But its unorganized structure allows it to push something backward at the technological level, mainly due to the inadequate finance capital. At present, due to cheap labor -cost in countries like Bangladesh, cost competition has increased. In every state of India, the textile is conserving its legacy as many dimensions, it is the basic needs of livelihood of people in every region of India from north to south and east to west. In the empowerment of women,
the textile is fulfilling their economic needs. Women are being financially contributing to the family by the consuming time in textile related work at home. Even girls teenager are also learning artistic textile skills and earning the money in free time after the school. So, overall it is inclusively contribute towards the socio-economic goals of the nation.

The main aim of the research is to study the textile industry through the prism of the inclusive growth and social responsibility. It investigates the role of the textile firm to achieving the inclusive development without compromising the social responsibility:

To find out the current problem and solution of unorganized textile workers;
To find out the data regarding textile this is not officially available;
To know about the social responsibility of unorganized sector for its employee welfare;
To know the environmental issues regarding textile informal sector;
To find out the contribution of unorganized sector in employment generation.

METHODS OF RESEARCH

This paper is trying to find the real meaning of inclusive growth in true manner. For this purpose, primary data and secondary data have been used in both quantitative and qualitative manner to reach the conclusion of this research. Secondary and primary data have been collected from the reliable sources. For analyzing the data, critical evaluation thoughts and SPSS tool has been used.

RESULTS AND DISCUSSION

Structure of Indian Textile Industry. Indian textile has started from small houses and now become the main stream of the economy, for the development of this cottage industry (Kuteer Udyog), the Indian government has established the ministry of textile on central level and state level & which run under the umbrella of the MSME (Micro small & medium enterprises) department. Indian textile has been divided into an organized and unorganized sector, but its unorganized structure reflects the diversity of its inclusive policies.

To develop the clothes products, textile industry follow mainly three steps as, spinning, weaving, finishing, apparel making. The participation of major textile industries are only 3% of total. In current scenario only 276 small medium and big mills are running in different region of India. This low participation of the major textile industry is due to negligence of the government.

The Sericulture and Silk Sector. In silk farming production, India stood on second place and producing 18% silk of total world production. India has the distinctive distinction of being the sole country manufacturing all the 5 noted industrial silks, namely, mulberry, tropical tasar, oak tasar, eri and muga, of that muga with its golden yellow glitter is exclusive. Mulberry sericulture is especially practiced in 5 states specifically, Karnataka, province, Assam and Bodoland, province, Jharkhand and state are major silk manufacturing states within the country. North East has the distinctive distinction of being the sole region manufacturing four styles of silk viz., Mulberry, Oak Tasar, Muga and Eri. Overall NE region contributes eighteenth of India's total silk production. India is that the second largest producer of silk within the world. Among the four styles of silk made in 2015-16, Mulberry accounts for seventy one.8% (20,434 MT), Tasar 9.9% (2,818 MT), Eri 17.8% (5,054 MT) and Muga zero.6% (166 MT) of the entire raw silk production of twenty eight,472 MT. The demand for superior quality bivoltine silk is increasing in Asian country for domestic consumption moreover as price other silk product for the export market. The Ministry of Textiles Government, Departments of Sericulture in numerous states offer technical and monetary help for enhancing the bivoltine silk production.

Composition of Indian textile. The textiles sector includes the organized Cotton and non-mechanized Fibre Textiles Mills. The non-mechanized Fibre and Filament Yarn business, the Wool and Woollen Textiles, the Sericulture and Silk Textiles, Powerlooms, Handlooms, Handicrafts, the Jute and Jute Textiles, and attire & clothes and textile also are the a part of Indian Textile business.
The following are also the part of this industry:
1. Spinning and weaving;
2. Knitting and Hosiery;
3. Garmenting;
4. Processing dyeing and finishing;
5. Instrumentation and IT;
6. Auxiliaries.

Figure 1 – Textile Industry in India (Source: textiletoday.com)

Indian textile is a leading industry in the manufacturing world. Clothes and all textiles product materials have become the basic needs of the society, these products have become the integrated part of daily human being needs, which never be separated. It is spreading all over the world and the demands of textile cannot be decrease, because increasing the population creating the opportunity for textile producers. Even it is providing employment to the weaker section of the society. From the era of Gandhi, it is continuing growing in terms of production as well as in terms of employment. Majority of workers are women they are earning its livelihood from this economic activity. This sector is highly informal or unorganized, spreading into different rural backward areas. It is more popular between the women housewives, because they are regularly meeting together sharing their social emotions along with generating income through this economic activity. Even this sector is also helpful in reducing the family dispute by providing the work to women so that they can utilize their time in economic opportunity rather than wasting time in unproductive family related issues.

**Inclusiveness and Textile.** Inclusive growth is the growth in which all things concerned for human welfare and development are incorporated. In context of India, diversity in the society by past categorical divide system cannot be ignore in the present time. The people belongs to different categories in India, still they are deprived from socio and economic development, we need to incorporate these people in the main stream of development through providing opportunities in terms of employment as well as providing economic perquisites benefit in lieu of money. Inclusive policy covers women, transgender, economical deprived peoples, and tribal section of the society for the overall human development of the country. To fulfilling the objective of inclusiveness of India the Textile is playing dominant role from the era of British India. From this era, Gandhi promoted khadi as movement of self-reliance for their people and currently the prime minister of India is also more emphasizing on textile products promotion world-wide through its self-brand image of khadi look. Majority of Informal units of textile is creating socio-economic inclusion opportunity in every state.
without any support of government. But for the social security of the unorganized sector workers still is far from socio-economic inclusion, because the government has not actual data about these small cottage units. The workers of these unorganized units are getting less wage as compare to other sectors, so these people are socially insecure and deprived from the basic medical health and education facilities.

![Figure 2](Source: fibre2fashion.com & financialexpress.com)

The Government is promoting khadi and textile for inclusiveness of society. From figure 2, it is clearly showing the textile informal sector promotion by the legends of India, so the critical study of these figures, it is found that the unorganized sector of India is engine of economy and the textile is the playing dominant role to achieving the Gandhi objective of inclusive society development.

**Textile and Corporate social responsibility.** According to statistics reports of ministry of textile revealed that more than 90% textile units are unorganized so the discussion for CSR in this sector is become irrelevant because we are calling them informal units and informal units are the units, which are beyond any organization regulations. There are no labor rules, labor union, and no social security regulation for the workers, so only, the discussion can be move on the social responsibility of the textile informal sector. Responsibility for employee working conditions, health, environment friendliness and uncertainty.

The reason behind prosperity of ancient society not lies in welfare measure adopted by the early administration. It actually lies in fragmented and decentralized nature of industry instead of concentration of means of production in few hands. As today we called them as cottage industry. In early times every household acted as a cottage industry and producing some good that can earn them livelihood. So, inclusive growth was inevitable phenomena at that time. Inclusive growth is a type of growth that’s including every section of society including most deprived one. So decentralization of mean of production had a credit of inclusive growth in ancient time. In medieval era, as industrial revolution progress, technology become so precise that everybody either not having access to it or unknown of it.

As a result household industry was incapable of competing with high capital and innovative industry, which later result in changing of decentralized to centralized nature of industry. And textile industry face changes from cottage or household industry to textile mills. Its hurts inclusiveness of means of production. As a result concentration of means of production emerges as an unstoppable tale. So from decentralized to centralized nature of industry, breakdown of inclusive societal structure occur which cause exclusion of a part of society from growth. The gap between two classes of society has widened as centralization is progressed. During British era as a result of ‘drain of wealth’, the condition of society in economic term become so bad that a never occupied exclusion was created. The cottage industry that was surviving at that time were abolished due British dumping product manufacturing in their own country in India. So our cottage industry not able to stand in competition with British product.

After independence, in nehruvian era India opted for industry as prime moving force. So large capital asset were created for streamlining economic growth as per optimum level. Though it help in filling up gap created during British era by wealth drain policy of British. On
data, it help in increase our economic growth “a quantitative analysis” but in term of economic development “a qualitative analysis” India were far lag behind. To develop economic development indicator financial inclusion and social inclusion are prerequisite.

In decade of 90’s, liberalization, privatization, globalization (LPG) of 1991 gives a boost to economy. It help in changing the behavior of government from regulator to facilitator. It changes government control to market control. Big firm were established in private sector due ease of doing business by government. But as new public administration approach focus on welfare of deprived. So regulations were required for corporate sector to enforce and shows some social responsibility. Because government exit from the role of money creation to public service. So corporate social responsibility has taken place of cottage industry of ancient time. As our research focus on role of textile industry in developing of inclusive growth and corporate social responsibility.

Corporate Social Responsibility of Modi Industries after independence. In terms of corporate social responsibility of big textile units, this sector is not enough contributing in the social liabilities towards its employees. In the past, Modi Textile Industry was the renowned philanthropic legendry example for all companies in India. In 1980’s the Modi industry was playing leading role in the area of corporate social responsibilities. Modinagar city, which is situated in Uttar Pradesh state of India was the famous for workers driven policies, still this city is the live witness of social responsibility of Modi textile industry.

Modi industry played a number of social responsibilities to uplift the livelihood of their employees. The major sources of responsibility were:

- Financial help for girls marriage;
- Established free educational institution from primary to higher education for children of workers and the local villagers;
- Financial aid in Funeral time of dependents;
- Medical facilities of family and dependents;
- Social security’s scheme for all workers;
- Employment to workers’ children after study;
- Separate Temples for the workers colonies.

Job Creation and Inclusive Growth. India’s Demographic Dividend With a population of roughly 1.28 billion folks, Bharat is that the second most inhabited country within the world. Almost sixty six per cent of India’s population – close to 850 million is of working age at the moment. The number is likely to extend by 169 million by the end of 2030. This demographic dividend can permit Bharat to with success emerge as a manufacturer of labor intensive merchandise like textile and apparel within the predictable future. For reaping the rewards of the demographic dividend, Bharat needs to produce jobs at the rate of 1,000,000 jobs per month. India has to, therefore, grow at a rate of eight to10 per cent per year; and therefore the model of growth needs to be inclusive with associate absolute specialize in job creation.

Employment Potential. The textiles sector holds a significant worth and potential from the perspective of employment generation. The sector presently employs a lot of than five large integer folks directly and another 6.7 crores within the allied sectors like cotton and jute farming, sheep rearing, textile machinery, etc. table 2, supported information printed by Annual Survey of trade provides the comparable standing of textiles for employment creation vis-à-vis alternative sectors. As a thumb rule, it's probable that for associate investment of Rs. 1 crore in a fully integrated textile and attire manufacturing set-up, thirty jobs are created whereas for attire producing alone seventy jobs are created for each Rs. one large integer investment. As a matter of fact, the All Asian country Textile and Garment Industry Survey of 2011-12 puts the use per large integer rupees of investment figure for non-SSI garment units between sixty eight and 169. Unmistakably, the textiles sector is nonpareil once it involves worth for money (read investment) within the sphere of employment generation.

Inclusive growth. Aside its job creation role, this sector is additionally seamlessly aligned with Government initiatives on girl’s empowerment. It's calculable that women represent regarding seventy per cent of the men within the attire sector. The sector conjointly provides job opportunities to millions within the beneath privileged sections of the society by
giving them a means of stable financial gain associated an opportunity to lift their customary of living. Hence, for a rustic like Asian country, the importance of the textiles sector for employment creation is peerless. A majority of the Indian population resides in rural elements of Asian country wherever people don't have access to quality education and alternative basic facilities. As entry level job roles within the textiles sector generally don't need folks with high technical skills or instructional background, an individual from rural Asian country, can become employable within the textiles sector with a nominal coaching of three to four weeks solely. Structural Shifts in international Industry China has been the undisputed leader in international trade over the last three decades. Within the textiles and apparel phase particularly, China has maintained a dominant share of over 40 per cent over the last twenty years. After the economic condition of 2009, China’s growth within the trade has slowed down from a median fifteen per cent to around four per cent in 2014. This trend is expected to continue additional within the future conjointly. Currently, China is vacating the global export market because of high wages and shift focused to the domestic market. Asian country stands an honest probability to capture a mammoth share of the space ceded by China in international textile and attire trade investing its raw material and men advantage.

### Table 1 – Estimated Employment in Textile and Apparel Value Chain (In Millions)

<table>
<thead>
<tr>
<th>Sector / Industry</th>
<th>As on March 2011</th>
<th>Projected for 2019</th>
<th>2018-19 (P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Textiles sector</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotton/Man-made Fiber/Yarn Textile/ Mill Sector</td>
<td>1.4</td>
<td>1.61</td>
<td>1.58</td>
</tr>
<tr>
<td>Man-made Fiber/ filament Yarn Industry (incl. texturing industry)</td>
<td>0.24</td>
<td>0.28</td>
<td>0.27</td>
</tr>
<tr>
<td>Decentralized Power-looms Sector</td>
<td>5.08</td>
<td>5.84</td>
<td>5.71</td>
</tr>
<tr>
<td>Handloom Sector</td>
<td>7</td>
<td>8.05</td>
<td>7.88</td>
</tr>
<tr>
<td>Knitting Sector</td>
<td>0.45</td>
<td>0.52</td>
<td>0.51</td>
</tr>
<tr>
<td>Processing Sector</td>
<td>0.44</td>
<td>0.51</td>
<td>0.50</td>
</tr>
<tr>
<td>Woolen Sector</td>
<td>3.2</td>
<td>3.68</td>
<td>3.60</td>
</tr>
<tr>
<td>Ready Made Garment Sector (including Knitwear Sector)</td>
<td>11.22</td>
<td>12.9</td>
<td>12.62</td>
</tr>
<tr>
<td>Sericulture</td>
<td>7.7</td>
<td>8.86</td>
<td>8.67</td>
</tr>
<tr>
<td>Handicraft Sector</td>
<td>8</td>
<td>9.2</td>
<td>9.00</td>
</tr>
<tr>
<td>Jute Industry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) Organized Jute Industry</td>
<td>0.26</td>
<td>0.3</td>
<td>0.29</td>
</tr>
<tr>
<td>ii) Decentralized Jute Industry</td>
<td>0.2</td>
<td>0.23</td>
<td>0.23</td>
</tr>
<tr>
<td>Total (i)</td>
<td>45.19</td>
<td>51.97</td>
<td>50.84</td>
</tr>
<tr>
<td>Jute Sector</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) Cotton Agriculture</td>
<td>20</td>
<td>23</td>
<td>22.50</td>
</tr>
<tr>
<td>ii) Cotton Ginning/Pressing</td>
<td>1.3</td>
<td>1.5</td>
<td>1.47</td>
</tr>
<tr>
<td>iii) Cotton Trade</td>
<td>19</td>
<td>21.85</td>
<td>21.38</td>
</tr>
<tr>
<td>Sub Total (ii)</td>
<td>40.3</td>
<td>46.35</td>
<td>45.34</td>
</tr>
<tr>
<td>Sheep rearing</td>
<td>2.8</td>
<td>3.22</td>
<td>3.15</td>
</tr>
<tr>
<td>Jute Agriculture</td>
<td>17</td>
<td>19.55</td>
<td>19.13</td>
</tr>
<tr>
<td>Textile machinery &amp; accessories</td>
<td>0.1</td>
<td>0.12</td>
<td>0.12</td>
</tr>
<tr>
<td>Total (ii)</td>
<td>60.2</td>
<td>69.23</td>
<td>67.73</td>
</tr>
<tr>
<td>Grand Total (I+II)</td>
<td>105.4</td>
<td>121.2</td>
<td>118.57</td>
</tr>
</tbody>
</table>


### Table 2 – Comparable standing of textiles for employment creation vis-à-vis other sector

<table>
<thead>
<tr>
<th>Manufacturing Sector</th>
<th>Fixed Capital (In Lakhs)</th>
<th>Persons Employed</th>
<th>Employment per crore Rupees investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy products</td>
<td>1203869</td>
<td>145601</td>
<td>12</td>
</tr>
<tr>
<td>Beverages</td>
<td>2675247</td>
<td>158507</td>
<td>6</td>
</tr>
<tr>
<td>Wearing apparel, except fur apparel</td>
<td>1280564</td>
<td>713833</td>
<td>56</td>
</tr>
<tr>
<td>Knitted and crocheted apparel</td>
<td>1369141</td>
<td>264261</td>
<td>19</td>
</tr>
<tr>
<td>Paper and paper products</td>
<td>642536</td>
<td>248529</td>
<td>39</td>
</tr>
<tr>
<td>Rubber products</td>
<td>2668512</td>
<td>218754</td>
<td>8</td>
</tr>
<tr>
<td>Basic iron and steel</td>
<td>40999861</td>
<td>650680</td>
<td>2</td>
</tr>
<tr>
<td>Electronic components</td>
<td>421154</td>
<td>76619</td>
<td>18</td>
</tr>
<tr>
<td>General purpose machinery</td>
<td>3417453</td>
<td>338964</td>
<td>10</td>
</tr>
<tr>
<td>Motor vehicles</td>
<td>7088020</td>
<td>175523</td>
<td>2</td>
</tr>
</tbody>
</table>

**Textile Market Growth Projections.** The expected high growth in exports apart, the rise in income of customers and their increasing propensity to pay on article of clothing things have been driving a integer growth of the domestic market. supported the emerging international and domestic market trends, it’s expected that the Indian textile and attire market can grow from current level of US$ 119 bn. to US$ 400 bn. by 2025-26.

| Source: Internal Estimates, Ministry of Textiles, Government of India. |

**Creation and comprehensive Growth.** Strategies taking into thought the unmatched potential for job creation in the textiles sector and therefore the opportunities emerging within the international market, the Government have developed a technique to foster growth and build an oversize number of jobs within the textile and attire sector. Additionally to the prevailing schemes that specialize in technology upgrade, infrastructure creation, and strengthening of ancient segments, the Government has given a special thrust to talent development. In order to make the Indian attire sector competitive, a special package for the Garmenting Sector has been free which is aimed toward removing the prevailing restrictions on productivity and jointly at incentivizing job creation and exports.

| Source: Internal Estimates, Ministry of Textiles, Government of India. |

**Table 3 – Indian textile and apparel market growth projections**

<table>
<thead>
<tr>
<th>n/n</th>
<th>2015-16</th>
<th>2025-26</th>
<th>CAGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exports</td>
<td>US$ 40 bn.</td>
<td>US$ 150 bn.</td>
<td>14 per cent</td>
</tr>
<tr>
<td>Domestic market</td>
<td>US$ 79 bn.</td>
<td>US$ 250 bn.</td>
<td>12 per cent</td>
</tr>
<tr>
<td>Total</td>
<td>US$ 119 bn.</td>
<td>US$ 400 bn.</td>
<td>13 per cent</td>
</tr>
</tbody>
</table>

**Table 4 – Special Package for Garmenting Sector: Estimated Employment Generation over next 3 years**

<table>
<thead>
<tr>
<th>Segment / Intervention</th>
<th>Employment Direct &amp; Indirect (Lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measures to Enhance Competitiveness of the Apparel Industry</td>
<td>9.7</td>
</tr>
<tr>
<td>80JJAA Amendments</td>
<td>12.25</td>
</tr>
<tr>
<td>Additional TUFFS for garmenting</td>
<td>9.5</td>
</tr>
<tr>
<td>Additional 3.67 per cent EPF contribution</td>
<td></td>
</tr>
<tr>
<td>Additional duty drawback for garments</td>
<td></td>
</tr>
<tr>
<td>Labor law reforms</td>
<td>1.75</td>
</tr>
<tr>
<td>Employment in upstream segments @ 35 per cent (yarn, fabric &amp; processing)</td>
<td>10.7</td>
</tr>
<tr>
<td>Indirect Employment(@ 1:1:3)</td>
<td>56.4</td>
</tr>
<tr>
<td>Total</td>
<td>100.3</td>
</tr>
</tbody>
</table>

Source: Internal Estimates, Ministry of Textiles, Government of India.

**Skilling individuals: making associate Enabling setting.** Job creation needs high growth in the returning years. To realize this growth, giant scale investments in producing are needed. This, in turn, can increase the demand of sure-handed labor for this sector. To satisfy the demand of sure-handed labor, lots of focus has been given to ability development initiatives within the country. For the textiles sector, the Integrated ability Development theme (ISDS) for development of sure-handed force during this sector has been operational, that leverages the experience and reach of existing textile coaching establishments and additionally invitations non-public sector participation and participation of authorities agencies. As on first Gregorian calendar month 2016, 7.7 100000 employees are trained beneath ISDS out of that five.06 (66 per cent) are absorbed within the trade. The whole target beneath ISDS is to coach fifteen 100000 employees by FY 2016-17. Moreover, skilling within the unorganized sector is promoted beneath loom Sector and Handicrafts Sector schemes of state of Asian country. Also, beneath the ability Asian country mission, a good and elaborate coaching framework has been enforced recently. For the textile and attire sector, 2 sector ability councils viz., Textiles sector ability Council and attire, Made-ups & Home Furnishing Sector ability Council are fashioned.

**Special Package for the Garmenting sector.** The garmenting trade, that holds vast potential for job creation, has been beset with many inhibiting factors including unequal access to international markets, comparatively higher wage prices, restrictive labor laws
 obstructive productivity, inadequate incentives for investments and exports, etc. to interrupt the shackles and to spur growth within the garmenting trade, the govt. has delivered a special package for rising the fight of the Indian garmenting sector.

The recently approved package includes extra disadvantage for garment exports, labor reforms like introduction of mounted term employment, increase in overtime limit and easing of Section 80JJAA of revenue enhancement act to support employment within the garmenting sector. The govt. also will currently bear the whole twelve per cent of employer’s worker Provident Fund (EPF) contribution for all the new staff for the primary 3 years. the availability of employees’ contribution to EPF has been created optional for those earning but Rs. 15,000 per month which can cause more money in hand with the employees. The introduction of mounted term employment can facilitate increase the labor offer and employability within the garment sector throughout the height season of the trade. a set term working man are thought of at par with permanent workman in terms of operating hours, wages, allowances and statutory dues. The overtime cap per quarter has additionally been raised from fifty hours to one hundred hours which can cause augmented earnings for the employees. The new package for the garment sector is anticipated to come up with over one large integer jobs during this sector over a 3 year amount as given within the table 4.

CONCLUSION

The anticipated upsurge in a job and also the creation of complete man-power base can attract massive scale investments, each domestic additionally as FDI, within the textiles sector and can serve to achieve the vision of the Hon’ble Prime Minister of creating Asian nation a worldwide producing hub. “India is unambiguously poised for re-casting the negative narrative and also the pessimism general within the world economy...by that specialize in social quality, by that specialize in long run goals and by investment in social and human capital”. Through its recent initiatives within the Textile and attire Sector, the Indian Government has opened a brand new narrative – a narrative of optimism, of enhancing exports, of job creation, and of social transformation. But its role in social responsibility is critical; the main reason for this sector is to be unorganized.

REFERENCES


THE STRATEGY OF SIMULATION OF POWERED LED LAMP SYSTEM (SOLAR CELL + DIESEL ENGINE) FOR TRADITIONAL FISHING VESSELS IN MAKASSAR

Iskandar S.C., Triyono M.B., Bambang SAP, Idkhan A.M.

1Department of Mechanical Engineering Education, State University of Makassar
2Department of Mechanical Engineering Education, State University of Yogjakarta
3Department of Mechanical Engineering Education, State Polytechnics of Malang

E-mail: soet_54mks@yahoo.com

ABSTRACT
This paper deals with explaining the importance of higher education research that is directed to the design the strategy of simulation of powered LED lamp system solar cell in future fishing vessels. The principal aim of this research is the utilization of renewable energy with the use of solar cell technology as a driver of lux system on fishing vessels. This research was a panel solar cell yields its power is 100 WP. It is applied to implement LED lamp with its power 100 WP. This wind energy is environmentally (clean energy), economically (cheapest), easy to operate and easy to maintain, also renewable energy. The method of analysis is quantitative approach using one way classification (analysis of variance or design of experiments). The finding of this research is accepted the null hypothesis or not differ significantly at 5% from each independent variable. The scenario and the parameters during the strategy simulation powered LED, solar cell as a power generated by The Fcount is higher than Ftable (3635.27 > 5.77), so H0 is rejected, it means at least there is one light intensity mean value that is produced by the different sun panel significantly on the real stage of 5%. It is expected to encourage and motivate the fisherman public in developing and applying this technology, so that it can upgrade the fish production quality and increase the economic value of fishermen society.

KEY WORDS
Power LED; renewable energy, solar cell, economic value.

In Indonesia, industry Energy has an important role in the attainment of social, economic, and environmental goals for sustainable development, and is a supporter of national economic activities. The usage of energy in Indonesia is increasing rapidly in line with the economic growth and resident increase; to fulfill requirement of energy that is increasing, develop various kinds of alternative energies, including renewable energy (solar cell), which until now has not been widely exploited.

Solar cell is one of the energies currently being developed today by the Government of Indonesia because as tropical state, the solar energy potency is big enough. Based on irradiation, data of the sun mustered out of 18 locations in Indonesia, solar radiation in Indonesia can be classified as follows: for occidental area and Eastern Indonesia with distribution of irradiation in KBI around 4.5 kwh/m²/day with monthly variation about 10%; and in KTI around 5.1 kwh/m²/day with a monthly variation of about 9%.

Fishery potency of deconvolution in Indonesia spreads over all part of water territories of the Indonesia Sea such as in territorial sea waters, marine waters of the archipelago and marine waters Exclusive Economic Zone (ZEE). The width of water territory of Indonesia sea is estimated 5.8 million km2 with the longest coastline in world of 81,000 km and islands bunch of 17,508, having fish potency estimated at 6.26 million tons/year which can be managed everlastingly with details of 4.4 million tons can be caught in water territory of Indonesia and 1.86 million obtainable tons from water territory ZEEI.

The problems of traditional fisherman, especially fieldsman, still use hold with ice block media as haul fish preservative media. Besides applying big cost, it also requires big storage space. While on the ship itself, it is very possible to install solar panels on the roof. So it enables scheme and making of hybrid power refrigerator. Energy yielded by solar cell hardly
depends on weather and absorption time of energy which only happened in the day time. Therefore, it is necessary to conduct hybrid power research (solar cell + diesel engine) as energy for refrigerator on traditional fisherman ship (Ariawan, 2008).

LITERATURE REVIEW

The Sun Energy Electric Revival (SEER) is the revival that uses the sunshine as the electric producer source. The main tool is to catch, change and result the electric is Photovoltaic (PV) or it is generally called Module/Panel Solar Cell. By PV, sun shine is changed into the negative and positive electron flowing process in PV because of the electron difference. The result of these electron flowing is the direct current electric energy that can be used to fill the battery/accumulator according to the needed tension and ampere (Figure 1).

The set capacity total in the sun energy conversion nowadays is less than 0.008 GW (8 MW). The national sun energy reached 4,8 kWh/m²/day (www.anekasurya.com). The advantage of SEER can be developed in the isolated region, especially in the unreachable region by the electric net/ state electric revival, hospitality environment, cheap operation cost and treatment.

The electric energy cost per kWh by using the earth heat energy is USD 0.08 (Rp. 800) and the electric selling price by PT PLN is USD 0.06 or around Rp. 650 per kWh. The electric energy cost per kWh for electric revival using motor fuel is USD 0.12 (Rp. 1.200). The coal usage is cheap, but it produces the high pollution and emission.

Several SEER main components are as follows: Solar Panel; Solar Charge Controller; Battery; Inverter.

![Figure 1 – Solar Cell energy (Source: http://www.energi-ku.com)](image)

![Figure 2 – The kind of Solar Cell Panel](image)
Table 1 – The Difference between Polycrystalline and Monocrystalline

<table>
<thead>
<tr>
<th>No.</th>
<th>Criteria</th>
<th>Polycrystalline</th>
<th>Monocrystalline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Making Process</td>
<td>Simple</td>
<td>Pure single silicone crystal made with the process of czechorsky, complicated and expensive process</td>
</tr>
<tr>
<td>2</td>
<td>Price</td>
<td>Cheap</td>
<td>Expensive</td>
</tr>
<tr>
<td>3</td>
<td>Heat Effect</td>
<td>Low Temperature coefficient, power reducing on every high temperature increasing</td>
<td>High Temperature coefficient, power reducing on every high temperature increasing</td>
</tr>
<tr>
<td>4</td>
<td>Efficiency</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>5</td>
<td>Dimension/measurement</td>
<td>Big</td>
<td>Small</td>
</tr>
</tbody>
</table>

Figure 3 – Scheme of SEER (1 - Panel solar cell; 2 - Battery; 3 - Burden; 4 - Solar Charge Controller)

Solar Charge Controller (SCC) is the tool that functions changing DC solar panel tool into DC battery tension, and regulate the energy filling from solar panel to battery and regulate the energy usage from battery to the burden.

Battery is the tool to save the energy. The kind of battery nowadays is used for the need of SEER is AGM battery, Deep Cycle VRLA, GEL Battery, and Lithium. While the kind of battery based on the electric tension that often used on SEER is: battery with the tension 12 V and 24 V. Inverter is the tool that functions to change from DC tension into AC tension.

Figure 4 – Battery, inverter and burden

The power sum (P) that produced can be counted with the formula are as follows:

\[ P = V \times I \]

Where: \( P \) is power [watt] or [W]; \( V \) is tension [volt] or [V]; \( I \) is current [ampere] or [A].

Project Based Learning (PBL) is the learning modern that have been developed in the progress countries as the United States. If it is translated into Indonesian, Project Based Learning means as the learning based project.

The learning based project (PBL) is the learning method that used the problem as the early step in collecting and integrating the new knowledge based its experience and real activity. PBL is designed to be used in the complex problem that needed learning in do investigation and understand it.

Simulation is an imitation process from something that is real and its state of affairs. The action of conducting this simulation describes the key characteristic qualities from the physical system behavior or certain abstract system (http://artikata.com).
RESULTS OF RESEARCH

This research used the quantitative and qualitative approaches by referring the teaching method based on project (PBL). This research is conducted in the department of Mechanical Engineering in the State University of Makassar. The sun panel laboratory design with the power of 100 WP.

![Flow Diagram of Research activity](image)

Figure 5 – Flow Diagram of Research activity

![Flow Diagram of Measurement light intensity](image)

Figure 6 – Flow Diagram of Measurement light intensity
The research subjects of the sun panel laboratory of 100 WP are the students of Semester IV of Thermodynamics lecturer subject participants of Technique and Heat Transfer. The research instruments that used are as follows: Score of Thermodynamics with Conventional Method; Score of Thermodynamics lecturer subject with PBL method.

Data is taken from observation result by digital multi-tester measurement tool. Data collecting technique are by taken data is the primary data (from measurement result) and experimental test. Analysis is conducted by using experimental design of factorial experimental design (Miller, I, 1985: 389).

![Figure 7 – Solar cell energy measurement](image1)

![Figure 8 – Light sensor (for measuring light intensity)](image2)

![Figure 9 – LED lamp at several time “on”](image3)

![Figure 10 – Collecting data light intensity with used light sensor](image4)
Figure 11 – Solar cell energy at fisherman vessel

Figure 12 – Solar cell energy at fisherman vessel

Figure 13 – Solar cell energy measurement at fisherman vessel

Table 2 – Time duration and light intensity (lux)

<table>
<thead>
<tr>
<th>Replication</th>
<th>Light Intensity Measurement at Noon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>07.00 a.m</td>
</tr>
<tr>
<td>1</td>
<td>140</td>
</tr>
<tr>
<td>2</td>
<td>138</td>
</tr>
<tr>
<td>3</td>
<td>138</td>
</tr>
<tr>
<td>4</td>
<td>130</td>
</tr>
<tr>
<td>5</td>
<td>129</td>
</tr>
<tr>
<td>6</td>
<td>122</td>
</tr>
<tr>
<td>7</td>
<td>177</td>
</tr>
<tr>
<td>8</td>
<td>162</td>
</tr>
<tr>
<td>9</td>
<td>124</td>
</tr>
<tr>
<td>10</td>
<td>110</td>
</tr>
</tbody>
</table>

Table 3 – Analysis of Variance

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Df</th>
<th>SS</th>
<th>MS</th>
<th>Fratio</th>
<th>Ftable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatments</td>
<td>3</td>
<td>21,527.40</td>
<td>7,175.80</td>
<td>6.68</td>
<td>2.87</td>
</tr>
<tr>
<td>Error</td>
<td>36</td>
<td>38,685.00</td>
<td>1,074.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>60,212.40</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The primary data that had been managed.

Because F count (5%,3,37) is higher than Ftable (5%,3,37), so zero hypothesis is rejected, it means that the time difference against the light intensity mean is on the real stage of 5%.

Irwin Miller, 1985:332-341; Charles R Hicks, 1983:388.
It can be concluded that because $F_{\text{count}}$ is higher than $F_{\text{table}}$ ($6.68 > 2.87$), so $H_0$ is rejected, it means that at least, there is one light intensity mean that had been produced by the significantly different sun panel on the real stage of 5%. The counting is continued to analyze the difference by using Newman-Keuls range test (Charles R Hicks, 1983: 51).

<table>
<thead>
<tr>
<th>Source</th>
<th>Dk</th>
<th>Quadrat Sum</th>
<th>Middle Quadrat</th>
<th>$F_{\text{count}}$</th>
<th>$F_{\text{table}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inter treatment</td>
<td>4</td>
<td>1399.276</td>
<td>349.81912</td>
<td>3635.9027</td>
<td>5.77</td>
</tr>
<tr>
<td>Galat</td>
<td>24</td>
<td>2.405311</td>
<td>0.0962125</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>1401.682</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Because $F_{\text{count}}$ is higher than $F_{\text{table}}$ ($3635.9027 > 5.77$), so the zero hypothesis is rejected, it means at least – there is one significantly different wind velocity mean value against the electric power of KASV on the real stage of 5%. The counting is continued to analyze the difference by using Newman-Keuls range test (Charles R Hicks, 1983: 51-54).
The stage that is done for PBL are socialization, practice of teaching aids making, teaching aids trial, participate in the competition and practice of PBL in the classroom and finally get gift as the first winner on the energy field on the Innovation and Technology competition (INOTEK) of 2017 that is hold by Malang city government and is participated on the national exhibition.

The F ratio is higher than Ftable. It means the zero hypothesis is accepted or is not different significantly at 5% from each independent variable. (3635.9027 > 5.77), so zero hypothesis is rejected, it means at least – there is one significantly different wind velocity mean value against the electric power mean of KASV on the real stage of 5%.

**SUGGESTIONS**

- The additional effort of watt peak on the sun panel that is expected in order to increase the light intensity and operation time;
- The additional effort of the additional tool on the sun panel that is expected can increase the light intensity;
- The way and practicing of PBL need to be socialized in front of the student.

**ACKNOWLEDGMENTS**

The authors wish to express their gratitude to the Ministry of Re-search, Technology and Higher-Education – Republic of Indonesia and The Director of State University of Makassar for their support.

**REFERENCES**

ABSTRACT
This study aimed to analyze the social changes in rural areas as a consequence of the shift of peasants to non-agrarian activities. Social change in the context of this paper is associated with livelihood diversification and its implications for rural restratification and its characteristic today. The research is conducted using qualitative method through community case study approach. Data collection is obtained through direct observation, face-to-face interviews and personal history. Respective perspective from three generations is used to track community history and changes that occur in the context of the village, community, and agricultural activities. The result shows that economic diversification has created a new rurality. New rurality or present-day rural characteristic are indicated by increasing prosperity, and agriculture that is no longer the dominant source of income. Livelihood diversification provides opportunities for vertical social mobility for the rural poor which are the offsprings of farm laborers and tenants who choose to become migrant workers in Korea. There has been a restratification characterized by the emergence of migrant groups as a new social class that shifts the upper class position previously occupied by landlords and their descendants. They are a new upper class in social stratification in the rural that manages to show their prosperity through the accumulation of capital from remittances they brought back to the village.

KEY WORDS
Indonesia, migrants, landlords, restratification, social class, social change.

Diversification of livelihoods away from agriculture occurs extensively in rural areas. People in the rural who depend on agriculture for their livelihoods are dwindling. The declining land resources, stagnant agricultural production prices and the increasing needs of farm households are some of the reasons that led peasants no longer rely solely on agriculture to meet their needs. Peasants require non-farm activities to stabilize and maintain the sustainability of their livelihoods (Rigg, 2001; Steward, 2007). Peasants are even will be completely disappeared from the rural sector if there is absolutely no alternative source of income outside agriculture (Chase, 2010). Only those who have adequate agricultural land, external resources and abundant labors can earn greater revenues from non-farm income. Peasants with limited land must have jobs outside the non-agricultural sector to survive.

Diversification opens opportunities for vertical social mobility for the rural poor. The poor who have no land nor power capital can earn income outside the agriculture while the possibility to obtain jobs through education and skills becomes more opened. Non-agricultural activities are increasingly seen as a way out to prosperity in the rural. Bryceson's
research in South Africa (2002), shows that those who have only limited (narrow) land with poor quality (unproductive) finally choose to do trading as a source of livelihood. Despite opening up opportunities for social mobility, diversification can also further strengthen social stratification. This is related to the greater income earned by the elite group due to the transfer of agricultural capital to more favorable nonfarm activities. Non-agricultural activities provide a path to prosperity.

Diversification becomes a part of territorial change in the rural area that turns the village into its new face. Most villagers have revenues which are not related to agriculture. This situation then encourages the stagnation of sources of income from agriculture. Agriculture has grown as a tertiary sector and is no longer a primary sector or what Bryceson (1996) called with the term deagrarianization. Deagrarianization does not indicate that agriculture disappears. Deagrarianization emphasizes the growing importance of various sources of income outside agriculture (Yaro, 2006; Terano and Fujimoto, 2009; Connor and Mtswana, 2017; Pritchard et al. 2017; Hebinck, 2018; Shackelton, 2018). Agrarian life is declined as impact from its farming communities that no longer fully make agriculture as the livelihood base.

Research on livelihood diversification and the decline of rural agriculture activities has been widely conducted (Bryceson, 2002; Meert et al., 2005, Steward, 2007; Ducrotoy et al., 2017; Khan, et al., 2017; Ebenezer, M and Abyssinia, M, 2018 ). In this case, most studies focusing on the effect of non-farm income as a strategy to reduce the risk of peasants' limited income from their agricultural activities. No studies have specifically focused on the influence of livelihood diversification on social stratification changes in rural areas. This paper will discuss deeper about the social changes that occur in rural areas as a consequence of the shift of peasants to non-agrarian activities. How does livelihood diversification affect the present-day rural characteristic? How does diversification create restratification in the rural? And how is the prosperity represented by each class in the rural hierarchy?

METHOD OF RESEARCH

Data for this paper were obtained using a community case study approach. This approach chosen for obtaining detailed and rich data (Berg, 2001; Creswell, 2003, and Yin, 2003). The community in this research is the Dukuh Jongso (Jongso Hamlet) peasants community, one of the communities that have the uniqueness as a modern peasant community but also still maintain the traditional order. This community represents the full character of a rapidly growing community of peasant with a variety of non-agricultural livelihood sources and increased prosperity due to remittances sent from Korea. However, the other character of this peasant community is they remain attached to the traditional order through the social stratification inherited by the landlord class in the past to the descendants to this day.

The data collection for this paper is obtained through direct observation, face-to-face interviews and personal histories. The perspectives of three different generations (grandparents- as first generation; father/mother- as second generation; and children as third generation) used to obtain a community history and description of rural change over the last twenty years, particularly regarding to the shifting of agricultural activity to non-agricultural and hierarchical or social stratification change that occurs along with it. Archival records in the form of maps and lists of taxpayers are also used in this study to obtain detailed descriptions of the village landscape as well as the mapping of the stratification upon land ownership.

RESULTS AND DISCUSSION

Jongso community is one of the rice farming communities in Wotan Village, Sukolilo District, Pati Regency, Central Java, Indonesia. Wotan Village is the largest food supplier in Pati Regency and also the village that has the largest rice field in Indonesia for the size of the village (1723 hectares). Wotan village is also known as a wealthy (sugih) village with a more
advanced development than the surrounding villages. It has flat landscapes with vast expanses of rice fields dominate the region. Paddy rice is a major agricultural commodity with an average production of 3.5 tons per hectare and a total production amount of 5400 tons of the entire land that can be harvested.

Jongso's hamlet located at the very end (north side) of Wotan Village. This hamlet is known as the richest in Sukolilo district because this is where the landlord and his family (pioneers) that owns large lands settled. The tenants of these landlords even have a land area up to 25 hectares per person. These pioneers are the migrants from Undaan District, Kudus. Until now, the history of this vast land ownership can still be found. The structure of land ownership at the village level shows that there are 1% (101 people) people owning land above 1 hectares (ha) as can be seen in Figure 1. Out of this amount, about 50% (68 owners of large land) are in Wotan Hamlet and Jongso Hamlet.

Present days Jongso is different from Jongso in the past. Jongso is now better known as the 'kampung TKI' means 'migrant hamlet'. The first generation of Jongso Hamlet migrants began in the 90's for work overseas. South Korea is a favorable country as the main destination for their departure in addition to Japan and Taiwan. The people in Jongso are even more facilitated because there is a Korean language school built in this village, so it does not have to go far out of the village to prepare their departure. If they have passed the Korean language, it is certain they will soon be dispatched. Currently there are 76 young people who are still living in South Korea with a five year contract system and about 40 people who have completed the contract and settled back in this village.

Diversification becomes a part of territorial change in the rural that turns the village into its new face (Bryceson, 1996; Chase, 2010). The earliest form of economic diversification in Jongso was by raising buffalo. Meanwhile, the most developed and popular diversification today is with the industry-scale chicken farming business as can be observed in Figure 2.
Departing to Korea becomes a job trend that is considered to bring prosperity faster. The departure of Jongso citizens to Korea became the starting point of change experienced by people in this region. New job opportunities outside agriculture are beginning to open. New businesses such as money lending services, chicken butchery, duck farming, catfish farming, tents and soundsystems rental, boarding houses and restaurants can be found around the village. One growing business is chicken farming industry with a turnover of billions of rupiahs. The farm, which has been built since 2015, originally was a government empowerment program (BNP2TKI) aimed at 'retired TKI' (former migrant workers) in order not to return to be migrant workers. Peasants who are interested to participate must have a capital of 40% - 60% or around 500-700 million rupiah. The operational value for making a cage per population of chicken is 50 thousand rupiah. For a cage with a capacity of 30,000 chicken, it takes about 1.5 billion rupiah. Owner earnings can reach 50 million in one time harvest season. Rural is no longer identified with poverty. The new rurality in Jongso as a whole is evident from the village heterogeneity due to economic changes and landscape changes. In this case migrants as mentioned by Kaitlin & Mary (2010) are considered to have the greatest financial capacity so that when they return home, they usually show their economic superiority.

The hierarchical distinction of society into social classes (social stratification) has been recognized by the Jongso community from the very beginning of this hamlet to the present day. Public awareness of the class is manifested in the term 'wong sugih' (upper class) and 'wong ora duwe' (lower class). Historically, the two classes are geographically separated in two kampongs namely 'Kampung Kulon' (for the upper class) and 'Kampung Wetan' (for the lower classes). Kampung Kulon is occupied by pioneers with its specific type of limasan-roof shaped houses. They are known as people who have dozens or even hundreds of acres of land. If Kampung Kulon known as the village of the king of the land, Kampung Wetan or Kampung Tanggulan is a village inhabited by workers from the village pioneers. They are the middle to lower class. They used to live in one big house together. They then have offspring and thrive to become what they are today. Their daily activity is to keep hundreds of buffaloes belonging to the landlords and to do the various jobs requested by the landlords. These workers have high loyalty to their patrons. This loyalty is shown by 'bekti' (filial) and 'manut' (submissive) on the command of the landlord.

The social hierarchy at Jongso was also born due to the ownership of agrarian resources (land) which ultimately determines the position within the existing social hierarchy. Wong sugih is in an upper position because it has a large land while the workers/tenants are in the lower class position because they have no land (landless). The decline of agricultural dominance in the rural economic structure has led to changes in social structure. The hierarchy of prosperity in the rural has also changed. To improve living standards, communities have an increasingly diverse sources of income. As mentioned in Halamska (2011), restratification takes place since rural populations have begun to be detached of agriculture.

In the context of Jongso, social class changes have been felt since the return of former Indonesian migrant workers who eventually became economically successful people. This change began to occur in the 1990s. The position of the landlord who had been a top class in the rural, was replaced by the new rich people who returned from Korea. This former generation of migrant workers now appears as a respected new class. Former Korean migrant workers are known to have high buying power. They are able to raise the price of land in this region. Currently (2018) the price of land has reached 125-135 million per square (1/7 hectare). From the history of buying and selling that once existed in Jongso, a former Korean migrant can buy land up to 6 squares at a price of Rp. 85 million per square or a total of 510 million. These lands were bought from Jongso people who sold the land, some of them landlords who needed money to pay for their children's college. There is a tendency in Jongso that those who continue their education until college are the children of the old rich (landlords). No one of the children of this landlord becomes a TKI. They choose formal employment paths in government or private offices. Those who leave for Korea are usually children from the lower class with average education of junior or senior high school.
The success of former Korean migrants becomes them as a class of rich people with characteristics different from the characteristics of the rich or the upper class coming from the landlords as can be seen in Figure 3.

They become upper class (new rich people) not because they have vast ricefields or become descendants of first settlers but because it can show its success by buying rice field, a chicken stall with billions of investments, building a magnificent mansion-style houses, buying luxury cars and handing out money during Eid.

Former Korean migrant who is in a low-class citizen has a position that is respected even more than the landlord because it is considered to have a more egalitarian pattern of communication, flexible, not dictatorial and open-minded. Meanwhile, landlords are usually respected in their internal environment (their clients). The former migrant worker who became the new rich class is not involved in the formal leadership of the village so that it is considered more objective and able to balance the decision that has been dominated by the upper class that has been hereditary occupied formal position in the village. The presence of a successful former Korean TKI became a balancing force among the landlord groups who among themselves were also split.

Basically, the upper classes in Jongso can be divided into two: economically upper class and socially. Those who are economically upper class are successful former Korean migrant workers, pioneers’s descendants and petingen. They are recognized as the upper class because of the more economical asset ownership than the average community. Meanwhile, those who belong to the social class are kiai / religious leaders/madrasah teachers and government officials. Kiai/religious leaders/madrasah teachers are recognized as upper class because they are considered knowledgeful, although generally they come from lower middle class. Meanwhile, civil servants are socially inclusive of the upper classes and (respected) because they are capable of solving the constraints faced in society and bridging the community to settle matters pertaining to the bureaucracy as Mundi (agriculture adviser, 46 y.o) mentioned: "When I work in private, my parents in-law were undermined me. When I wear this uniform, the treatment was different, very different, though materially far below than in private". The social re stratification in Jongso is morethicker in the shift in
upper-class positions due to the structure of income and not by structure of education and work, as can be seen in Figure 4.

Successful peasants and tenant heirs on experiencing upward social mobility become higher strata of the pioneer’s descendants is driven by income structure. Nevertheless they remain under the *petinggen* and the *dongkolan* from community’s respect perspective. The income structure of migrant workers is the highest among other non-agricultural jobs in Jongso. Currently, income that is close to the income of Korean migrant workers is only revenue for investors or owners of stalls. Meanwhile, pioneers descendants or landlords, are experiencing downward mobility from the side of the income structure. Some of them are experiencing difficulties because various need to keep their upper class identity, which often costly, for instance the ceremonies of death. In addition to the cost of maintaining upper class identity, the declining mobility trends also occur due to investments in substantial education conducted by the upper classes. This often makes them sell the land they own. In general, those who send their children to college level are from the wealthy (landlord) family. College graduates will be oriented to become employees both in government and private environment.

In the context of restratification, what appears to be called by Halamska (2011) as a transitional group is quasi-peasants, educated unemployed and migrants. Transitional groups are not all found in Jongso. There are only two transitional groups of pseudo-peasants and migrants. Quasi-peasants are the vast majority of those who ultimately go into business and put agriculture as a side job with less desirable results. These average peasants are those who currently work as owners of stall, stall labor, and workers in the Kudus cigarette factory. Their income is much greater than the work on the farm. ‘Stall labors’ and workers in the factory in average are peasant with a land less than 0.25 hectares or even landless. They do not expect much from farmland because of the risk of high crop failure. Educated unemployment is not found in Jongso, as the number of relatively few college graduates tends to be directly absorbed in the private or government sectors. Usually they use social networks or acquaintances to facilitate their children’s access to the job.

**CONCLUSION**

The decline of agricultural dominance in the rural economic structure has led to changes in social structure. The hierarchy of prosperity in the rural has also changed. To
improve living standards, communities have an increasingly diverse their sources of income. Substantive increase in revenue. Restratification has occurred since the rural population has not depend on agriculture. Restratification occurs because of changes in the structure of work, the structure of education and the structure of income. The categories of work relating to agriculture are diminishing as the category of non-agricultural employment is increasingly diverse.

Economic diversification has created a new rurality. Type of rural (new rurality) is characterized by increasing prosperity, a highly developed infrastructure, more practical lifestyles, more open interactions, diverse economic activities, and agriculture which is no longer as the dominant source of income. Diversification opens opportunities for vertical social mobility for the rural poors, the children of farm laborers and tenants who then choose to become migrant workers abroad (Korea). There has been a restratification characterized by the emergence of migrant groups as a new social class that shifts the upper class position originally occupied by landlords and their descendants. Migrants become the transitional group that occupies the upper class position. They are a new upper class in social stratification in the rural that manages to show its prosperity through the accumulation of capital from remittances they bring back to the village.

REFERENCES

7. Ducrottoy, MJ; Revie, CW; Shaw, AP; Musa, UB; Bertu, WJ; Gusi, AM; Ocholi, RA; Majekodunmi, AO; and Welburn, SC. 2017. Wealth, Household Heterogeneity and Livelihood Diversification of Fulani Pastoralist in the Kachia Grazing Reserve, Northern Nigeria during a Period of Social Transition. PLOS ONE 12 (3). 1 22.


ABSTRACT
Human needs for tourism today continue to increase throughout the world especially marine tourism which is widely developed in Indonesia. The potential tourism on Gili Ketapang Island is an attractive beach and coral reef for snorkeling. Marine tourism on Gili Ketapang Island is still recently developed and needs to be managed properly. This study aims to determine the quality of tour guide services, tourist satisfaction, revisiting intention and relationship between these three variables. Tour guide service variable is explained by four indicators: communication, attitude, skill and knowledge. Tourist satisfaction variable is explained by four indicators: tourist variation, service quality, activities quality, and object quality. The research conducted on January 2019 by interviewing to 100 snorkeling tourists then analyzed use Structural Equation Modeling (SEM) model to examine the relationships between variables and indicators. Tour guide service quality and tourist satisfaction are classified as good. Revisiting intention from tourist is also classified as good. Guide service has a real influence on the level of tourist satisfaction and tourist satisfaction also has a real influence on the revisiting intention of the tourists.

KEY WORDS
Snorkeling, tourism, relationship, Gili Ketapang.
Tjiptono's (2012) stated that tourist satisfaction is a response of what perceived by tourists between expectations before and after the activity. Cahyadi and Gunawijaya (2009) further explained that tourists will be interested to come back to the location if they get good knowledge and nice experience from services provided by a tour companion or guide. The satisfaction and desire of tourists to come can be the key of sustainable tourism management. Therefore the purpose of this study was to find out the relationship between the quality of service guides and tourist satisfaction and the desire of tourists to return to Gili Ketapang Island.

**MATERIALS AND METHODS OF RESEARCH**

This research was conducted at the Gili Ketapang Island, Probolinggo Regency, East Java (Figure 1) in January 2019. The island was chosen because it has a newly developed marine tourism destination and has considerable potential based on its environmental conditions.

Gili Ketapang Island is in the administrative area of Probolinggo Regency in the East Java Province. It has an area of around 61 hectares and is inhabited by around 8061 people (BPS Probolinggo Regency, 2018). Geographically, this island is located between 7° 40’36.87” to 7° 40’51.82” LS and 113° 14’35.68” to 113° 15’42.05” BT. The boundary of the area around this island is the Madura Strait waters.

Data collecting method used structured interviews to the tourists choosing by random sampling. Data collected examine by Likert scale and then analyzed using Structural Equation Modeling (SEM). This method examines the relationship between exogenous and endogenous variables, which have a direct or indirect influence in complex ways. Tour guide service variables are included in exogenous variables, while tourism satisfaction and return visit intentions are included in endogenous variables. The SEM model can be formed using Analysis of Moment Structure (AMOS) software version 23. The variables and indicators used in SEM modeling can be seen in Table 1.

![Figure 1- Research location](image)

There are three influences that exist between the latent variables which are translated into three hypotheses, namely:

**Hypothesis 1:**
H₀: Tour guide service has no a real influence on tourist satisfaction;
H₁: Tour guide services have a real influence on tourist satisfaction.
Hypothesis 2:
$H_0$: Tour guide service has no a real influence on revisiting intention;
$H_1$: Tour guide services have a real influence on revisiting intention.

Hypothesis 3:
$H_0$: Tourist satisfaction has no a real influence on revisiting intention;
$H_1$: Tourist satisfaction has a real influence on revisiting intention.

Hypothesis testing can be analyzed based on regression values of the model. Test the hypothesis by looking at the value of C.R (Critical Ratio) and P value (Probability) contained in the results of Regression Weights. The hypothesis is accepted if it has a value of C.R ≥2.00 and P ≤ 0.05.

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>Indicators</th>
<th>References</th>
</tr>
</thead>
</table>
| Tour Guide Service      | • Knowledge
                          • Skill
                          • Attitude
                          • Communication                | Purwaningsih (2013); Riana (2016); Brigitha et al (2018) |
| Tourist Satisfaction    | • Tourist variation
                          • Service quality
                          • Activities quality
                          • Object quality               | Basiya and Razak (2012); Kalebos (2016) |
| Revisiting Intention    | • Good experience
                          • Information, promotion
                          • Visit frequency
                          • Visit motivation           | Nuraeni (2014); Chen et al (2016) |

RESULTS AND DISCUSSION

The tourist's profile of Gili Ketapang Island are presented in Table 2 found that the majority of respondents were male, age 20-25, types of work were student and came from East Java region.

<table>
<thead>
<tr>
<th>No</th>
<th>Indicators</th>
<th>Category</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gender</td>
<td>Male</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Female</td>
<td>38</td>
</tr>
<tr>
<td>2</td>
<td>Age</td>
<td>≥20 years</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20-25 years</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25-30 years</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 years≤</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>Job</td>
<td>Student</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>College student</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Employee</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Entrepreneur</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not work</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Origin</td>
<td>East Java</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outside East Java</td>
<td>2</td>
</tr>
</tbody>
</table>

Gender and age of a person can influence behavior in tourism. Since snorkeling activities in Gili Ketapang attracted more male tourists in productive age because requires supportive physical conditions. According to Sarkawi (2015) gender differences between men and women can influence the behavior of an individual. Behavior will be influenced by the self-concept of a particular individual. This behavior can develop based on environment and knowledge.

Distance between the area of origin and location of tourism also influence tourism activities. Almost all tourists come from around of the Gili Ketapang Island, such as Probolinggo, Pasuruan, Situbondo, Surabaya, Malang, and Kediri. Variations of their origin is nearby the island and also influenced by easy distribution of tourism information.
Table 3 – Perception of tourist on tour guide service

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Score (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Communication</td>
<td>20</td>
</tr>
<tr>
<td>Attitude</td>
<td>19</td>
</tr>
<tr>
<td>Skill</td>
<td>28</td>
</tr>
<tr>
<td>Knowledge</td>
<td>19</td>
</tr>
<tr>
<td>Average</td>
<td>21.5</td>
</tr>
</tbody>
</table>

The tour guide service has been done with good and mostly of answers on 4 and 5 score. Hence, the indicators that should be improved are attitude and guides knowledge. The friendly cultural background of the community becomes the backbone of the communications and the good performances. Limited knowledge on tourism since they are fisherman who has not enough experience and not certificated also tourism activities that is only recently been developed.

Table 4 – Perception of tourist on tourist satisfaction

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Score (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Tourist variation</td>
<td>17</td>
</tr>
<tr>
<td>Service quality</td>
<td>31</td>
</tr>
<tr>
<td>Activities quality</td>
<td>22</td>
</tr>
<tr>
<td>Object quality</td>
<td>25</td>
</tr>
<tr>
<td>Average</td>
<td>23.75</td>
</tr>
</tbody>
</table>

Although the tourist satisfaction has been achieved with good and mostly of answers on 4 and 5 score, still need to be increased. Indicators such as variations in activities and qualities of existing objects, can be increased by create more tourism activities. Historic location and cultural activities can be an attractive tourism option for new objects.

Table 5 – Perception of tourist on revisiting intention

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Score (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Good experience</td>
<td>32</td>
</tr>
<tr>
<td>Information, promotion</td>
<td>30</td>
</tr>
<tr>
<td>Visit frequency</td>
<td>20</td>
</tr>
<tr>
<td>Visit motivation</td>
<td>12</td>
</tr>
<tr>
<td>Average</td>
<td>23.5</td>
</tr>
</tbody>
</table>

Figure 2 – Structural equation model relation of tour guide service, tourist satisfaction, and revisiting intention
The revisiting intention variable has the majority of answers on 4 and 5 score. This shows that respondents have high desire to revisit the tourist sites. Good experience, availability of information, and good promotion strategy give the highest value compared to those of the other indicators in supporting this variable. Motivation indicator has lowest value because tourism development in this area still has to improve on some aspect such as guide knowledge, tourist variation and object quality.

The equation model is considered as a good model if it has an acceptable measure or Goodness of Fit (GOF). Model match requirements and analysis results can be seen in Table 5.

<table>
<thead>
<tr>
<th>No</th>
<th>Goodness of fit index</th>
<th>Cut off value</th>
<th>Analysis</th>
<th>Model evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chi-Square (df= 41)</td>
<td>≤ 56,942</td>
<td>50,443</td>
<td>Good</td>
</tr>
<tr>
<td>2</td>
<td>CMIN/DF</td>
<td>≤ 2</td>
<td>1,230</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>Probability</td>
<td>≥ 0,05</td>
<td>0,148</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>GFI</td>
<td>≥ 0,90</td>
<td>0,931</td>
<td>Good</td>
</tr>
<tr>
<td>5</td>
<td>AGFI</td>
<td>≥ 0,90</td>
<td>0,869</td>
<td>Marginal</td>
</tr>
<tr>
<td>6.</td>
<td>TLI</td>
<td>≥ 0,90</td>
<td>0,979</td>
<td>Good</td>
</tr>
<tr>
<td>7</td>
<td>CFI</td>
<td>≥ 0,90</td>
<td>0,987</td>
<td>Good</td>
</tr>
<tr>
<td>8</td>
<td>NFI</td>
<td>≥ 0,90</td>
<td>0,936</td>
<td>Good</td>
</tr>
<tr>
<td>9</td>
<td>RMSEA</td>
<td>≤ 0,08</td>
<td>0,048</td>
<td>Good</td>
</tr>
</tbody>
</table>

Based on the Table 6, the model formed is quite good because it fulfills almost all the matching conditions between Cut off value and Analysis. This model can be used to test the hypotheses prepared in the study. The results of the hypothesis test are presented in Table 7.

<table>
<thead>
<tr>
<th>n/n</th>
<th>C.R</th>
<th>P</th>
<th>Hypothesis</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y1</td>
<td>←</td>
<td>X 3.33</td>
<td>0.00</td>
<td>Hypothesis 1</td>
</tr>
<tr>
<td>Y2</td>
<td>←</td>
<td>X 2.43</td>
<td>0.01</td>
<td>Hypothesis 2</td>
</tr>
<tr>
<td>Y2</td>
<td>←</td>
<td>Y1 4.09</td>
<td>0.00</td>
<td>Hypothesis 3</td>
</tr>
</tbody>
</table>

H1: Tour guide services have a real influence on tourist satisfaction.

Based on the analysis, tour guide services have real influence on tourist satisfaction. Purwaningsih (2013) showed that tourists basically have expectation before they come. This expectation is in the form of a desire to get new experiences that are different from the usual activities and get new knowledge related to tourism sites. The tour guide service quality will greatly determine the level of tourist satisfaction because if the service can exceeded tourist’s expectations, the response of tourists will be good and has revisiting intention. Furthermore, Swarbrooke and Horner’s research (2007) state that the benefits of fulfilling tourist satisfaction are recommendations between tourists.

H1: Tour guide services have a real influence on tourist revisiting intention.

Based on the analysis, tour guide services have a real influence on tourist revisiting intention. Nuraeni (2014) explained that service quality of tourism will affect tourists’ satisfaction. The tour guide will provide the best service in order to influence tourists to visit again. Furthermore, Fen and Lian’s research (2006) states that there is a significant positive influence between the qualities of service on the tourist interest to revisiting a location.

H1: Tourist satisfaction has a real influence on tourists revisiting intention.

Based on the analysis, tourist satisfaction has a real influence on tourists revisiting intention. Intention of tourists to return or revisiting the sites will provide a guarantee to continuity of tourism in the future. There is a strong relationship between satisfaction and desire to return as explained Basiya and Razak (2012) about the positive relationship between customer satisfaction, behavior after activities and activity performance. Customers who have fulfilled their expectations before doing their activities will increase their desire or commitment to do it again.
The analysis show that all indicators that forming the variables have a significant value on the model. C.R (Critical Ratio) and P (Probability) values have qualified the requirements. This result shows that each indicator can have a real influence on the variables formed, in which more positive the indicator value then be more positive the variable’s value.

Some examples of indicators that have influence are communication on the guide service. Purwaningsih (2013) explained that the verbal language skills of tour guides have a large influence on tourist satisfaction. Tourism activities can run poorly if communication between tour guide and tourists is not well established. The next indicator that has a big influence is the tour guide’s attitude. Good behavior will also create a good impression for tourists. Generally the people of Gili Ketapang Island are friendly and open to tourists. This condition must be maintained so as to make the environment comfortable for tourists.

Indicators that have low value of loading factor are tourist variation. This can be due to limited tourist activities at this location. Tourism is only focused on snorkeling and only few part of the island can be used for snorkeling. The Kalebos study (2016), shown that the quality of products or tourism activities had a significant and positive influence on the satisfaction of tourists. The better quality of products or tourism activities, the more tourist satisfied.

Tourism development on the Gili Ketapang Island for the future needs to increase the knowledge of tour guide on tourism objects, especially coral reefs. This increase can be through training or additional insights related to coral reef ecosystems. Evaluation and development for marine tourism activities must be continue. This is because there are many positive impacts that arise from this development. Ghodoudsi et al., (2018) explained that the majority of community stated that there were benefits from tourism activities through various aspects. Most local people also say that tourists can still respect to traditional culture. Stem et al., (2010) explained that higher levels of tourism can be a powerful tool to have an impact on the economy, social, and empowerment of local communities to support environmental conservation.

CONCLUSION

The quality of tourist guide services has been done well so that the level of tourist satisfaction is good. Tour guide service and level of tourist satisfaction encourage revisiting intention of the tourists. Guide service has a real influence on the level of tourist satisfaction. Communication indicator has the highest relationship value. Tourist satisfaction also has a real influence on the revisiting intention of tourists. Quality of activities indicator has the highest relationship value on the model. Tour guide service also influences revisiting intention even though the value is not as high as other variables. Development can be in the form of adding new tourism objects based on the potential of the region which is expected to increase tourist satisfaction so as to increase the revisiting intention of the tourists in the future.
REFERENCES


SOCIAL ENTREPRENEURSHIP INTENTION: A SYSTEMATIC LITERATURE REVIEW

Danang Nugroho*, Margo Purnomo, Bambang Hermanto, Erna Maulina
Department of Business Administration, University of Padjajaran, Bandung, Indonesia
*E-mail: danang17003@mail.unpad.ac.id
ORCID: 0000-0002-7189-5329

ABSTRACT
The concept of Social Entrepreneurship is interesting because this research is focused on achieving profit but also creates benefits for the community, especially in the last decade. This study is to find out what is the impact of social entrepreneurial intention as a step to conduct a literature review to understand the new developments and discoveries that have emerged in previous research. The systematic literature review is used in this research methodology so that the systematically review can be explained. Based on the findings of the literature review study, it is expected that there are methods or frameworks that can be used for researchers as well as practitioners to understand the formation of social entrepreneurial intentions so that they can inspire further research.

KEY WORDS
Social entrepreneurial intention, social entrepreneur, systematic literature review, intentions.

Many research concepts from entrepreneurs are currently being studied by academics as one of the fields that have caught their attention in recent years. The concept of entrepreneurs is also glimpsed by the government because the impact of this entrepreneurial process is proven to be able to increase growth in the economic, social sector and also support political stability in a country. Research that supports this is from Thurik & Wennekers, (2004) which states that the role of entrepreneurs can be an effective instrument to reduce social problems, then research from Nawaser et al, (2011) which states that there is a positive relationship between entrepreneurship and poverty reduction from Kebaili et al (2017).

The role of Entrepreneurship can be evidence in increasing effective instruments for economic value creation and can simultaneously solve various social problems. The concept which has two dual traits turns out to be increasingly popular in practice and theory, so that these two concepts have the name of a new research, namely "Social Entrepreneurship" (Nicholls, 2010). The concept of Social Entrepreneurship is needed for developing countries as one of the catalysts to accelerate the process of addressing gaps in social, economic and political development so that economic and social development can be an anticipate (Tiwari et al, 2017).

The concept of social entrepreneurs today uses a combination of principles that are used for companies, business principles, or principles commonly used by capitalism to be able to create social change by building or managing a business. This combination is done solely to address social problems with innovative solutions (Tran & Korflesch, 2016). In addition to achieving profits, organizations in Social Entrepreneurship also prioritize other things in the form of benefits that can be felt by the wider community. This is what distinguishes Social Entrepreneurship from other entrepreneurial activities.

In this study, researchers will use analytics approach to find research that has been done on Social Entrepreneurial Intention. This analysis is conducted to learn how to apply the theory that has been used in the Social Entrepreneurs Intention. Basically, the purpose of this study is to discuss the Social Entrepreneurial Intention by discussing systematic literature, and offering some suggestions or references for related research in the future. The Systematic literature review method will provide information obtained from previous research, therefore research can provide advice based on research and empirical research. Furthermore, all of these articles will discuss the Concept Social Entrepreneurial Intentions,
explanations about research, and the results of literature analysis, information obtained and suggestions for use based on theoretical perspectives.

**LITERATURE REVIEW**

The concept of social entrepreneurship dwells on idea about venture creations by adding social benefits as an end goal. Social entrepreneurs will always try various unique ways of providing solutions to various problems in education, environment, trade, health and human rights (Lacap et al., 2018). With this, social entrepreneurship is considered a key factor for a nation's sustainable development (Lacap et al., (2018); Mair & Noboa, (2006)). Social entrepreneurship is considered a sub-discipline in the field of entrepreneurship. Mair & Noboa, (2006) suggests that social entrepreneurship is a process that includes: discussing social problems and specific solutions (or solving solutions) to overcome them; evaluation of social impacts, business models and business sustainability, creating social mission for non-profit business oriented that focus on dual or triple chases from the bottom line.

The environment of social entrepreneurship is based on the concept of business creation. The word "social" in social entrepreneurship explains art and science doing and creating opportunities and also organizations that require high creativity, risk taking and profit maximization. From the point of view of Jean-Baptiste Say as an economist, an entrepreneur is someone who uses resources to produce greater output and achieve high levels of productivity. As for Schumpeter (1975), an entrepreneur is an innovator. In addition, Drucker (1995) defines an entrepreneur as someone who continues to look for change and someone who uses opportunities in the environment (Lacap et al, 2018). From this perspective, Mair & Marti, (2006) defines social entrepreneurship as an innovation process in which resources are used to take advantage of environmental opportunities and meet social needs. Therefore, social entrepreneurship is basically normal individuals who carry out extraordinary activities (Mair & Noboa, 2006). This social entrepreneurship has an unyielding motivation to change society. This trait is known as entrepreneurial quality (Drayton, 2002).

The concept of social entrepreneurship is about helping others (Prabhu, 1999). The concept of social entrepreneurship can be altruism, in addition to helping other people, this activity can also fulfill the personal needs obtained when involved in these activities (Mair & Marti, 2006). Even business companies, social entrepreneurship can be emphasized while looking for ways to achieve profitability. Therefore, while the main concern of entrepreneurs is to seek profit (Schumpeter, 1934; Baumol, (1993) there are several factors that motivate a venture creator engages itself in the field of entrepreneurship (Mair & Marti, 2006).

There are several types of social entrepreneurship in Indonesia according to the DBS organization that take care of and monitor developments regarding the conditions of social entrepreneurship in Indonesia, for the first type is Community-based Social Enterprise, which is a business concept based on the community that has a concentration on the needs of the community itself, usually this activity is in the form of a trading union/cooperation called PERMASTE which was established to provide solutions to access special needs for the visually impaired community. In accordance with the empowerment orientation, each member and community will both get different benefits or profits (Haryanti et al, 2016).

The second type is Not-for-Profit Social Enterprise, which has the motivation from the establishment of social entrepreneurship, is a form of social concern as a way to overcome problems that occur in the community with a wider scope. For example here is a community called “BERBAGINASI” who try to raise rice packs or food from the community to be given to the homeless people, this community raises funds by selling various merchandise to public (Haryanti et al., 2016).

The third type is Hybrid Social Enterprise oriented business oriented to sustainable development. The condition of this business orientation requires a source of funds used to support a more diverse and balanced social business, from social, commercial, to commercial funds. One example is the Yayasan Cinta Anak Bangsa Foundation (Y CAB) where targeted beneficiaries are underprivileged teenagers aged 10-24 years and underprivileged mothers. This foundation has consumers from the production of their
products, besides that it also has a business unit in the form of individual donors, donor agencies or individuals / institutions that provide grants (Haryanti et al., 2016).

The fourth type is Profit-for Benefit Social Enterprise, which is a type of social entrepreneurship that is bigger than the three previous types because it has a vision and target in the form of fluency, development, and growth in forming organizations on a larger scale so that they can be independent without dependence on individuals or donors. An example of this type is Kampung Kearifan Indonesia enterprise (KKI) has activities in two parts, namely empowering local farmers to grow native Indonesian organic food and marketing their products in their own outlets which have the name The Ethno Gourmet Shop which has penetrated local and foreign markets (Haryanti et al., 2016).

Understanding an individual’s goal of managing and building a business based on their’s intentional behavior (Krueger & Carsrud, 1993). According to Bird, (1988) entrepreneurial intention is a mental orientation that directs individuals towards conception and implementation of unique business concepts. This is an individual belief in establishing an organization and is determined to implement the plan to build a business in the future (Thompson, 2009). In the context of social entrepreneurship, social entrepreneurial intention is the belief and desire of an individual to establish a social organization (Tran & Korflesch, 2016). So from this we can see that knowledge about social entrepreneurship is still very developed so that full study cannot be done yet. This study looks at the existence of several types in seeing the process from previous studies on Social Entrepreneurship.

**METHODS OF RESEARCH**

This study will be conducted using a systematic literature review. This method will help identify and make it easier for researchers to review previous research literature. This systematic literature review was adopted from Tranfield et al, (2003) which made it easier for researchers to conduct inclusion determinations according to the research theme and carry out exclusion processes that were not in accordance with the research recommendations. The use of this methodology will make it easier for researchers to get a comprehensive scope of literature. The methodology from Tranfield et al, (2003) uses 5 phases to facilitate the literature review process, namely planning, searching, screening, extraction, and synthesis, including reporting.

**Planning.** The researcher tried to make a plan in the study to be able to define the research question. The research question in this study is "What is the application of the formation of Social Entrepreneurial Intention?". The answers to the research questions will facilitate the content and see the theory and practice that occurs. The next step here is to identify the research database and use keystring for the search for the electronic database that is suitable for the research question.

**Searching.** The search process for related articles to this research question was carried out using 3 electronic databases: Emerald Insight, Sage pub and Proquest. The selection of this article is based on articles that provide good presentations about Entrepreneurial Intention, and related empirical research. The keywords used in this study is "Entrepreneurial Intention". Researchers use this keyword so they can see widely about Entrepreneurial Intention so they can answer research questions from general to specific.

**Screening.** The search results from these 3 electronic databases: Emerald Insight, Sage Pub, and Proquest produced 365 articles listed with the abstract. After that, the researcher reviews the results of the study using the research question, "What is the application of the formation of Social Entrepreneurial Intention?". Then the researchers carried out the specified inclusion and exclusion techniques to simplify the review of the articles. The inclusion criteria that the researchers did were:

- Only choose articles in English;
- Only articles in research papers;
- No Duplication;
- Read Abstract which contains an explanation the research question;
- Articles that show empirical research methods.
And, the exclusion criteria that researchers do are:

- Articles not using English language;
- Not included articles others than research paper papers (such as magazines, books, conference papers, proceeding papers, audio / video, Thesis / dissertation);
- Articles that do not fit with the research question;
- Have duplication.

![Figure 1 – Literature search process (Source: Chandorkar, 2013)](image)

*Extraction.* Based on the results of the screening criteria above, the researcher obtained 57 articles from the inclusion results to search for "Entrepreneurial Intention" as a search technique in general, then the researchers’ re-inclusion in accordance with research
questions that only sought themes for Social Entrepreneurial Intention. So the researchers only got 6 articles that specifically answered the research questions. This shows that research on social entrepreneurial intention is still rarely done. Researchers deliberately chose these research keywords in general to see all of the methods and also theoretic basis used in research in general. From these results the researchers conducted in-depth reviews as outlined in Excel as the inclusion database. This database using Excel is useful to be able to find out and dissect the article in a structural dissection and reviews in the form of columns available in Excel (Tranfield et al, 2003). Using Excel column, researchers can group information on aspects of the article. Information that researchers do is by grouping articles in the form of Title, Author, Publisher, and year of publication. After doing this, the researcher also made a group for paper type, Research design, Research Method, and locus from the previous research. The next step, the main elements in making this article such as the purpose of research, definition of research, keywords used within the research, aspects, and analyzed units will be performed. The focus of this study is to look at the unit of analysis from previous studies on social entrepreneurial intention.

RESULTS OF STUDY

In this section, the researcher will explain the findings of a systematic review that has been identified based on group criteria in the excel database. The researcher will explain the findings of the article from the year and publication, namely as many as 6 previous articles that specifically discuss the research question.

Classification based on Year and Publication. The researchers found that the beginning of research on social entrepreneurial intention began in 2011. This shows that this research is still relatively fresh and able to improve new research about social entrepreneurial intention. From 6 articles that the researchers found, it was found 2 articles published in 2011 and the rest running every year from 2015-2018, each of which was 1 article. Publishers from these 6 articles are Asia Pacific Journal of Innovation and Entrepreneurship, South Asian Journal of Business Studies, Journal of Science and Technology Policy Management, Social Enterprise Journal, Education and Training, and finally the International Journal of Entrepreneurial Behavior & Research.

Classification Based on paper type. Based on the classification of the systematic literature review, researchers classified the paper type from Petersen et al. (2008), there are 6 kinds of categories from the research paper facet:

1. Validation Research: These techniques investigated are novel and have not yet been implemented in practice. Techniques used are for example experiments, i.e., work done in the lab.
2. Evaluation Research: These techniques are implemented in practice and an evaluation of the technique is conducted. That means, it is shown how the
technique is implemented in practice (solution implementation) and what are the consequences of the implementation in terms of benefits and drawbacks (implementation evaluation). This also includes identifying problems in industry.

3. **Solution Proposal:** A solution for a problem is proposed, the solution can be either novel or a significant extension of an existing technique. The potential benefits and the applicability of the solution is shown by a small example or a good line of argumentation.

4. **Philosophical Papers:** Papers sketch a new way of looking at existing things by structuring the field in form of a taxonomy or conceptual framework.

5. **Opinion Papers:** These papers express the personal opinion of somebody whether a certain technique is good or bad, or how things should been done. They do not rely on related work and research methodologies.

6. **Experience Papers:** Experience papers explain on what and how something has been done in practice. It has to be the personal experience of the author.

The findings from this previous study found that there are 2 results of articles from Tran & Korflesch (2016) and Jiao (2011) using Philosophical Papers type, 2 previous studies using Validation Research, from Lacap et al (2018), Kirby & Ibrahim (2011). And the next 2 studies using Evaluation Research, articles from Urban & Kujinga (2017) and research from Hockerts (2015). There are still many opportunities to conduct this research in the social entrepreneurial intention field because this research is still very few.


**The application of Social entrepreneurship intention,** Hockerts, (2015) with the title "Determinants of Social Entrepreneurial Intentions" is a development of the Theory of Planned Behavior (Ajzen, 1991) which has been modified by Mair & Noboa, (2006) it generate a new variable such as, Empathy, Moral Obligation, Social Entrepreneurial Self-Efficacy, Perceived Social Support and Experience as Antecedent of Social Entrepreneurial Intention. This study uses a survey method to 181 Malaysian students who have studied which personality traits (predictable characteristics and openness) predict certain characteristics of social entrepreneurial intentions (such as having a social vision or looking
for social innovation opportunities). The practical implications of these studies suggest that policy makers and business schools want to boost the proportion of their alumni are involved, more service learning in social organizations, and it will tend to promote social entrepreneurial intentions. This research shows opportunities for future research because there is still a gap between intention and implementation which makes them motivated for this outcome to become a reality in the real world. And also need to add some variables that interact with deep beliefs or mental prototypes in forming social entrepreneurial intention.

Lacap et al, (2018) is the form of development from Hockerts, (2015) who want to research the Filipino and Indonesian university students from selected higher education institutions (HEIs) using a quantitative research design and use the method of structural equation modeling - partial least square to measure the direct and indirect effects of the structural model. The result is the prior experience variable with social problems is positively and significantly related to empathy, moral obligation, social entrepreneurial self-efficacy and perceived social support as well as findings from Hockerts, (2015). This study suggests an intervention for each individual to participate in solving social problems because this can encourage people to form an increase in social entrepreneurial intention.

Kirby & Ibrahim, (2011) use The Theoretical Framework is Ajzen's Theory of Planned Behavior. Data collection is a questionnaire survey of 183 of the 2,000 undergraduates at the British University in Egypt, drawn three faculties from the University. The findings of this study state that most students are confused about social entrepreneurship, because they do not know what to do and the actual about social entrepreneurship. Although in Egypt there are already 3 well-known social entrepreneur organizations such as Ashoka Arab World, The Schwab Foundation and Yes Egypt that strive to support and promote social enterprise in Egypt but these students do not understand it. These students are more likely to choose as wealth-creating business entrepreneurs than entrepreneurs who create social value for others.

Urban & Kujinga, (2017), This study discusses several contextual factors from the influence of the institutional environment to individual behavior, using sample 153 students from a total population of 1,200 students in Management and Commerce at three different prominent public universities in South Africa in understanding the concept of social entrepreneurs. This study uses a quantitative data method with a cross-sectional survey design by hypothesizing the influence of different institutional profiles in social entrepreneurial intentions, by using correlation analysis and structural equation modeling. The variables used in this research are regulatory environment, normative environment, cognitive environment, Desirability, Feasibility in forming construct for social entrepreneurial intention. The results of this study show that the regulatory environment has a positive and significant result impact on feasibility and desirability. And, feasibility and desirability give a positive impact on social entrepreneurial intention.

Classification based on Research Methods. This research detected only the quantitative method and a conceptual model from the previous research. This quantitative method is used by using a survey to collect a large amount of data that affects behavior in the formation of social entrepreneurial intention.

CONCLUSION

This research was conducted using a systematic literature review to answering the research questions in the form of "What is the application of the formation of Social Entrepreneurial Intentions?". The researcher collected various articles and included inclusion to answer the criteria of the research question. The results are 6 articles found from electronic database such as the Emerald Insight, Proquest and Sage Pub. The first study of the intention of social entrepreneurship began in 2011 and began to develop the following year.

There are 2 types of research methods that were found in reviewing this study, namely in the form of quantitative data with surveys and conceptual papers. This shows that research from this field is still fairly new and appealing because researchers want to examine
empirical research can understand the situation in shaping social entrepreneur intention. In this study there are findings of research to facilitate researchers and practitioners in the future.

Researcher suggest to using Empirical research that can be done in the future is to use theoretical framework from Theory of Planned Behavior (TPB) (Ajzen, 1991) or using modified TPB theory from Mair & Noboa, (2006) which was adapted and tested by Hockerts (2015) and Lacap et al, (2018). The researcher saw that the research could be updated to adjust to the current situation in order to be able to resolve some of the obstacles that occurred.

Possible empirical research in the future is to use the framework of Urban and Kujinga, (2017) by looking at the variables of Desirability and Feasibility in the institutional environment. Using samples for students which are intended to provide greater heterogeneity and importance in higher education is a great potential to become candidates who promise social entrepreneurs. In the future research that can be done is to include factors such as moral judgment and empathy (Mair & Noboa, 2006), and it can also include other factors such as environmental factors such as cultural values, and factors of observable influences such as cultural traditions, or social norms and values.

REFERENCES


SHOPPING BEHAVIOR OF INDONESIAN CUSTOMER IN MODERN RETAIL

Farisa Harahap Yulita*, Megawati Simanjuntak, Bagus Sartono
School of Business, Bogor Agricultural University, Indonesia
*E-mail: yulita_farisa@gmail.com

ABSTRACT
The purpose of this study is to analyze the consumer shopping behavior in modern retail. The method used in this research was cross sectional design. The data obtained was processed using quantitative approach with descriptive analysis and carried out by online survey. Population of this study is visitors who visit the groceries store. The sampling technique in this study used convenience sampling method. Sample in this study were 212 respondents. Criteria of respondents are customers who visit modern retailers at least three times in the last month with a minimum age of 17 years. The average expenditure of modern retail customers per shopping activity, both hypermarkets and supermarkets, is in the range of Rp 100.000 - Rp 500.000. The average time of visit hypermarket respondents is 1-3 hours for both men and women. For supermarkets, the average time of visit for woman respondents is <1 hour while men visit 1-3 hours. According to the type of retail, the time of visit to the hypermarket is 1-3 hours while for supermarket <1 hour. For hypermarkets, respondents prefer to pay using debit with a purchase amount of Rp 100.000 - Rp 500.000. Respondents who shop at the supermarket type of payment using cash with expenditure amount of Rp 100.000 - Rp 500.000.

KEY WORDS
Hypermarkets, shopping behavior, supermarkets, public service.

Retail is a series of business activities that sell products or services. It has been given additional value to be able to meet personal, family, group or end-user needs in retail quantities. Retail business in Indonesia can be classified based on its nature, namely traditional (conventional) retail and modern retail. In a process of distributing goods, retail becomes the last and most important link that connects between producers and consumers (Utami 2010).

Retail business in Indonesia period 2005 to 2013 is growing rapidly. During this period, the growth of the number of modern retailers averaged around 19 percent and around 6 percent per year for the growth of the number of traditional retailers (Hikmawati 2018). It is indicated by the very aggressive expansion of modern retail into the residential areas (Saidani and Arifin 2012). The retail growth rate was influenced by the increasing population, the strength of people's purchasing power and the fulfillment need for consumed products (Solha 2008).

The growing number of people makes Indonesia the most potential consumer market. The survey conducted by the Boston Consulting Group (BCG) recorded 88 million people which is about 35 percent of the population are middle class consumers, who regularly spend more than Rp 2 million per month on routine household expenses, including food, transportation, communication and other ordinary household supplies. In 2020, this number will estimate at 141 million, representing 53 percent of the market share (HKTDC 2017).

This condition responded quickly by foreign and domestic investors to develop retail properties and shopping centers (shopping malls and department stores) in Indonesia. The industry categories that still the widest tenants are the fashion industry and food and beverages. The fashion industry represents around 60 percent of total leasing transactions in 2017 followed by food and beverages industry with 30 percent and the rest for health, beauty and jewelry retailers. Although the modern retail industry in the food and beverages sector has been proven to have great potential in the past six years when the retail market has
entered a challenging period. In recent years, there has been a decline in sales of modern retailers in Indonesia.

Several modern retail outlets in the past few years have closed branch shops in several regions due to high operational costs but lack of visitors. Consumer behavior is changing today with the phenomenon of the development of internet networks affect sales activities, especially the retail sector. The development of technology shifts consumer behavior from offline purchases to online shop purchases. About 4.6 million online buyers were recorded in 2013 which increased to 8.7 million in 2016. According to Singapore Post Limited (2014) e-commerce sales in 2013 reached 1.8 billion and increased to 4.49 billion.

This condition is a challenge for modern retail outlets to be able to survive amid the emergence of similar e-commerce businesses. Increasing e-commerce sales will bring the trend of the emergence of online shops which will ultimately reduce the number of visitors to offline stores because of the convenience offered by online stores. Decreasing number of offline store visitors indicates that consumer buying interest in offline stores has also declined (Shahnaz 2016).

The growth population in Indonesia continues to increase every year. The result is an increasing in national food demand and consumption. This makes the modern retail business in the food and beverages category still has great potential in Indonesia. But along with the presence of online shopping sites which, according to Pebriani (2017), are becoming part of the development of e-commerce businesses that are increasing rapid and offer alternative ways of shopping for consumers resulting in these online stores being able to complement or replace existing conventional shops. This is because these online stores are not limited by space or time (Budian 2015). Although Colliers International Indonesia Research (2017), recorded that currently only 1 percent of consumers did online shopping for groceries. The increasing volume of internet users in Indonesia can be a threat to retail businesses in maintaining outlets modern retail floor.

From a survey conducted by Singapore Post, the preference of Indonesians to shop through groups on social media is most dominant so they can connect directly with retailers. Others use social media platforms such as online forums to share shopping experiences and products that have been purchased. The increasing number of internet users is now in line with the increase in online transactions to reach 10 percent and an increasing number of online shoppers. Based on the description above, the purpose of this study is to analyze consumer shopping behavior in modern retail.

**LITERATURE REVIEW**

The definition of modern retail according to Utami (2010) is a sales activity that involves solving large quantities of products or goods to be distributed directly in small quantities to end consumers who are tailored to their needs. The main characteristic of modern retail is management that is carried out in a modern way using technology, prices cannot be negotiable, facilities provided are sophisticated, there are several payment methods that can be used namely credit cards, debit cards or e-money, using the principle of self-service, there are promos, discounts and prizes, generally managed by the private sector and the condition of the building or building is clean and well maintained (Purnomo et al. 2013).

The classification of modern retail business based on the area of sales according to Davison (1988) and Evans and Berman (1998) include kiosks; small shop with an area of less than 100 m², minimarkets; operated with a sales area of 100 m² to 1000 m², supermarkets; operated with sales area of 1000 m² to 5000 m², hypermarkets; operated with a sales area of more than 5000 m². This is also stated in the Republic of Indonesia Presidential Regulation Number 112 of 2007 has been concerned the Arrangement and Development of Traditional Markets, Shopping Centers and Modern Stores, that what is meant by modern stores is a shop with an independent service system, selling various types of goods in retail, minimarkets, supermarkets, department stores, hypermarkets and wholesalers in the form of grocery.
Purchasing behavior according to Kotler and Armstrong (2008) is the buying behavior of end consumers, individuals and households who buy goods and services for personal consumption. Purchasing behavior is often influenced by individual thoughts and feelings towards certain objects (Siswanto, 2009). Consumer behavior is all consumer actions to obtain, use and sell goods or services in order to meet their needs. Individuals have the power to decide something, then consumer preference for an object becomes something very important to know. The importance of purchasing comes from the strong need for a product, the involvement of one’s ego on the product, and the severity of social and financial consequences of poor decision making. This causes consumers to look for additional information about the product. Consumers in the search and use of information have the value or benefits obtained from that information. Information that is valuable helps consumers to make purchasing decisions that are more satisfying and avoid negative consequences related to poor decision making (Boyd, et al., 2000).

METHODS OF RESEARCH

The method used in this research was cross sectional design. The data obtained was processed using quantitative approach with descriptive analysis and carried out by online survey methods to respondents. Population of this study is visitors who visit the groceries store. The sampling technique in this study used convenience sampling method. Criteria of respondents are customers who visit modern retailers at least three times in the last month with a minimum age of 17 years. Sample in this study were 212 respondents. Data collected in the study was primary data. Primary data that includes all the independent and dependent variables in this study. This study used an online questionnaire with Google Docs.

RESULTS AND DISCUSSION

This research was conducted on 212 respondents who are modern retail consumers. The profile of respondents in this study shows in Table 1 include gender, age, city, recent education, and job. Table 1 shows the profile of research respondents based on demographic aspects.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Category</th>
<th>Amount (n)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>46</td>
<td>21.7</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>166</td>
<td>78.3</td>
</tr>
<tr>
<td>Age</td>
<td>20 – 24</td>
<td>37</td>
<td>17.5</td>
</tr>
<tr>
<td></td>
<td>25 – 35</td>
<td>138</td>
<td>65.1</td>
</tr>
<tr>
<td></td>
<td>36 – 45</td>
<td>26</td>
<td>12.3</td>
</tr>
<tr>
<td></td>
<td>46 – 55</td>
<td>9</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>&gt; 55</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>Level of education</td>
<td>Post graduated (S2/S3)</td>
<td>26</td>
<td>12.3</td>
</tr>
<tr>
<td></td>
<td>Under graduated (S1)</td>
<td>163</td>
<td>76.8</td>
</tr>
<tr>
<td></td>
<td>Diploma (D3)</td>
<td>10</td>
<td>4.7</td>
</tr>
<tr>
<td></td>
<td>Senior High School</td>
<td>13</td>
<td>6.1</td>
</tr>
<tr>
<td>Job</td>
<td>Student</td>
<td>30</td>
<td>14.2</td>
</tr>
<tr>
<td></td>
<td>Entrepreneurs</td>
<td>17</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td>Housewives</td>
<td>27</td>
<td>12.7</td>
</tr>
<tr>
<td></td>
<td>Private employee</td>
<td>69</td>
<td>32.5</td>
</tr>
<tr>
<td></td>
<td>Civil servant/Police/Army</td>
<td>31</td>
<td>14.6</td>
</tr>
<tr>
<td></td>
<td>Freelance</td>
<td>5</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td>Unemployment</td>
<td>10</td>
<td>4.7</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>23</td>
<td>10.8</td>
</tr>
<tr>
<td>City</td>
<td>Bogor</td>
<td>69</td>
<td>32.5</td>
</tr>
<tr>
<td></td>
<td>Jakarta</td>
<td>45</td>
<td>21.2</td>
</tr>
<tr>
<td></td>
<td>Medan</td>
<td>16</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>Pekanbaru</td>
<td>16</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>Bekasi</td>
<td>12</td>
<td>5.7</td>
</tr>
</tbody>
</table>
Table 1 shows that the majority of modern retail respondents were female with total is 166 people (78.3%) and male with total is 46 people (21.7%). The results of this study indicate that woman respondents are more dominant to shopping because their needs are more than men. The respondents of modern retail consumers decided into five categories. First category is 20-24 years old (17.5%). Second category is 25-35 years old (65.1%). Third category is 36-45 years old (12.3%). Fourth category is 46-55 years old (4.2%). The last category is > 55 years old (0.9%). These results indicate that the second category that dominates modern retail consumers because the age group generally has the power to make a living in meeting their daily basic needs.

Respondents who go shopping in modern retail are dominated by respondents with undergraduate education (76.8%). The next respondent was dominated by respondents with post graduated education (12.3%). The education level of the next respondent was high school (6.1%) and diploma education level (4.7%). These results indicate that the level of education affects consumer consumption of an item or service because differences in the level of education can determine the way of view and sensitivity of consumers to information (Sumarwan 2011).

Respondents who go shopping in modern retail based on the type of job are divided into eight groups, namely students, entrepreneurs, housewives, private employees, civil servants/police/army, freelancers, unemployment, and others. The results showed that respondents who go shopping in modern retail were dominated by private employees (32.5%), the second was servants/police/army (14.6%), and the third was students (14.2%). The least number of respondents in the job category was freelancers (2.4%). The number of respondents from the employee and student groups shows that respondents in this group have a high need for shopping for daily necessities to modern retail outlets.

Distribution city of modern retail respondents in this study decided into five categories. Most of the respondents are lived in Bogor (32.5%). The second was in Jakarta (21.2%). The large number of respondents from Bogor shows that the development of modern retailers generally still occurs in urban areas because of the densely populated population and the lifestyles of developing urban communities.

Every modern retail customer will have a different shopping behavior. Shopping behavior will be seen based on the average expenditure when shopping, the average visit time, favorite days visiting modern retail, and payment methods for modern retail customers. Table 2 shows the shopping behavior of modern retail customers by research respondents.

Table 2 – Respondents’ behavior in shopping in modern retail

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Hypermarket</th>
<th></th>
<th>Supermarket</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount (n)</td>
<td>Percent (%)</td>
<td>Amount (n)</td>
<td>Percent (%)</td>
</tr>
<tr>
<td>The average expenditure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; Rp 100,000</td>
<td>5</td>
<td>3.6</td>
<td>2</td>
<td>2.7</td>
</tr>
<tr>
<td>Rp 100,000 – Rp 500,000</td>
<td>97</td>
<td>70.3</td>
<td>53</td>
<td>71.6</td>
</tr>
<tr>
<td>Rp 500,000 – Rp 1,000,000</td>
<td>23</td>
<td>16.7</td>
<td>14</td>
<td>18.9</td>
</tr>
<tr>
<td>&gt; Rp 1,000,000</td>
<td>13</td>
<td>9.4</td>
<td>5</td>
<td>6.8</td>
</tr>
<tr>
<td>The average visit time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 1 hour</td>
<td>48</td>
<td>34.8</td>
<td>33</td>
<td>44.6</td>
</tr>
<tr>
<td>1 – 3 hours</td>
<td>90</td>
<td>65.2</td>
<td>39</td>
<td>52.7</td>
</tr>
<tr>
<td>&gt; 3 hours</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2.7</td>
</tr>
<tr>
<td>Favorite days</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekends and national holidays</td>
<td>75</td>
<td>54.3</td>
<td>42</td>
<td>56.8</td>
</tr>
<tr>
<td>Weekdays</td>
<td>63</td>
<td>45.7</td>
<td>32</td>
<td>43.2</td>
</tr>
<tr>
<td>Payment methods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debit</td>
<td>67</td>
<td>48.6</td>
<td>39</td>
<td>52.7</td>
</tr>
<tr>
<td>Credit</td>
<td>6</td>
<td>4.3</td>
<td>5</td>
<td>6.8</td>
</tr>
<tr>
<td>Cash</td>
<td>65</td>
<td>47.1</td>
<td>30</td>
<td>40.5</td>
</tr>
</tbody>
</table>

Table 2 shows that the average expenditure of modern retail customers per shopping activity, both hypermarkets and supermarkets, is in the range of Rp 100,000 - Rp 500,000. Respondents who are hypermarket customers spend their money around Rp 100,000 -
Rp 500.000 on each purchase (70.3%). Similar to hypermarkets, respondents who are supermarket customers also spend their money around Rp 100.000 - Rp 500.000 for each purchase (71.6%).

The average visit time spent by respondents who are modern retail customers will be different. Based on Table 2, it is known that 65.2 percent of respondents who are hypermarket customers have an average visit time of 1 to 3 hours per arrival to shop. As many as 52.7 percent of respondents who are supermarket customers have an average visit time less than 1 hour. In this study it is also known that there are only 2 respondents who are supermarket customers who spend more than 3 hours in each arrival shopping.

The favorite day of the respondents to shop at modern retailers of hypermarkets and supermarkets has the same behavior. As many as 54.3 percent of respondents who are hypermarket customers agree that weekends and national holidays are the right day to shop. This is also similar to respondents who are supermarket customers. As many as 56.8 percent of respondents prefer weekends and national holidays to shop.

The payment method that preference of hypermarket and supermarket customer respondents is debit. Hypermarket customer respondents are preferred to pay using the debit method (48.6 %). Supermarket customer respondents are preferred to pay using the debit method (52.7%).

Shopping at hypermarkets also requires time to shop. The duration of the visit was divided into three categories, namely <1 hour, 1-3 hours, and > 3 hours. The respondents who needed spending time for <1 hour as many as 49 women, 1-3 hours as many as 74 women and >3 hours as many as 2 women. For men respondents, 29 respondents only needed 1-3 hours to shop. This shows that woman respondents dominated with duration of visit 1-3 hours.

Table 3 – Distribution of respondents by gender and time of visit in the Hypermarket category

<table>
<thead>
<tr>
<th>Gender</th>
<th>Time of visit</th>
<th>&lt; 1 hour</th>
<th>1-3 hours</th>
<th>&gt; 3 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td></td>
<td>49</td>
<td>74</td>
<td>2</td>
</tr>
<tr>
<td>Men</td>
<td></td>
<td>0</td>
<td>29</td>
<td>0</td>
</tr>
</tbody>
</table>

Similar to hypermarkets, supermarkets are visited by women and men. The time of visit was the same as the hypermarket. Women respondents needed <1 hour for visit the hypermarket as many as 32 respondents. Woman respondents needed 1-3 hours as many as 10 respondents. Men respondents needed 1-3 hours as many as 18 respondents.

Table 4 – Distribution of respondents by sex and length of visit in the Supermarket category

<table>
<thead>
<tr>
<th>Gender</th>
<th>Time of visit</th>
<th>&lt; 1 hour</th>
<th>1-3 hours</th>
<th>&gt; 3 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td></td>
<td>32</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Men</td>
<td></td>
<td>0</td>
<td>18</td>
<td>0</td>
</tr>
</tbody>
</table>

There are two types of retail modern, namely hypermarkets and supermarkets. When shopping, respondents need different times. The time of visit divided into 3 categories, namely <1 hour, 1-3 hours, and > 3 hours. Respondents who visited the hypermarket with time of visit <1 hour were 49 respondents. Respondents who visited the hypermarket with time of visit of 1-3 hours were 103 respondents. Respondents who visited the hypermarket with time of visit >3 hours were 2 respondents. Respondents who visited supermarket with time of visit <1 hour were 32 respondents. Respondents who visited Supermarket with time of visit of 1-3 hours were 28 respondents. This shows that respondents most often visit hypermarkets with time of visit for 1-3 hours.

On every purchase, there are 3 types of payments, namely debit, credit, and cash. Whereas the expenditure has four categories, namely <Rp 100.000, Rp 100.000 - Rp 500.000, Rp 500.000 - Rp 1.000.000, and >Rp 1.000.000. At the hypermarket, respondents who use the type of debit payment with an expenditure <Rp 100.000 as many as 5
respondents. Respondents who used a type of debit payment with an expenditure Rp 100.000 - Rp 500.000 as many as 60 respondents. Respondents who used a type of debit payment with an expenditure > Rp 1.000.000 as many as 12 respondents.

Table 5 – Distribution of respondents based on time of visit and type of retail

<table>
<thead>
<tr>
<th>Time of visit</th>
<th>Hypermarket</th>
<th>Supermarket</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 hour</td>
<td>49</td>
<td>32</td>
</tr>
<tr>
<td>1 – 3 hours</td>
<td>103</td>
<td>28</td>
</tr>
<tr>
<td>&gt; 3 hours</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

A total of 8 respondents used the type of credit payment with expenditure Rp 100.000 - Rp 500.000. A total of 41 respondents used a type of cash payment with expenditure Rp 100.000 - Rp 500.000. Respondents who used the type of cash payment with expenditure Rp 500.000 - Rp 1.000.000 as many as 28 respondents. This can indicate that most respondents use debits and range of expenditure is Rp 100.000 - Rp 500.000.

Table 6 – Distribution of respondents based on the type of payment and expenditure on the hypermarket category

<table>
<thead>
<tr>
<th>Type of payment</th>
<th>Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Debit</td>
<td>5</td>
</tr>
<tr>
<td>Credit</td>
<td>0</td>
</tr>
<tr>
<td>Cash</td>
<td>0</td>
</tr>
</tbody>
</table>

1: < Rp 100.000; 2: Rp 100.000 – Rp 500.000; 3: Rp 500.000 – Rp 1.000.000; 4: > Rp 1.000.000.

Every time you spend at supermarket, respondents use 3 types of payments, namely debit, credit, and cash. In addition, there are large expenditures divided into four categories, namely <Rp 100.000, Rp 100.000 - Rp 500.000, Rp 500.000 - Rp 1.000.000, and >Rp 1.000.000. Respondents who used the type of debit payment and expenditure were <Rp 100.000 as many as 2 respondents. Respondents who used the type of debit payment and expenditure range Rp 100.000 to Rp 500.000 for 19 respondents. Respondents who used the type of debit and expenditure payments amounted >Rp 1.000.000 as many as 7 respondents. Respondents who used the type of credit payment and expenditure range Rp 100.000 to Rp 500.000 for 4 respondents. Respondents who used a type of cash payment and expenditure range Rp 100.000 to Rp 500.000 as many as 20 respondents. Respondents used the type of cash payment and expenditure range Rp 500.000 to Rp 1.000.000 for 8 respondents. This showed that the most respondents in the supermarket used cash with an expenditure range Rp 100.000 to Rp 500.000.

Table 7 – Distribution of respondents based on the type of payment and expenditure in the Supermarket category

<table>
<thead>
<tr>
<th>Type of payment</th>
<th>Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Debit</td>
<td>2</td>
</tr>
<tr>
<td>Credit</td>
<td>0</td>
</tr>
<tr>
<td>Cash</td>
<td>0</td>
</tr>
</tbody>
</table>

1: < Rp 100.000; 2: Rp 100.000 – Rp 500.000; 3: Rp 500.000 – Rp 1.000.000; 4: > Rp 1.000.000.

CONCLUSION

The average expenditure of modern retail customers per shopping activity, both hypermarkets and supermarkets, is in the range of Rp 100.000 - Rp 500.000. The average time of visit by hypermarket and supermarket respondents is 1-3 hours. The favorite day to visit of the respondents to shop at the types of modern retailers of hypermarkets and
supermarkets has the same behavior, namely weekends. The payment method for hypermarket and supermarket respondents is debit.

The average time of visit hypermarket respondents is 1-3 hours for both men and women. For supermarkets, the average time of visit for woman respondents is <1 hour while men visit 1-3 hours. According to the type of retail, the time of visit to the hypermarket is 1-3 hours while for supermarket <1 hour.

For hypermarkets, respondents prefer to pay using debit with a purchase amount of Rp 100.000 - Rp 500.000. Respondents who shop at the supermarket type of payment using cash with expenditure amount of Rp 100.000 - Rp 500.000.

Suggestion for further research is that it is necessary to do research on tenant mix in shopping malls that have modern retail stores in the category of groceries.

REFERENCES

ANALYSIS OF FINANCING RISK USING CREDIT SCORING ON MICROFINANCE: A CASE STUDY IN X ISLAMIC BANK

Safitri Dayu*, Novianti Tanti, Sartono Bagus
School of Business, IPB University, Indonesia
*E-mail: dayusafitri@gmail.com

ABSTRACT
Credit scoring is a tool used to measure and predict the financing risk for the financing to be provided. An inaccurate scoring model will increase the financing risk. This study aims to examine the credit scoring used by X Islamic Bank, by using the logistic regression test. The results showed that from the 11 variables used, only 4 variables significantly affect the quality of financing and the R Square of the model is 2.3%.

KEY WORDS
Credit scoring, financing risk, Islamic bank, microfinancing.

Small and Medium Entreprises (SMEs) have an important role in the economy of a country. Therefore, SMEs needs to be constantly developed and empowered. Support is necessary from various parties to realize competitive SMEs in the free market. Such support is beneficial for SMEs in maintaining a business when the country’s economy is hit by a crisis.

Islamic Banking is a financial institution that becomes a mediator between those who have excess funds and lack of funds. The role of Islamic Banking, in general, is to be able to provide benefits to all people. The SMEs actors can utilize the existence of Islamic Bank in developing business, especially helping the problem of limited capital through a product called microfinance. Microfinance is financing intended for people with a business of 2 years minimum. The bank will experience several risks when conducting financing disbursement, one of which is financing risk.

In terms of financing risk, bad financing is the source of loss for X Islamic Bank. Non-performing finance in banks is the total financing quality is in the substandard, doubtful, and bad category. The NPF level can be obtained through a comparison between the number of problem financing and total financing. X Islamic Bank has a quite high NPF level because it is above the bank’s health standard set by the Indonesian Bank at 5%.

Islamic Bank must be able to manage financing risk due to the potential failure of other parties in fulfilling their agreed obligations. Risk mitigation performed by X Islamic Bank at...
the beginning of financing is by applying credit scoring used to attract prospective customers who are eligible for financing. According to Andhayani (2009), the ability of the credit scoring model as a tool to perform the financial analysis is useful as the first step in mitigating the failure of obligation fulfillment by the customer. Credit scoring is widely used in financing risk management to forecast the obstacles that customer will repay the financing. The purpose of credit scoring is to predict the risk rather than explain a risk. The important point is that credit scoring is a prediction of risk and does not explain why some customers are default while others are not. However, credit scoring needs to be reviewed periodically to see the level of accuracy and to see less significant factors.

LITERATURE REVIEW

According to Ascarya and Yumanita (2005), the basic principle of Islamic banking is to follow the Islamic rules which are free from MAGHRIB (maysir, gharar, riba, and bathil). Financing is the provision of money based on contracts between banks and customers who are obliged to return the money within a certain period of time with agreed upon profit sharing (Permata et al. 2014). Ibrahim and Ghazali (2014) defined microfinance as providing financing for the poor to help them rise from poverty through entrepreneurship.

According to BI (2011), the risk is the potential loss due to the occurrence of certain events. Risk management is essentially a series of methodologies and procedures used to identify, measure, mitigate, monitor and control risks arising from all bank business activities. Risk management is an effort to manage risk to realize the opportunity to get profits sustainably because the risks to the bank's activities are taken into account.

According to Khan and Ahmed (2008), financing risk is the risk arising from the failure of customers fulfilling their obligation fully and timely according to the agreement. Gosh (2013) argued that such financing risk is also called default risk which ensues from the uncertainty of customers in paying back the financing in time to the bank.

According to Thomas et al. (2002) credit scoring are a very important application in statistical modeling and the problem of distinguishing between good and bad. The main objective is to estimate the possibility of default. Credit scoring will provide a score for each loan applicant by defining the cut off value. Each applicant with a score lower than the cut off will be rejected and the higher one will be given financing. Cole (2014) defined Credit scoring as a numerically statistical form which results in a score, a higher score correlates with a lower chance of default.

The financing quality is based on the accuracy of principal payments and margin is divided into 5 groups, namely:
- Current (collectibility 1) is on time and no arrears installment payment;
- Special Attention (collectibility 2) is when there are arrears in payment of principal installments and/or margin that have not exceeded 3 (three) months;
- Substandard (collectibility 3) is when there are arrears in payment of principal installments and/or margins that have exceeded 3 (three) months but have not exceeded 6 (six) months;
- Doubtful (collectibility 4) is when there are arrears in payment of principal installments and/or margins that have exceeded 6 (six) months but have not exceeded 9 (nine) months;
- Bad (collectibility 5) is that there are arrears in payment of the principal installments and/or the margin has exceeded 9 (nine) months.

METHODS OF RESEARCH

Types and Source of Data. This research used primary and secondary data. Primary data was obtained by conducting in-depth interview with the Micro Manager, Branch Manager and the Group Head. While secondary data was sourced from the database of the research location, namely the X Islamic Bank.

Dependent Variable:
Y₀ = performing financing (collectibility 1-2);
Y₁ = non performing financing (collectibility 3-5).

Independent Variable: RPC ratio (X₁), Current ratio (X₂), Profitability (X₃), Business reputation/integrity (X₄), Bank relationship history (X₅), Business prospect (X₆), Dependence on suppliers (X₇), Dependence on customers (X₈), Term (X₁₀), Collateral adequacy ration (X₁₁).

Descriptive analysis is a method to describe the data that is collected simply. This analysis can be presented in table or graph, even include the calculation of standard deviation, average, and so on (Mustafa and Hardius 2007).

Logistic regression is a statistical analysis technique used to analyze data whose response variables have two or more categories with one independent variable in the category and continuous scale (Kuncoro, 2005).

The binary regression model is a model used to determine the relationship between explanatory variables (X) with a binary response variable (Y). The dependent variable Y follows the Bernoulli distribution with a chance distribution function:

\[ f(Y = y) = \pi^y (1 - \pi)^{1-y} \]

With \( y = 0 \) or \( y = 1 \), and \( \pi \) is the chance for \( y = 1 \).

If the occurrence of the Y response variable is \( n \), the chance of each event is the same, and each event is independent of each other then Y will follow the Binomial distribution. Hosmer and Lemeshow (1989) explained that the logistic regression model with \( E(Y = 1 | x) \) as \( \pi(x) \) is:

\[ \frac{e^{g(x)}}{1 + e^{g(x)}} \]

With the logistic regression, logit connecting functions are required, transform logit as a function of \( \pi(x) \) is:

\[ x = \ln \left( \frac{\pi(x)}{1 - \pi(x)} \right) = \beta_0 + \beta_1 X_1 + \cdots + \beta_\rho X_\rho \ldots \]

RESULTS AND DISCUSSION

The data description for each explanatory variable can be seen in Figure 2 to Figure 4. All customers with the 2.00x RPC ratio variable are customers in the performing financing category (Figure 2a). This is different from the results of in-depth interviews which reveal that higher the RPC ratio value is better because it means that performing financing customers are more able to pay obligations to the bank. If the RPC ratio value is too high, then the prospective customer does not really need financing, but the prospective customer only needs fresh money. Conversely, if the RPC ratio is less than 2.00x then the prospective customer cannot be given financing due to the low ability to pay. RPC ratio is part of the indicators used to see the ability to pay of the prospective customers.

Based on the percentage, customers who experienced the biggest bad credit are those with a current ratio value of less than 1, which amounted for 5.41% (Figure 2b). Setiyawan (2014) argued that the current ratio is one of the ratios that measure the level of company liquidity by comparing current assets with current debt. The higher the current ratio means the higher the company's ability to fulfill short-term financial obligations. This means that the current ratio in the results of this study is in accordance with the theory.

According to Kusumajaya (2011), the definition of profitability is a description of management's performance in managing the company. Whereas according to Winarno et al. (2015) profitability is the company's ability to make a profit. Profitability can also be interpreted as the level of net income earned by the company when conducting its operations (Soliha and Taswan 2002). Profitability has an important role in the company because the higher the profitability of the company, the company will be more capable of paying all
obligations and the company remains in a liquid state (Hanum 2012). Based on interviews conducted with the Bank, the higher the profitability of prospective customers, the higher the ability of management to manage the company. This means that the lower the profitability value, the higher the chance of bad financing. However, in this study, bad financing is in the second choice, namely customers with the profitability of 15-25% with a percentage of 3.59% (Figure 2c).

Based on the results of interviews with the Bank, reputation/business integrity was obtained from the people’s opinions located approximately 10 meters from the prospective customer's house/business and carried out without the knowledge of the prospective customer. This is to avoid collaboration between people and prospective customers to improve the character of prospective customers. The percentage of bad financing is only found in the positive opinion of 3.27% for the business reputation/integrity category (Figure 2d). While customers with negative/positive opinions are in the current financing category.

In terms of customers characteristics based on the bank relationships history, none of the customers in the bad financing is in the category of ‘frequent arrears’ because
prospective customers with a history of collectibility 3, 4, and 5 will automatically be rejected. Figure 3a shows that the highest percentage of bad financing is found in the “history of arrears” of 3.64%. This means that prospective customers have a history of collectible 2. Whereas ‘on time payment’ is seen from the history of collectibility 1. Bank relationship history can be obtained through Debtor Information (iDeb). In accordance with what is explained in POJK Number 18 /POJK.03/2017 Customer Information is information about the Customer, Fund Provision Facility received by the Customer, and other related information presented based on Customer Reports received by OJK from Reporters (Commercial Banks, BPR, BPRS, Financing Institutions that provide Fund Provision Facilities, Other Financial Services Institutions that provide Fund Provision Facilities, except microfinance institutions). According to Rosanti (2015), customer information is held in order to facilitate the process of providing funds, implementing risk management and identifying customer quality. One of the steps taken by the bank in analyzing the feasibility of financing provision is to check the financing information related to the prospective customer. The financing information is in the form of a bank or financing institution, the value of the financing facilities that have been obtained, the current payment, and other information related to the financing facility.

Business duration is the period of a businessman runs his business or the ones working period in pursuing a field of work (Setiaji and Fatuniah 2018). All customers with a business duration of fewer than three years have performing financing. Based on the results of the interview with X Islamic Bank, prospective customers who want to obtain micro financing should at least have a business that has been running for 2 years because a business with this duration can be considered as settled. According to (Ismanto and Diman 2014) (Satria et al. 2016), the longer a person’s business increasingly influences the currentness of loan repayment. However, the results of the study show that the highest proportion of non-performing customers is in businesses with 3-7 years duration of 3.77% (Figure 3b).

![Figure 4](https://example.com/figure4.png)

**Figure 4 – Percentage of financing quality for variables of (a) dependency on customers, (b) term, (c) collateral adequacy ratios**

The stable business prospect variable has a non-performing financing quality percentage of 3.49% (Figure 3c). Based on the results of the interview, it was found that stable means business with almost similar or does not change average annual turnover. While developing is a business that experiences increasing turnover every year and increasing business, such as retailers turn into wholesalers. Advanced is a business with a turnover far greater than developing and the business expansion, for example, which initially only as a clothing seller then advanced into convection and then can set up a factory. The results of the descriptive analysis show that the business progresses more smoothly
compared to the stable business. This is in accordance with the opinion of X Islamic Bank that advanced is the highest business status.

From Figure 3d, it can be seen that the percentage of bad financing for the variable of dependence on suppliers is in the limited category of 5.40%. According to the interviews with the Bank, many and varied customers' suppliers will have increased performing financing. Research shows the same results with the opinions of the Bank. Limited means that customers take goods from a limited or certain number of suppliers or 1-2 suppliers. While some say that it means customers have several suppliers or 3-5 suppliers. Many and varied means that customers have large quantities and a variety of suppliers or more than 5 suppliers.

Customers characteristic in the variable of dependency on customers (Figure 4a) for the limited category have the highest percentage of non performing financing of 5.80%. While some dependency on customers has a non performing financing of 4.31% and many and varied are 2.89%. Based on the results of interviews with the Bank, limited means business have limited customer with certain people or certain markets with around one to two customers only. While some means have more markets than limited or with 3-5 customers only. Many and varied have a much more and diverse market. Many and varied customers mean business has more than 5 customers, anyone can become their customer.

The term is the microfinance time period of a customer in X Islamic Bank. The financing period offered starts from less than 1 year to more than 3 years (Figure 4b). The customers' characteristics in the category of the highest non performing financing in the term variable are customers with a financing period of more than 3 years which amounted to 4.02%. This indicates that the risk of non-performing customers is more prone to customers with long term.

Figure 4c shows that the highest percentage of collateral adequacy ratios for customers with non performing financing is found in the category >125% -150%, which is amounted to 3.62%. Higher collateral adequacy ratio is better because it shows the value of the collateral when the customer defaults. Supriyadi and Kartikasari (2015) stated that collateral is a guarantee, namely property belonging to the customer or third party which is bound as collateral in accordance with the financing agreement. Collateral has two functions, as payment of financing if the customer is unable to pay by selling the collateral and as a determinant of the amount of financing. Banks in this case usually will not provide a financing value greater than the amount of the collateral provided. According to Bahsan (2007) in the provision of bank financing, the financing collateral is usually required for a financing provision, so ideally the collateral is expected to have high economic value and fulfill judicial aspects so that the bank will be not in a weak position when a problem occurs, because the collateral can be sold to cover the costs of uncollectible financing.

Logistic Regression Analysis. Table 1 shows Nagelkerke R-square which is R Square in multiple regression based on the likelihood estimation technique with a maximum value of less than one which is difficult to present. Therefore, Nagelkerke R-square which is a modification of Cox and Snell R Square where the values vary from 0-1, will be easier to interpret as the interpretation of R-Square in multiple regression or Pseudo R-square in multinominal logistic regression. Table 1 shows the Nagelkerke R-square value of 0.023 or 2.3%, which means that the existing variables are only able to explain the diversity of financing quality 2.3% while the remaining 97.7% is influenced or explained by other variables not included in this study.

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox and Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2871.785</td>
<td>0.006</td>
<td>0.023</td>
</tr>
</tbody>
</table>

Variables Influencing the Quality of Financing. Based on the output, it is explained that the independent variables that have no significant effect on the quality of financing are an RPC ratio, profitability, business reputation/integrity, bank relationship history, experience/duration of business, business prospects and dependency on suppliers. While the
independent variables that significantly affect the quality of financing are the current ratio, dependency on customers, the duration and the collateral adequacy ratio. All significant independent variables on the model are variables with the dichotomous binary scale (category/nonmetric). The financing risk faced by X Islamic Bank is the risk of default, i.e. the risk of unreturned of the disbursed funds. The following is the explanation of the four significant variables.

Current Ratio. The first variable that has a significant effect on the quality of financing is the current ratio. Based on the results of the Wald test, the current ratio of <1 has a p-value of 0.086 less than alpha 10%. This means that the current ratio of <1 has a significant effect on quality of financing. The current ratio of <1 has a B value of 0.734 and exp (B) of 2.082, indicating that the risk of non performing financing is 2.082 times greater than the current ratio of >2. Therefore, it can be concluded that the current ratio <1 has a higher chance of bad financing compared to the current ratio of >2.

The 1-2 current ratio has a p-value of 0.015 less than alpha 10%. This means that the 1-2 current ratio has a significant effect on quality of financing. The 1-2 current ratio has a B value of 0.365 and exp (B) of 1.440, this indicates that the risk of bad financing of 1-2 current ratio is 1.440 times greater than the current ratio of >2. Therefore, it can be concluded that the 1-2 current ratio has a higher risk of bad financing compared to customers with a current ratio of >2.

### Table 2 – Effect of current ratio on quality of financing

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Ratio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 1</td>
<td>0.734</td>
<td>0.428</td>
<td>2.943</td>
<td>0.086</td>
<td>2.082</td>
</tr>
<tr>
<td>1-2</td>
<td>0.365</td>
<td>0.149</td>
<td>5.953</td>
<td>0.015</td>
<td>1.440</td>
</tr>
</tbody>
</table>

Dependency on Customers. Based on the results of the Wald test, customers with ‘limited customers’ have a p-value of 0.126 more than 10%. This means that ‘dependency on limited customer’ has no significant effect on quality of financing. Customers with ‘dependency on limited customer’ have a B value of 0.662 and exp (B) of 1.939, which means that the opportunity for non performing financing for customers with ‘dependency on limited customer’ is 1.939 times greater than customers with ‘dependency on multiple and diverse customer’. Therefore, it can be concluded that customers with ‘dependency on limited customer’ have a higher risk of non performing financing compared to customers with ‘dependency on multiple and diverse customer’.

### Table 3 – Effect of customer dependence on quality of financing

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependency on Customers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited</td>
<td>0.662</td>
<td>0.432</td>
<td>2.345</td>
<td>0.126</td>
<td>1.939</td>
</tr>
<tr>
<td>Multiple</td>
<td>0.573</td>
<td>0.167</td>
<td>11.749</td>
<td>0.001</td>
<td>1.773</td>
</tr>
</tbody>
</table>

Customers with ‘dependencies on multiple customers’ have a p-value of 0.001 less than alpha 10%. This means that ‘dependency on multiple customers’ has a significant effect on quality of financing. Customers with ‘dependency on multiple customers’ have a B value of 0.573 and exp (B) of 1.773, which means that the risk of non performing financing for customers with ‘dependency on multiple customers’ is 1.773 times greater than customers with ‘dependency on multiple and diverse customers’. Therefore, it can be concluded that customers with ‘dependency on multiple customers’ have a higher risk of performing financing compared to customers with ‘dependency on multiple and diverse customer’.

Term. Financing term is determined based on the contract between the customer and the bank. The agreement is based on the customer’s request which is adjusted to other considerations by the Bank. The term variable has a significant effect on quality of financing.
Variable of over 3 years term has a p-value of 0.767 above alpha (10%). This means that more than 3 years term not significantly affects the quality of financing. Customers with a term of more than 3 years have a B value of 0.153 and exp (B) of 1.165 compared to a term of less than 1 year. This shows that a term of more than 3 years has a risk of bad financing 1.165 times higher than the term of less than 1 year.

Based on the results of the Wald test, customers with a term of 1-3 years have a p-value of 0.519 more than alpha (10%). This means that the term of 1-3 years does not have a significant effect on the quality of financing. Customers with a term of 1-3 years have a B value of -0.334 and exp (B) of 0.716. This means that bad financing risk for customers with financing term of 1-3 years is 0.716 times smaller than customers with terms of less than 1 year. Therefore, it can be concluded that customers with a financing term of 1-3 years have a lower risk of non performing financing compared to customers with terms of less than 1 year.

Table 4 – Effect of terms on quality of financing

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;3 years</td>
<td>0.153</td>
<td>0.516</td>
<td>0.088</td>
<td>0.767</td>
<td>1.165</td>
</tr>
<tr>
<td>1-3 years</td>
<td>-0.334</td>
<td>0.518</td>
<td>0.416</td>
<td>0.519</td>
<td>0.716</td>
</tr>
</tbody>
</table>

Collateral adequacy ratio of 125% -150% has a p-value of 0.302 above alpha (10%). This means that the collateral adequacy ratio of 125% -150% does not have a significant effect on quality of financing. Customers with an adequacy ratio of 125% -150% have a B value of 0.123 and exp (B) of 1.131 compared to the collateral adequacy ratio of >175%. This shows that the collateral adequacy ratio of 125% -150% has a risk of bad quality financing 1.131 times higher than the collateral adequacy ratio of >175%.

Collateral adequacy ratio of >150% -175% has a p-value of 0.104 above alpha (10%). This means that the collateral adequacy ratio of >150% -175% has no significant effect on quality of financing. Customers with collateral adequacy ratio of >150% -175% have a B value of -0.298 and exp (B) of 0.742. This means that the risk of non performing financing for customers whose adequacy ratio is >150% -175% is 0.742 times smaller than customers whose collateral adequacy ratio is more than 175%. Therefore, it can be concluded that customers with a collateral ratio of >150% -175% have a smaller risk of non performing financing compared to customers with collateral adequacy ratio of more than 175%.

Table 5 – Effect of collateral adequacy ratio on quality of financing

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collateral Adequacy Ratio</td>
<td>5.412</td>
<td>0.067</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>125% -150%</td>
<td>0.123</td>
<td>0.120</td>
<td>1.065</td>
<td>0.302</td>
<td>1.131</td>
</tr>
<tr>
<td>&gt;150% -175%</td>
<td>-0.298</td>
<td>0.183</td>
<td>2.647</td>
<td>0.104</td>
<td>0.742</td>
</tr>
</tbody>
</table>

Managerial Implications. In accordance with both descriptive analysis and logistic regression analysis, the strategies that can be prepared in order to improve the quality of current financing and reduce non-performing financing on microfinance in X Islamic Bank are:

- The logistic regression analysis shows that there are four variables that have a significant effect on quality of financing, namely the current ratio, dependency on customers, the terms and the collateral adequacy ratio. While the other 7 variables are not significant, necessary for the Bank to do:
  a. Hold training for employees to be able to hone analytical skills during customer surveys
  b. Needs to be a double checker to ensure that what is done by the first employee is in accordance with the procedure or not
c. There is a need for periodic evaluations and performance evaluations in X Islamic Bank employees. Employees with good quality of work will be rewarded, whereas employees with poor quality work will receive punishment.

- The results of R square show a value of 2.3%. This means that the variables used in the system scoring at X Islamic Bank, only 2.3% are influencing the financing quality, while 97.7% are influenced by other variables not included in the model. Therefore, it is necessary for the Bank to conduct further research to be able to use significant variables that affect the quality of financing.

CONCLUSION

Based on the results and understanding of the classification of customer status and also the analysis of variables that influence the quality of financing, it can be concluded that:

- Variables that influence the quality of financing are the current ratio variable, dependency on customers, terms, and collateral adequacy ratio;
- The R Square owned by the model is 2.3%.

RECOMMENDATIONS

In relation to the credit scoring stage, it is now possible to conduct behavioral scoring and collection scoring models for the provision of financing facilities. Other methods such as vintage analysis, bayes method, discriminant method, and other statistical methods are required.

REFERENCES

INPUT-OUTPUT ANALYSIS FOR AGRICULTURAL SECTOR IN THE ECONOMY STRUCTURE OF ACEH PROVINCE, INDONESIA

Sari Cut Rozana*, Student
Magister Program of Agribusiness, Syiah Kuala University, Indonesia

Zakiah, Nugroho Agus
Department of Agribusiness, Syiah Kuala University, Indonesia

*E-mail: cutrozasari@gmail.com

ABSTRACT
Agriculture is one of the most dominant sectors in Indonesian people's income because the majority of Indonesia's population works as farmers. An economy is said to experience growth if the economy level achieved is now higher than achieved in the previous year. The greater growth in each sector means the contribution to economic development in the country or region is getting higher, so that the level of welfare will be better. High construction growth illustrates that to support every economic activity sector is needed. The purpose of this study is to analyze the role of the agricultural sector in the Aceh Province economy structure. This study used Input-Output Tables of 1998, 2006 and 2012. The results of the study shown that the agricultural sector has an important role in the Aceh Province Economy Structure, as evidenced by the increase in output throughout the year. Besides producing high output, the agricultural sector was the largest sector in creating added value.

KEY WORDS
Agricultural sector, input-output analysis, output structure, value added structure.

Agriculture is one of the most dominant sectors in Indonesian people's income because the majority of Indonesia's population works as farmers. But agricultural productivity is still far from expectations. One of the factors causing lack of agricultural productivity is human resources are still low in processing agricultural land and results. The majority of farmers in Indonesia still use manual systems in processing agricultural land.

An economy is said to experience growth if the economy level achieved is now higher than achieved in the previous year. The greater the growth in each sector means the contribution to economic development in the country or region is getting higher, so that the level of welfare will be better.

Regional development planning that has been carried out so far, is still partial and has not been able to detect how the influence of investment in a sector on the economic structure of a region. This failure causes in the implementation of planning, for that we need an analysis model that can integrate development planning of a region.

Planning Economic growth is the goal of development, where both have a related relationship. Post-2004 tsunami had an influence on the development of the economic sector, especially the agricultural sector, which is one of the important sectors in economic development in Aceh Province. In 2005 the agricultural sector had a negative growth rate. The development of the growth rate in each sector has a relationship with other sectors. After the tsunami, many agricultural lands in Aceh Province were built for housing, hotels, restaurants and buildings for trade so that the sector had a positive growth rate.

In order to develop an area, with the aim of improving the community welfare, the regions will develop economic sectors in accordance with their superiority. The economic sector is said to have advantages because the sector is capable of producing high output and added value. In addition to producing output and added value, the leading sector also produces exports are able to provide foreign exchange for regional development (Suharto, 2002).
The biggest contribution to economic development in Aceh, given by the agricultural sector is 26.93 percent even though the growth rate of this sector in 2017 is smaller at 5.21 percent compared to the growth rate of the construction sector, which is 12.96 percent. High construction growth illustrates that to support every economic activity sector is needed. The purpose of this study is to analyze the role of the agricultural sector in the Aceh Province economy sector.

METHODS OF RESEARCH

The study took place in the Aceh Province which is located at the tip of Sumatra Island. Aceh Province had diverse potential characteristics. Aceh Province is located at 01°58'37.2" - 06°04'33.6" North Latitude and 94°57'57.6" - 98°17'13.2" East Longitude, with an average height of 125 m above sea level.

This study used the Input-Output Tables of 1998, 2006 and 2012. The Input-Output tables used to evaluate development outcomes through economic analysis used for planning materials. The object of this research was the agricultural sector. Based on the background, objectives and formulation of the problem, the scope of this research was analyze the role of the agricultural sector

This study used the Input-Output Tables of 1998, 2006 and 2012. Where 1998 consisted of 30 sectors, 2006 consisted of 55 sectors and in 2012 consisted of 66 sectors. Then by used leontife inverse matrix all sectors each year, namely 1998, 2006 and 2012 to 13 sectors, used the 13x13 matrix sector as found in the BPS Input-Output Table. This category included all economic / business activities, which include the agricultural sector.

Output was the production value of goods and services produced by economic sectors. Where total output was equal to total input (Daryanto and Yundy, 2010b). If the input used equal to one, the output produced also equal to one. The equation can be written as follows:

\[
X_i = \sum_{j=1}^{n} X_{ij}
\]

Where: \(X_i\) = Total output of economic sector (j); \(X_{ij}\) = Total input of economic sector (j).

If the total input of sector \(i\) is equal to one, the amount of output produced by sector \(i\) is equal to the number of inputs used by sector \(i\). If the total input sector \(j\) is greater than 1 then the amount of output produced by sector \(j\) is also greater, and conversely if the total input of sector \(i\) is smaller than 1, the output produced by sector \(i\) will also be smaller.

Added value was the remuneration created for production factors that play a role in the production process. Where the service covers the components, namely wages, salary,
business surplus, depreciation, and indirect taxes (Saragih, 2003). The equation can be written as follows:

\[ V_j = \sum_{i=1}^{n} V_{ij} \]

Where: \( V_j \) = Primary input from other economic sectors \((j)\); \( V_{ij} \) = The amount of output sector \((i)\) used as input by sector \((j)\).

If \( V_j \) is equal to one then the structure of \( j \) value added sector is equal to the average value added structure of sector \( j \), if \( V_j > 1 \) then the value added structure of sector \( j \) is greater than the average \( j \), and if \( V_j < 1 \) then sector value added structure \( j \) lower than \( j \).

**RESULTS AND DISCUSSION**

The results of the first objective analysis aims to looked at the role of the agricultural sector in the Aceh Province economy structure, can also be seen through an analysis of the Input-Output Table. The Aceh Province Input-Output Tables of 1998, 2006 and 2012 consists to 13 sectors. The output definition in this study was the entire production value of goods and services produced by economic sectors in Aceh. The analysis of the output structure was intended to give an overview of which sectors were able to contribute high to the formation of the overall output. The total output produced by economic sectors in Aceh from 1998, 2006 to 2012 continues to experience significant increases. In 1998 the total output was recorded at Rp. 34,265,931 million, and experienced an increase in 2006 which reached Rp. 123,779,495 million or about three times that of 1998. Total output also increased by 32 percent, reached Rp. 163,767,771 million in 2012 can be seen in figure 1 below.

![Figure 2 – Largest Sectors According to Aceh Province Output Rating in 1998, 2006 and 2012](Image)

(Source: Table IO results of Aceh Province 1998, 2006, 2012; processed)

If seen from the number of outputs produced by sector, it can be seen that there are four sectors which are the most dominant sectors from 1998 to 2012. These sectors were (1) agriculture, (2) mining and quarrying sector, (3) industrial sector agricultural processing and (6) construction sector. When viewed from the amount of output produced, the sector was the leading sector that needs attention from the government in order to develop the regional economy.

If viewed from the amount of outputs produced by sector, it can be seen that these four largest sectors according to output ratings as presented in Table 1. The agricultural sector was an sector that has increased output from 1998, 2006 to 2012. In 1998 the agricultural sector could create output Rp. 6,739,731 million or 13.67 percent and in 2006 the agricultural sector experienced an increase in the production of Rp. 22,975,262 million or 18.56 percent of all output then in 2012 the agricultural sector accelerated in the creation of output, which amounted to Rp. 28,214,418 million or 20.16 percent of the total output produced in 2012.
Table 1 – The Four Largest Sectors According to Output Ranks for Aceh Province Year 1998, 2006 and 2012 in Million

<table>
<thead>
<tr>
<th>code</th>
<th>Sector</th>
<th>1998</th>
<th>2006</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Output</td>
<td>%</td>
<td>Output</td>
</tr>
<tr>
<td>1</td>
<td>agriculture (agriculture, forestry, and fisheries)</td>
<td>6,739,731</td>
<td>13.67</td>
<td>22,975,262</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>mining and quarrying sector</td>
<td>10,022,708</td>
<td>33.84</td>
<td>39,833,044</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>industrial sector agricultural processing</td>
<td>4,359,255</td>
<td>17.08</td>
<td>13,548,238</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Construction</td>
<td>1,040,474</td>
<td>7.79</td>
<td>9,645,406</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The amount of output ratings (1-4)</td>
<td>22,162,168</td>
<td>72.00</td>
<td>86,001,950</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other Sector</td>
<td>12,103,763</td>
<td>28.00</td>
<td>37,777,545</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>34,265,931</td>
<td>100.00</td>
<td>123,779,495</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: IO Table Results of updating Aceh Province in 1998, 2006 and 2012 (processed).

The amount of added value in each sector was determined by the amount of output (the amount of production value) produced and the amount of costs incurred in the production process (Hotman, 2006). Therefore, a sector has a large output value does not necessarily have a large added value. It was because, in added value, also calculated the amount of production costs incurred by a sector in carrying out activities.

Figure 3 – Composition of Gross Added Value according to the Components of Aceh Province in 1998, 2006 and 2012 (Source: Table IO results of Aceh Province 1998, 2006, 2012; processed)

In the figure above the amount of gross added value according to the components in Aceh Province. The gross value added component consists of wages and salaries, business surplus, depreciation, indirect taxes and subsidies. In Figure 2 for 2012 it was known that the gross value added component in Aceh was allocated to wages and salaries of 37.48 percent. Furthermore, it was allocated a business surplus of 56.08 percent, allocated for depreciation of 6.82 percent, and 2.46 percent allocated for indirect taxes.

Table 2 – The Four Largest Sectors by Ranking the Gross Value Added of Aceh Province in 1998, 2006 and 2012 in Million

<table>
<thead>
<tr>
<th>code</th>
<th>Sector</th>
<th>1998</th>
<th>2006</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Output</td>
<td>%</td>
<td>Output</td>
</tr>
<tr>
<td>1</td>
<td>agriculture (agriculture, forestry, and fisheries)</td>
<td>5,740,563</td>
<td>22.40</td>
<td>14,837,253</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>mining and quarrying</td>
<td>9,767,586</td>
<td>38.12</td>
<td>25,289,392</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Wholesale and retail trade, repair and maintenance of cars and motorbikes</td>
<td>1,053,370</td>
<td>4.11</td>
<td>7,739,085</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>other services</td>
<td>119,817</td>
<td>0.46</td>
<td>353,1304</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The amount of output ratings (1-4)</td>
<td>16,681,336</td>
<td>65.09</td>
<td>51,397,034</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other Sector</td>
<td>8,939,253</td>
<td>34.91</td>
<td>16,999,572</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>25,620,589</td>
<td>100.00</td>
<td>88,356,066</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: IO Table Results of updating Aceh Province in 1998, 2006 and 2012 (processed).

The results of the analysis in Table 2 shown that agriculture was the largest sector in creating value added. Besides being large in the creation of output this sector was also capable of producing relatively large added value, aims in 1998 the agricultural sector was able to create added value of Rp. 5,740,563 million then the agricultural sector experienced an increase in 2006 which was Rp. 14,837,253 million and in 2012 the agricultural sector continued to experience an increase of Rp. 21,406,402 million. The Agriculture Sector was able to produce relatively large added value because in addition to meeting domestic needs,
this sector is also able to export most of its output. Then the mining and quarrying sectors, the wholesale and retail trade, repair and maintenance of cars and motorbikes, and other services sectors respectively.

CONCLUSION

Based on the results of research and discussion have been done it can be concluded as follows:
1. The agricultural sector has an important role in the structure of the economy in Aceh Province. The agricultural sector experienced an increase in output in 1998, 2006 and 2012 in the input output table, in 1998 the agricultural sector produced an output of Rp. 6,739,731 million increased in 2006 amounting to Rp. 22,975,262 million in 2012 the agricultural sector produced an output of Rp. 28,214,418 million;
2. Increased output throughout the year can be interpreted that the agricultural sector has an important role in the structure of the economy in Aceh Province. In addition to producing high output, the agricultural sector also has relatively large added value to the economy in Aceh Province.

REFERENCES

THE EFFECT OF SERVICE QUALITY ON CUSTOMER SATISFACTION AT PT MULTI RENTALINDO: A CASE STUDY OF EMPLOYEES IN KAWAN LAMA WEST JAKARTA

Butarbutar Novita, Syah Tantri Yanuar Rahmat, Anindita Rina
Faculty of Economics and Business, University of Esa Unggul, Indonesia
*E-mail: tantri.yanuar@esaunggul.ac.id

ABSTRACT
Owning a car is certainly the desire of everyone, for those who have not been able to buy a car or do not want to be bothered with maintenance and other costs, or maybe just need a car at certain times. So, alternative car rental is one of the best solutions. Using a rental car / car rental at this time is very easy and quite affordable; this is because the growth of service providers also grows very rapidly. Transportation is known as one of the links of goods and passenger distribution networks that have developed very dynamically and play a role in supporting political, economic, socio-cultural and defense security development. The success of the transportation sector can be seen from its ability to support and encourage the improvement of the national, regional, local, and political stability. This study aims to analyze service quality, customer satisfaction and customer loyalty at PT. Multi Rentalindo. The data analysis method used is Structural Equation Modeling by using 132 respondents of employees of the company PT. Kawan Lama as a research sample in November 2018. The results showed that service quality has a positive effect on customer satisfaction and customer loyalty, so customer satisfaction can increase customer loyalty.

KEY WORDS
Service, reliability, responsiveness, guarantee, customer satisfaction, customer loyalty.

The growth of the national automotive industry greatly influenced the rapid car rental business in Indonesia. The Association of Indonesian Vehicle Rental Companies (Asperkindo) estimates that in 2019 there will be a significant surge in car rental in the national market. This situation, if supported by a relatively stable economic condition and conducive political and national security climate, car rental business opportunities remain promising and can certainly continue to grow until the next few years (http://www.ikpi.or.id).

According to Pongki Pamungkas, the chairman of Asperkindo based on the article quoted on Kapanlagi.com (January, 2011), "Competition in the car rental business is increasingly unhealthy and there is a tendency to slam rates, especially for small business players but natural selection will determine. If the vehicle rental company slams rates, it will certainly affect maintenance, delivery service to consumers and so on. Asperkindo always reminds association members to calculate the correct cost structure. "The Muslim Entrepreneur Magazine (January, 2011) in his article mentions that the transportation business is actually a service business.

The company must be able to bind consumers with products in the form of attractive and attractive services, so that consumers remain loyal to use the service provider services, of course with the right and effective strategy. In Indonesia there are not many transportation service providers that really provide good service in the form of service, convenience, and security to their customers. PT. Multi Rentalindo as one of the specialized vehicle rental providers (in Kawan Lama Group) both long-term leasing (leasing) and short-term (rental) as much as possible to go public serving companies outside the Kawan Lama Group.

LITERATURE REVIEW

Service quality is someone's actions to other parties through the presentation of products or services according to the tastes, expectations and needs of consumers.
Companies can provide services that are in accordance with the wishes expected by consumers, the quality of service of the company is good. Good service will give encouragement to consumers to make repeat purchases at the company. (Gronroos, 1984) proposed the concept of perceived customer service quality for the first time, and he believed that service quality was a comparison between expected customers and perceived service, including technical parts (service results) and functional parts (service processes).

According to Sulastiyono (2008: 35) the assessment of the quality of service is determined by guests as users of these services. In other words, service quality is the best value of the services provided to customers. Therefore, service quality can be created by first identifying guest expectations about the services needed and desired, then adjusted to the services needed and desired, then adjusted to the services that will be provided by the hotel. Customer satisfaction is a real impact that directly arises when service quality can meet expectations and customer's specific requirements. This is justified by (Tjiptono, 2006) that quality is closely related to customer satisfaction.

Goetsh and Davis cited by Tjiptono (2001: 51) define quality as follows: "Quality is a dynamic condition that relates to products, services, people, nature and environment that meet or exceed expectations". The definition of quality has the following elements: 1) Quality includes efforts to meet needs. 2) Quality includes products, services, people and the environment. 3) Quality is an ever-changing condition. From the definition above it can be concluded that service quality is the key to achieving success. Whether or not the quality of service for goods or services depends on the ability of producers to consistently meet consumer expectations. Consumers who feel satisfied indirectly create loyalty, and encourage recommendations from mouth to mouth, can even improve the company's image in the eyes of consumers. Therefore service quality must be the main focus of the company's attention. The essence of the concept of service quality is to show all forms of actualization of service activities that satisfy those who receive services in accordance with responsiveness (responsiveness), foster assurance (assurance), show physical evidence (tangible) that can be seen, according to empathy (empathy) of those who provide reliability-based services that carry out the duties of service that are consequently given to satisfy those who receive service.

Reliability services are very important in the work dynamics of an organization. Reliability is a form of characteristic or characteristic of employees who have high work performance. Reliability in service delivery can be seen from the reliability of providing services in accordance with the level of knowledge, reliability in mastering the applied work field, reliability in mastering the work field according to work experience. demonstrated and reliability using work technology. For the Reliability dimension, it consists of indicators: a. The ability of officers to deliver services clearly b. Expertise in providing services c. Timeliness of service and discipline of employees d. Responsibilities of officers in providing services. Sunyoto (2004: 16) the reliability of an individual organization in providing services is needed to deal with the rolling dynamics of work demands high quality service according to individual employee reliability. Every service requires a reliable form of service, meaning that in providing services, every employee is expected to have the ability in high knowledge, expertise, independence, mastery and work professionalism, so that the work activities carried out produce satisfying forms of service, without any complaints and excessive impressions for services received by the community (Parasuraman, Zeithaml, & Berry, 1998).

The company's ability to deliver promised services accurately since the first time, for example a company might choose a consultant solely based on reputation. If the consultant is able to provide what the client wants, the client will be satisfied and pay a consulting fee. However, if the consultant embodies what the client expects, the consultation fee will not be paid in full (Tjiptono, 2012: 174).The demands of the reliability of employees in providing services that are fast, precise, easy and smooth become the assessment requirements for the people served in showing the actualization of the work of employees in understanding the scope and description of work that is the concern and focus of each employee in providing services. The core service of reliability is that every employee has a reliable ability, knows about the ins and outs of work procedures, working mechanisms, corrects various
deficiencies or irregularities that are not in accordance with work procedures and is able to show, direct and give correct direction to any form of service that has not been understood by the community, so that it has a positive impact on the service, namely employees understand, master, are reliable, independent and professional in their work description (Parasuraman, Zeithaml, & Berry, 1998).

Responsibility is a policy to help and provide services that are fast (responsive) and appropriate to customers, with the delivery of clear information. Let consumers wait for negative perceptions in service quality. For the Responsiveness dimension, it consists of indicators: a. Respond to every customer/applicant who wants to get service b. Accuracy and timeliness of officers in serving customers c. The clerk helps customers obtain information and respond to customer complaints. According to (Tjiptono, 2012) regarding the willingness and ability of service providers to help customers and respond to their requests immediately. Every employee in providing forms of service, prioritizes aspects of service that greatly affect the behavior of people who receive services, so that the responsiveness of employees is needed to serve the community in accordance with the level of absorption, understanding, incompatibility of various forms of service that he does not know. This requires a wise explanation, detailed, fostering, directing and persuading to address all forms of procedures and working mechanisms that apply in an organization, so that the form of service gets a positive response (Parasuraman, 2001).

Assurance (guarantee) is one dimension that becomes a measure of service quality. That is the ability of employees to foster trust in the customers in their organization. Consists of several components including competence (proficiency), courtesy (politeness), credibility (credibility), security (security), and communication (communication). The form of certainty of a service is largely determined by guarantees from employees who provide services, so that people who receive services are satisfied and believe that all forms of service matters carried out are completed and completed in accordance with the speed, accuracy, ease and quality of services provided ( Parasuraman, 2001: 69) For the dimension of Assurance (Guarantee), it consists of indicators: a. Guarantee the ease of service procedures b. Guaranteed ease of service requirements c. Guaranteed cost certainty in service d. Guaranteed certainty of service completion time. The other forms of collateral are guarantees for employees who have good personality behavior in providing services, of course there will be different employees who have characters or characters that are less good and who are not good at providing services (Margareth, 2003: 201).

Satisfaction is the level of one's feelings (customers) after comparing between performance or perceived results (services received and felt) with what he expected. Service is expected to make customers satisfied by giving customers what they really need and want, not giving what we think they need. Churchill & Surprenant in (Tjiptono, 2006: 349) formulates customer satisfaction as a result of purchases and usage obtained from a comparison between reward and purchase costs with the anticipated consequences. Whereas Westbrook & Reilly in Tjiptono (2006: 349) argue that customer satisfaction is an emotional response to experiences related to certain products or services purchased, retail outlets, or even behavioral patterns (such as shopping behavior and buying behavior), as well as markets whole. Oliver (1980) defined customer satisfaction as a comparison between expectations and experiences before and after buying, it is a DISCON-hope for technical theory. He believes that customer satisfaction is a relative concept. If the product or service exceeds customer expectations, the level of customer satisfaction is high; if not, it's low.

Dick and Basu (1994) believe that customer loyalty is a long-term commitment that customers want to buy products consistently. Oliver (1999) shows that customer loyalty is a commitment to re-buy and re-patronize brand products and services consistently in the future. Fornell (1992) thinks that customer loyalty must be measured in two aspects: whether customers want to buy products or services consistently and whether satisfied customers are willing to pay more for products or services. Burton et al. (2003) are consistent and whether satisfied customers are willing to pay more for products or services. Burton et al. (2003) are consistent and whether satisfied customers are willing to pay more for products or services. Burton et al. (2003) believe that customer loyalty is determined by whether the customer's
experience is satisfied, the more experience customers are satisfied, the more they are willing to buy products or services again.

Indicators of customer loyalty according to Kotler & Keller (2006; 57) are Repeat Purchases (loyalty to product purchases); Retention (Resistance to negative influences about the company); referrals (referring in total to the company's existence). Furthermore Griffin (2003; 223) suggests the benefits that the company will get if it has loyal customers, among others:

- Reducing the cost of marketing (because it costs to attract new customers is more expensive);
- Reducing transaction costs (such as contract negotiation fees, order processing, etc);
- Reducing customer turnover costs (due to fewer customer changes);
- Increase cross sales which will increase the company's market share;
- A more positive word of mouth assuming that loyal customers also mean those who are satisfied;
- Reducing failure costs (such as replacement costs, etc).

Zeithaml (2000; 211) explains that loyal customers will usually do the following: 1. Will trough word of mouth new customers with similar relationship potential. 2. Less likely to be pulled away by competitors. 3. Buy more product / service from the company over time. Understanding this loyalty until now, none of the experts and books are considered the most perfect, especially in providing the right terminology. This is also recognized by Egan (2001; 312). Javalgi and Mober in Egan (2001; 313) provide two definitions of loyalty in two terms: 1. In Behavioral terminology Usually based on purchases and measured by the frequency of such purchases and brand switching. 2. In Attitudinal terminology Incorporating consumer preferences and dispositions towards brands to determine levels of loyalty.

**HYPOTHESIS DEVELOPMENT**

Wang & Shieh (2006) state that overall reliability has a very positive impact on customer satisfaction. A similar statement was also conveyed by Raza, et al (2012), that reliability has an important and positive relationship with customer satisfaction and makes consumers return to use the service. Akhtar, et al (2011) states that there is a positive and significant relationship between service quality and customer satisfaction such as compliance obligations, guarantees, and reliability.

H1. Reliability has a positive effect on customer satisfaction.

According to Parasuraman in Tjiptono and Chandra (2005: 134) which states that "responsiveness relates to the ability of employees to help customers and respond to their requests, and inform when services will be provided and then provide services quickly, if employees respond quickly to serving customers then the company will get sympathy from the customer itself ". Studies have found that response is not only an important component of the service quality model but also has a positive effect on customer satisfaction (Al-Azzam 2015). If employees are very responsive to customers it will lead to a higher level of customer satisfaction (Al-Azzam 2015). The level of response is very dependent on employee attitudes and behavior. As such, it is important for companies to provide the orientation needed for their employees on a regular customer relationship. As a result, this will lead to higher problems (Khan & Fasih 2014). Factors such as employee knowledge and politeness also help in expanding trust (Parasuraman & Zeithaml, 1988). Previous research shows that positive trust affects customer satisfaction. customer trust in employees leads to higher levels of satisfaction and positively influences purchase intentions (Khan & Fasih 2014).

H2. Responsiveness has a positive effect on customer satisfaction.

Guarantee and Customer Satisfaction refers to customer trust and confidence in the company to provide the best service to them (Arsanam & Yousapronpaiboon 2014).

H3. Guarantees have a positive effect on customer satisfaction.

Reliability is the ability to carry out promised services that are trusted and accurate (Parasuraman, Zeithaml, & Berry, 1985). Research findings indicate that reliability has a
positive relationship with customer loyalty (Kheng et al., 2010).

H4. Reliability has a positive effect on customer loyalty.

Responsiveness is the willingness to help customers, and provide fast service (Parasuraman et al., 2002). The relationship between response and customer loyalty was found to be insignificant (Kheng et al., 2010). These results conflict with findings that reveal a positive and significant relationship between response and loyal customers (Glaveli, Petridou, Liassides, Spathis 2006; AUKA et al., 2013).

H5. Responsiveness has a positive effect on customer loyalty.

Guarantees represent the knowledge and politeness of employees and their ability to inspire trust and confidence (Parasuraman et al., 2002). Consistent with the study by Ndubisi (2006), other researchers also found a significant relationship between guarantee and customer loyalty (Lymperopoulos, Chaniotakis & Sourel, 2006; Kheng et al., 2010; AUKA et al, 2013).

H6. Guarantees have a positive effect on customer loyalty.

Consumers will be loyal or loyal to a brand if consumers get satisfaction from the brand. To increase customer satisfaction, the company needs to regulate the structure marketing strategy so that consumers are interested in the products offered. If the product gives satisfaction to consumers then consumers will remain loyal to use the brand and try to limit the purchase of other products. This is in accordance with research conducted by Maylina (2003), where satisfaction has a significant positive effect on brand loyalty to consumers. Every business actor certainly wants a condition of relationships that are successes, where the level of satisfaction and customer loyalty is high. Because at this position, the company will get many benefits as well as stimulating customers to tell positive things to other customers (word of mouth communication), can also reduce marketing costs, attract new customers, respond to competitors’ threats, and obtain cumulative value for sustainable business (Aaker, 1995, in Hasan, 2009: 79).

Fornell (1992) thinks that customer loyalty must be measured in two aspects: whether the customer wants to buy the product or service consistently and whether satisfied customers are willing to pay more for the product or service. Burton et al. (2003) believe that customer loyalty is determined by whether the customer’s experience is satisfied. The experience of more satisfied customers, the more they are willing to buy products or services again.

H7. Customer satisfaction has a positive effect on customer loyalty

METHODS OF RESEARCH

The study was conducted in November 2018 with the research method using quantitative descriptive research methods, according to Sugiyono (2013: 23) quantitative methods because research data in the form of numbers and analysis using statistics. Quantitative methods are used if the problem is a deviation between what is supposed to be and what happens, between rules and implementation, between theory and practice, between plans and implementation. The method of data analysis in this study uses Structural Equation Modeling (SEM). The sampling process is carried out using the entire population and the number meets the requirements for the SEM method, which Ferdinand (2002) states that the number of representative samples to use SEM analysis techniques is 100-200. The object of this research is PT head office employees. Kawan Lama, located in West Jakarta with a total population of 132 respondents. The aspects studied were service quality, customer satisfaction and customer loyalty. The data measurement method uses a Likert scale with one to five scale intervals.

This study uses 1 independent variable, namely customer loyalty and two dependent variables, namely service quality (reliability, responsiveness, assurance). Measurement of service quality variables proposed by Ratminto and Atik (2007, p. 179), based on several literature reviews, can be concluded that to measure service quality, namely: Size-oriented results that include: a. Effectiveness that is the achievement of predetermined goals, both in the form of targets, long-term goals and organizational mission. According to Kotler quoted
by Tjiptono (1996: 148) there are four methods for measuring customer satisfaction, namely as follows. 1) Measurement of customer satisfaction through this method can be done in various ways, including the following. a. Directly reported satisfaction, that is, measurements are made directly through questions, but achieving this goal must also refer to the organization's vision. b. Productivity is a measure that indicates the government's ability to produce output needed by the community. c. Efficiency is an inverse comparison between output and input. Ideally the government should be able to organize a certain type of service with as little input (cost and time) as possible. Thus, the government's performance will be even higher if the stated objectives can be achieved in the shortest possible time and at the cheapest cost. d. Satisfaction, meaning how far the government can meet the needs of employees and the community. e. Equitable justice, meaning that the scope or range of activities and services provided by the government must be as wide as possible with equitable distribution and treated fairly. 2) Process-oriented size. a. Responsiveness, namely the ability of the government to recognize community needs, set the agenda and priority of services, and develop service programs in accordance with the needs and aspirations of the community. This responsiveness measures the government's responsiveness to customer expectations, desires and aspirations and demands. b. Responsibility is a measure that shows how much the level of suitability between the administration of the government and the laws or regulations and procedures has been set. c. Accountability is a measure that shows how much the level of conformity between the administration of the government and external measures that exist in the community and owned by stakeholders, such as values and norms that develop in the community. d. Adaptation is a measure that shows the responsiveness of an organization to the demands of changes that occur in its environment. e. Survival means how far the government or service program can demonstrate the ability to continue to grow and survive in competing with other regions or programs. f. Openness or transparency is a procedure / procedure, administration of government and other matters relating to the public service process must be informed openly so that it is easily known and understood by the public, both requested and unsolicited. g. Empathy is the treatment or attention of the government or service providers to actual issues that are developing in the community.

Customer satisfaction indicators Tjiptono (2005), "Customer movements or campaigns are also based on the idea that satisfied customers tend to be more loyal, not easily tempted to switch to suppliers that offer cheaper prices and potentially disseminate their profit experience to others". According to Kotler (2003), the characteristics of satisfied customers are as follows: a. Become more loyal or become a loyal customer b. Buy more if the company introduces new products or products and perfects existing products c. Give favorable comments about the company's products d. Less attention to products, advertising e. competitors, less sensitive to prices f. Giving ideas or ideas to the company g. Requires a service fee that is smaller than the cost of a new customer, because the transaction becomes routine.

According to Griffin (2005), "Customer loyalty indicators are a reliable measure to predict sales growth as well as customer loyalty can be defined based on consistent consumer buying behavior". 1) Customers make regular repeat purchases 2) Buy between product lines or services (purchase across product and service lines). 3) Referring to other people (Refers other). 4) Demonstrating immunity to attraction from competitors (demonstrating immunity to the full of the competition).

Furthermore, from the dimensions of the measurement displayed in the form of a questionnaire, then tested the validity and reliability test. Validity test is carried out with Confirmatory Factor Analysis by looking at the value of Kaiser-Meyer-Olkin Measure of Sampling (KMO) and Measures of Sampling Adequacy (MSA). In this test the value obtained must be greater than 0.5, which means that the analysis of factors is appropriate or suitable for use, and can be further processed (Malhotra, 2004). The scale of service quality consists of 20 questions and 5 of them are invalid so there are 15 questions left, the customer satisfaction scale consists of 10 questions and 2 of them are invalid so there are 8 questions left, the customer loyalty scale consists of 10 questions and all are valid. The reliability test of
Cronbach Alpha value is greater or equal to 0.7, which means reliable, that is to say service quality, customer satisfaction and customer loyalty can be said to be trusted as a tool for collecting data in research. The next stage, the data is processed using the SEM analysis method.

RESULTS AND DISCUSSION

The focus of this study is service quality (Reliability, Responsiveness and Assurance), on customer satisfaction and customer loyalty where the results of reliability and assurance show that the hypothesis data supports hypotheses or hypotheses accepted, as SEM testing has been done, and can be seen in Figure 1 the following:

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Hypothesis Statement</th>
<th>T-Value</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Reliability has a significant effect on customer satisfaction</td>
<td>1.27</td>
<td>Data does not support the hypothesis</td>
</tr>
<tr>
<td>H2</td>
<td>Responsiveness has a significant effect on customer satisfaction</td>
<td>-0.13</td>
<td>Data does not support the hypothesis</td>
</tr>
<tr>
<td>H3</td>
<td>Assurance have a significant effect on customer satisfaction</td>
<td>6.30</td>
<td>Data supports the hypothesis</td>
</tr>
<tr>
<td>H4</td>
<td>Reliability has a significant effect on customer loyalty</td>
<td>3.88</td>
<td>Data supports the hypothesis</td>
</tr>
<tr>
<td>H5</td>
<td>Responsiveness has a significant effect on customer loyalty</td>
<td>-1.96</td>
<td>Data does not support the hypothesis</td>
</tr>
<tr>
<td>H6</td>
<td>Assurance has a significant effect on customer loyalty</td>
<td>-2.37</td>
<td>Data does not support the hypothesis</td>
</tr>
<tr>
<td>H7</td>
<td>Customers satisfaction has a significant effect on customer loyalty</td>
<td>3.67</td>
<td>Data supports the hypothesis</td>
</tr>
</tbody>
</table>

Figure 1 – Path Diagram T-Value

DISCUSSION OF RESULTS

The results of testing the first hypothesis (H1) found that the data supports the hypothesis with a value of t-value 1.27 that is reliability can affect customer satisfaction. The results of this study are in line with research conducted by Wang & Shieh (2006) stating that overall reliability has a very positive impact on customer satisfaction. In addition, the results of this research also reinforce previous research conducted by Akhtar, et al (2011) stating that there is a positive and significant relationship between service quality and customer satisfaction such as compliance obligations, guarantees, and reliability. So, that the results of its achievement lead to satisfaction. The results of testing the second hypothesis (H2) found that the data does not support the hypothesis with a t-value of 0.13 responsiveness has no relationship with customer satisfaction. The results of this research are different from previous research conducted by Guarantees and Customer Satisfaction refers to customer trust and confidence in the company to provide the best service to them (Arsanam & Yousapronpalboon 2014).

The results of testing the third hypothesis (H3) found that the data supports the hypothesis with a t-value of 6.30 which is a guarantee that has a positive effect on customer satisfaction.
satisfaction. The results of this study are in line with the research conducted by (Arsanam & Yousapronpaiboon 2014) guarantee and customer satisfaction refers to customer trust and confidence in the company to provide the best service to customers.

The results of testing the fourth hypothesis (H4) found that the data supports the hypothesis with a value of 3.88 t-value, namely reliability has a positive effect on customer loyalty. The results of this research are supported by research conducted. The findings of the study indicate that reliability has a positive relationship with customer loyalty (Kheng et al., 2010).

The results of testing the fifth hypothesis (H5) found that the data did not support the hypothesis with the value of t-value -1.96, namely responsiveness did not affect customer loyalty. The results of this study are in line with research conducted by (Kheng et al., 2010) that the relationship between response and customer loyalty was found to be insignificant. However, these results contradict findings that reveal a positive and significant relationship between response and loyal customers (Glaveli, Petridou, Liassides, Spathis 2006; AUKA et al., 2013).

The results of testing the first hypothesis (H6) found that the data supports the hypothesis with a t-value value of -2.37, which is a guarantee that can affect customer loyalty. Guarantees represent the knowledge and politeness of employees and their ability to inspire trust and confidence (Parasuraman et al., P. 2002) Consistent with research by Ndubisi (2006), other researchers also found a significant relationship between guarantee and customer loyalty (Lymperopoulos, Chaniotakis & Soureli, 2006; Kheng et al., 2010; AUKA et al., 2013).

The results of the first hypothesis testing (H7) found that the data supports the hypothesis with a t-value value of 3.67, namely customer satisfaction can affect customer loyalty. The results of this study are in line with research conducted by Fornell (1992) thinking that customer loyalty must be measured in two aspects: whether customers want to buy products or services consistently and whether satisfied customers are willing to pay more for products or services. Burton et al. (2003) believe that customer loyalty is determined by whether the customer’s experience is satisfied. the experience of more satisfied customers, the more they are willing to buy products or services again. So that the results of its achievement lead to loyalty.

**MANAGERIAL IMPLICATIONS**

In maintaining the business continuity of the company, employees play an important role in maintaining business stability. In addition, within an organization, employees act as planners, implementers, supervisors and controllers of organizational activities. In this study, the company is expected to be able to further improve the quality of service in terms of reliability, responsiveness and assurance to get satisfaction and loyalty from customers. The quality of service itself greatly affects the purchasing power of customers. Service quality can also increase the value of the company and can increase the interest in purchasing power of its securities customers can increase revenue from the company.

**CONCLUSION**

This study aims to examine the effect of service quality on customer satisfaction and customer loyalty at PT. Multi Rentalindo. Based on the results of the research and discussion of the problem, the following conclusions were taken:

- Service quality of PT. Multi Rentalindo is included in the important category for customers. The highest service quality expected by customers is the quality of the guarantee that is equal to 6.30%. The second highest service quality expected by customers is the quality of responsiveness which is equal to 3.88%.

- Customer satisfaction PT. Multi Rentalindo as a whole is included in the good category which is equal to 3.67% and almost meets customer expectations for service quality. The highest customer satisfaction on guarantee quality is 6.30%.
Rentalindo successfully proved the quality of its guarantee to customers so that customers provide the highest rating on guarantee quality performance;

- Simultaneously, the quality of service guarantees greatly affects the customer satisfaction of PT. Multi Rentalindo is 6.30%, but partially reliability and responsiveness do not affect customer satisfaction because customers need more quality assurance given by PT. Multi Rentalindo.

Some of the limitations contained in this study are: (i) This research was conducted only on employees of the company PT. Kawan Lama Group by taking the object of research at PT. Multi Rentalindo. (ii) This study only addresses the quality of service, customer satisfaction with customer loyalty. (iii) Some respondents are less serious in answering the questionnaire. (iv) Working conditions that make it difficult for some respondents to fill in questions (questionnaires).

**SUGGESTIONS**

By knowing that service quality variables consisting of Reliability (X1), Responsiveness (X2), and Guarantee (X3), have a significant influence on Customer Satisfaction (Y1) and Customer Loyalty (Y2), PT. Multi Rentalindo pays attention to and reconsider the importance of reliability, responsiveness and assurance in realizing an excellent service quality. In addition, some of these things will also be a benchmark for the community in choosing the services they want because along with the increase in expectations and also people's preferences to vote, it will actually trigger competition with other competitors.

- Future research is recommended to add other independent variables besides reliability, responsiveness, and assurance, which of course can affect customer satisfaction;
- Future research is recommended to study more deeply using more samples so that the research obtained can be more accurate.

For the next researcher, it is expected to be able to find other variables that support the higher value of service quality, so that in addition to the knowledge that researchers get increased, other car rental companies can consider continuing to improve services through other supporting variables, such as price factors and so forth.

**REFERENCES**

ABSTRACT
Government agency is collective designation which includes work unit and organizational unit of ministries or departments, non-departmental government institution, secretariat of state high institution, and other central and regional government agencies; including state-owned enterprises, state-owned legal entities, and regional-owned enterprises. One of the very effective models in improving the quality of performance of an agency is by using the Malcolm Baldrige Criteria for Performance Excellence. This research was conducted with the aim of: 1) measuring the performance of XYZ Government Agency so that their performance consistency can be monitored and 2) finding out the opportunities and obstacles in measuring the performance of XYZ Government Agency by using the Malcolm Baldrige Quality Award (MBNQA) criteria. The type of this research is descriptive research that uses XYZ Government Agency as the research object. The measurement conducted in this research applies the Malcolm Baldrige method. The findings showed that the criteria with the highest percentage score is operation (39.8%) and the lowest percentage score is strategy (35.1%). The total score is 377.5 from a maximum score of 1000 points. It showed that the performance of XYZ Government Agency is at the level of “initial growth” (scale point of 376-475).

KEY WORDS
systems and information technology and rearrange existing procedures (Widilestari, 2011). Thus, it can be concluded that competence must be increased as well as the skills of human resources in order to improve their performance and productivity. Improving the quality of human resources will have an impact on improving the quality of an agency or a company. Therefore, improving the quality of an agency or company requires the right model to process an agency or company. One of the very effective models in improving the quality of performance is the Malcolm Baldrige Criteria for Performance Excellence. Increasingly quality human resources will also make the quality of an agency or company better.

Malcolm Baldrige is one tool that can be used to identify and evaluate the performance of an organization or work unit. The Malcolm Baldrige Criteria for Performance Excellence (MBCfPE) method is based on organizational diagnostics with the basis of organizational processes and results. MBCfPE is able to identify strengths and opportunities for improvement from various areas of the organization (Purbajati et al, 2014). Previous studies that have proven the use of Malcolm Baldrige include Ekowati (2012) which explained that performance measurement using Malcolm Baldrige is quite effective. Similarly, previous research conducted by Renita and Maukar (2016) showed that study programs measured using Malcolm Baldrige are at the industry leader level. It means that the measurement using the Malcolm Baldrige method is quite effective and well used. In addition, Hasyim (2018) also stated the same thing that the use of the Malcolm Baldrige method is quite effective. The difference between previous research and current research is in the use of research method in which previous research did not only explain one method of performance measurement but also explained about other performance measurements such as balanced scorecard and others.

Internal assessment is one way for XYZ Government Agency from various groups to conduct assessments so that they can improve the performance of the agency to achieve excellent performance. The arising problem is the number of government agency that do not know the formulation or measurement system of the final score that states the performance level of the company. Based on these problems, a system that can facilitate companies in conducting internal assessments using the MBCfPE method is needed. This research was conducted with the aim of measuring the performance of XYZ Government Agency so that their performance consistency can be monitored.

METHODS OF RESEARCH

This research is a descriptive research which is intended to capture individual and group phenomena and certain situations that occur accurately (Sulistiyanto, 2015). This type of descriptive research is chosen because it is a type of research that provides a description or explanation of a situation as clearly as possible without any treatment of the object under research. The objective of descriptive research is to describe systematically and accurately about the facts and characteristics of the population or about the particular field to be researched.

By using a qualitative approach and descriptive analysis, this research is intended to observe, explain, and describe in-depth things related to the research objectives. This research sought to reveal the performance of the XYZ Government Agency with the basis of the Malcolm Baldrige method. To be able to express these problems, it applies qualitative method. This is based on the consideration that a qualitative approach can reveal and explain a phenomenon more deeply. The research subject is the XYZ Government Agency.

Data collection technique of the research includes observation, interview, questionnaire, and brainstorming which are described as follows (Sugiyono, 2012): Observation; Interview; Questionnaire; Brainstorming.

The following are the steps for implementing Malcolm Baldrige as a performance measurement tool for government agency. Mathematically, the Malcolm Baldrige score on each questionnaire category variable according to Herлина & Prasetio (2018) is obtained through the following formula:
Where: \( n_i = \) Number of ‘i’ answer voters; \( w_i = \) Weight of ‘i’ answer; \( N = \) Total number of respondents; \( W = \) Weight of the most answer; \( X = \) The total number of questions in each category of variables.

Table 1 – Operational Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Sub-Variables</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>1. Senior leader</td>
<td>1. Vision and values</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Communication and organizational performance</td>
</tr>
<tr>
<td></td>
<td>2. Governance and social responsibility</td>
<td>1. Organizational management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Legal behavior and ethics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Support for key community</td>
</tr>
<tr>
<td>Strategic planning</td>
<td>1. Strategy development</td>
<td>1. Development process</td>
</tr>
<tr>
<td></td>
<td>2. Strategy dissemination</td>
<td>1. Strategic objectives</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Development and dissemination of action plans</td>
</tr>
<tr>
<td>Community focus</td>
<td>1. Market and community knowledge</td>
<td>1. Market and community knowledge</td>
</tr>
<tr>
<td></td>
<td>2. Community relations and satisfaction</td>
<td>1. Development of public relations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Determination of community satisfaction</td>
</tr>
<tr>
<td>Knowledge measurement, analysis and management</td>
<td>1. Measurement, analysis, and improvement of organizational performance</td>
<td>1. Performance measurement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Performance analysis</td>
</tr>
<tr>
<td></td>
<td>2. Information management, information technology, and knowledge</td>
<td>1. Availability of data and information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Organizational knowledge</td>
</tr>
<tr>
<td>Workforce focus</td>
<td>1. Workforce engagement</td>
<td>1. Employee enrichment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Development of employees and leaders</td>
</tr>
<tr>
<td></td>
<td>2. Workforce environment</td>
<td>3. Assessment of employee involvement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Capability and capacity of the workforce</td>
</tr>
<tr>
<td>Operation focus</td>
<td>1. Design of work systems</td>
<td>1. Core competence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Work process design</td>
</tr>
<tr>
<td></td>
<td>2. Work process management and improvement</td>
<td>3. Readiness to respond to emergencies</td>
</tr>
<tr>
<td>Results</td>
<td>1. Service and product results</td>
<td>1. Work process management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Work process improvement</td>
</tr>
<tr>
<td></td>
<td>2. Community focus results</td>
<td>1. Community focus results</td>
</tr>
<tr>
<td></td>
<td>3. Workforce focus results</td>
<td>1. Workforce focus results</td>
</tr>
<tr>
<td></td>
<td>4. Leadership and governance results</td>
<td>1. Process effectiveness results</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Leadership and social responsibility results</td>
</tr>
<tr>
<td></td>
<td>5. Market and financial results</td>
<td>1. Market and financial results</td>
</tr>
</tbody>
</table>

Through this formula, the author looks for the percentage weight of each question, then looks for the average value of all questions in one categorical variable which is then converted into Malcolm Baldrige scores on that category variable (Giunta, 2015). In accordance with the analysis of the questionnaire results in each of the categories described previously, the results that can be seen in the MBNQA score criteria indicated by each item are scores that reflect the choice of answers from filling out the questionnaire. Meanwhile, the actual MBNQA score criteria, according to IQAF (2007) in Herlina & Prasetio (2018), is the result term that refers to the company’s output and outcomes in achieving the requirements of each of the seven criteria. The following is the table of the position or class of the company according to MBCfPE:
Table 2 – Position or Class According to MBCIPE

<table>
<thead>
<tr>
<th>Position/Class of the Company</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Development</td>
<td>0-275</td>
</tr>
<tr>
<td>Early Result</td>
<td>276-375</td>
</tr>
<tr>
<td>Early Improvement</td>
<td>376-475</td>
</tr>
<tr>
<td>Good Performance</td>
<td>476-575</td>
</tr>
<tr>
<td>Emerging Industry Leader</td>
<td>576-675</td>
</tr>
<tr>
<td>Industry Leader</td>
<td>676-775</td>
</tr>
<tr>
<td>Benchmark Leader</td>
<td>776-875</td>
</tr>
<tr>
<td>World Leader</td>
<td>876-1000</td>
</tr>
</tbody>
</table>


RESULTS AND DISCUSSION

The recapitulation of the achievement of scores from all categories based on the results of the questionnaire is presented in table 9 as follows.

Table 3 – All Category Scores Based on XYZ Government Agency Questionnaire Results in 2018

<table>
<thead>
<tr>
<th>No</th>
<th>Categories</th>
<th>Maximum Score</th>
<th>Agency Score</th>
<th>Percentage of Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leadership</td>
<td>120</td>
<td>91</td>
<td>75.8%</td>
</tr>
<tr>
<td>2</td>
<td>Strategy</td>
<td>85</td>
<td>55</td>
<td>64.7%</td>
</tr>
<tr>
<td>3</td>
<td>Customer</td>
<td>85</td>
<td>64</td>
<td>75.2%</td>
</tr>
<tr>
<td>4</td>
<td>Knowledge Measurement, Analysis and Management</td>
<td>90</td>
<td>64</td>
<td>71.1%</td>
</tr>
<tr>
<td>5</td>
<td>Workforce</td>
<td>85</td>
<td>65</td>
<td>76.4%</td>
</tr>
<tr>
<td>6</td>
<td>Operation</td>
<td>85</td>
<td>63</td>
<td>74.1%</td>
</tr>
<tr>
<td>7</td>
<td>Results</td>
<td>450</td>
<td>311</td>
<td>69.1%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1000</td>
<td>713</td>
<td>71.3%</td>
</tr>
</tbody>
</table>

Table 3 shows that the total score obtained by XYZ Government Agency for the entire Malcolm Baldrige National Quality Award category, based on the results of the questionnaire, is 713 or 71.3% of the maximum score of 1000. The category with the highest score is result (311) and the lowest is strategy (55). In addition, for the achievement percentage, the category with the largest value is workforce (76.4%) and the smallest is strategy (64.7%).

The frequency distribution of respondents’ answers is quite varied. Respondents who gave answers with a total score equal to or greater than 71.3% (the performance of good institutions), the highest score included respondents who were aged 17-25 years (53.4%), were female (80.9%), had length of employment under 1 year (60%), had educational background of master’s degree (70%), and had type of structural official positions (60%).

Respondents who gave answers with a total score below 71.3% (the performance of less institutions) the highest score included respondents who were aged 46-55 years (66.7%), were male (78.3%), had length of employment of 1 -5 years (60.9%), had educational background of association’s degree or equivalent (73.7%), and had type of expert positions (66.7%). The results of the frequency distribution of respondents’ characteristics according to the assessment of agency performance levels can be seen in full in appendix 10.

The results of the score assessment of each item are used to calculate the achievement of the scores of all categories as shown in table 3 below.

Table 4 shows that the total score obtained by XYZ Government Agency for all categories of Malcolm Baldrige Criteria for Performance Excellence based on the results of interviews and document observations is 209.75 or 20.98% of the maximum score of 1000. Category with the largest score is result (102.5) and the lowest is workforce (15). In addition, for the weight of achievement, the category with the largest value is result (22.77%) and the smallest is leadership (17.08%).

After the scores of each category based on the results of the questionnaire, interviews and document review are obtained, the next is conducting the average score assessment for each category using the following formula: Average score of each category = (Category
scores from the questionnaire results x 1/3) + (Category score from the interview and observation results x 2/3). Achieving the average score of all categories based on that formula can be seen in table 5.

Table 4 – All Category Scores Based on the Results of Interview and Document Observation to the XYZ Government Agency in 2018

<table>
<thead>
<tr>
<th>Categories &amp; Items</th>
<th>Maximum Score</th>
<th>Weight</th>
<th>Item Score</th>
<th>Category Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Leadership</td>
<td>120</td>
<td>17.08%</td>
<td>20.50</td>
<td></td>
</tr>
<tr>
<td>1.1 Senior leader</td>
<td>70</td>
<td>15%</td>
<td>10.5</td>
<td></td>
</tr>
<tr>
<td>1.2 Governance and social responsibility</td>
<td>50</td>
<td>20%</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>2. Strategy</td>
<td>85</td>
<td>20.29%</td>
<td>17.25</td>
<td></td>
</tr>
<tr>
<td>2.1 Strategy development</td>
<td>40</td>
<td>15%</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>2.2 Strategy implementation</td>
<td>45</td>
<td>25%</td>
<td>11.25</td>
<td></td>
</tr>
<tr>
<td>3. Customer</td>
<td>85</td>
<td>20.29%</td>
<td>17.25</td>
<td></td>
</tr>
<tr>
<td>3.1 Customer voice</td>
<td>45</td>
<td>25%</td>
<td>11.25</td>
<td></td>
</tr>
<tr>
<td>3.2 Customer engagement</td>
<td>40</td>
<td>15%</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>4. Knowledge Measurement, Analysis, and Management</td>
<td>90</td>
<td>20%</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>4.1 Measurement, analysis, and improvement of organizational performance</td>
<td>45</td>
<td>15%</td>
<td>6.75</td>
<td></td>
</tr>
<tr>
<td>4.2 Knowledge, information and information technology management</td>
<td>45</td>
<td>25%</td>
<td>11.25</td>
<td></td>
</tr>
<tr>
<td>5. Workforce</td>
<td>85</td>
<td>17.64%</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>5.1 Workforce environment</td>
<td>40</td>
<td>15%</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>5.2 Workforce engagement</td>
<td>45</td>
<td>20%</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>6. Operation</td>
<td>85</td>
<td>22.64%</td>
<td>19.25</td>
<td></td>
</tr>
<tr>
<td>6.1 Work process</td>
<td>45</td>
<td>25%</td>
<td>11.25</td>
<td></td>
</tr>
<tr>
<td>6.2 Operational effectiveness</td>
<td>40</td>
<td>20%</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>7. Results</td>
<td>450</td>
<td>22.77%</td>
<td>102.50</td>
<td></td>
</tr>
<tr>
<td>7.1 Process and service outcome</td>
<td>120</td>
<td>20%</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>7.2 Customer focus outcome</td>
<td>80</td>
<td>35%</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>7.3 Workforce focus outcome</td>
<td>80</td>
<td>15%</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>7.4 Leadership and governance outcome</td>
<td>80</td>
<td>20%</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>7.5 Financial and marketing outcome</td>
<td>90</td>
<td>25%</td>
<td>22.5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1000</td>
<td>20.98%</td>
<td>209.75</td>
<td></td>
</tr>
</tbody>
</table>

Table 5 – Average Score of All Categories of Malcolm Baldrige Criteria for Performance Excellence Based on Questionnaire, Interview, and Document Observation Results of XYZ Government Agency in 2018

<table>
<thead>
<tr>
<th>Categories</th>
<th>Maximum Point</th>
<th>Category Point from the Questionnaire Results</th>
<th>Category Point from the Interview and Observation Results</th>
<th>Average of Category Point</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>120</td>
<td>91</td>
<td>20.50</td>
<td>44.00</td>
<td>36.67%</td>
</tr>
<tr>
<td>Strategy</td>
<td>85</td>
<td>55</td>
<td>17.25</td>
<td>29.83</td>
<td>35.10%</td>
</tr>
<tr>
<td>Customer</td>
<td>85</td>
<td>64</td>
<td>17.25</td>
<td>32.83</td>
<td>38.63%</td>
</tr>
<tr>
<td>Knowledge Measurement, Analysis and Management</td>
<td>90</td>
<td>64</td>
<td>18.00</td>
<td>33.33</td>
<td>37.04%</td>
</tr>
<tr>
<td>Workforce</td>
<td>85</td>
<td>65</td>
<td>15.00</td>
<td>31.67</td>
<td>37.25%</td>
</tr>
<tr>
<td>Operation</td>
<td>85</td>
<td>63</td>
<td>19.25</td>
<td>33.83</td>
<td>39.80%</td>
</tr>
<tr>
<td>Results</td>
<td>450</td>
<td>311</td>
<td>102.50</td>
<td>172.00</td>
<td>38.22%</td>
</tr>
<tr>
<td>Total</td>
<td>1000</td>
<td>713</td>
<td>209.75</td>
<td>377.50</td>
<td>37.75%</td>
</tr>
</tbody>
</table>

The table 5 shows that the total score achieved by XYZ Government Agency is 377.50. It means that by using agency performance assessment based on the Malcolm Baldrige Criteria for Performance Excellence, XYZ Government Agency achieve average predicate and is included in the category of early improvement (scale points 376-475). Early improvement means that XYZ Government Agency is in an initial position to increase in the service sector. Generally, the performance of XYZ Government Agency is quite good even though there are still gaps between reality and expectations. Some categories also still show a fairly high gap in the sub-categories of strategy (35.1%) and leadership (36.67%).
Therefore, improvements need to be prioritized in those categories. More specific recommendations can be drawn up based on the data obtained through questionnaire and interview.

After determining the performance predicate and level of XYZ Government Agency according to the Malcolm Baldrige Criteria for Performance Excellence, the next step was analyzing the relationship between the process dimension categories and the result categories. The analysis was carried out by carrying out the Pearson correlation test on the data from the questionnaire.

Table 6 – Relationship between the Process Dimension Categories and the Result Categories of XYZ Government Agency in 2018

<table>
<thead>
<tr>
<th>No</th>
<th>Process Dimension Categories</th>
<th>Significance (p-value)</th>
<th>Correlation Coefficient</th>
<th>Strength of Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leadership</td>
<td>.001</td>
<td>.627</td>
<td>Strong</td>
</tr>
<tr>
<td>2</td>
<td>Strategy</td>
<td>.001</td>
<td>.716</td>
<td>Strong</td>
</tr>
<tr>
<td>3</td>
<td>Customer</td>
<td>.001</td>
<td>.633</td>
<td>Strong</td>
</tr>
<tr>
<td>4</td>
<td>Knowledge Measurement, Analysis, and Management</td>
<td>.001</td>
<td>.642</td>
<td>Strong</td>
</tr>
<tr>
<td>5</td>
<td>Workforce</td>
<td>.001</td>
<td>.767</td>
<td>Very Strong</td>
</tr>
<tr>
<td>6</td>
<td>Operation</td>
<td>.001</td>
<td>.690</td>
<td>Strong</td>
</tr>
</tbody>
</table>

Drawing the conclusions by referring to the basis of decision-making correlation tests in table 6 are as follows. The result variable has a significant (meaningful) relationship with all process dimension variable (significance value (p) <0.01) in which all process dimension categories have a significance value of 0.001. Meanwhile, at the level of strength (closeness) of the relationship between the result variable and the process dimension variable, the workforce category has the highest relationship with the result category, because it has the highest correlation coefficient value of 0.767 (very strong relationship).

DISCUSSION OF RESULTS

The implementation of the XYZ Government Agency has not been fully applied in the work. This research found the fact that senior leaders had not been committed to the vision, mission, and values and had not become the “soul” of the organization. It is a necessity for senior leaders to develop their vision, mission and values and make it a “living document”.

The researcher obtained information from the informant that the vision, mission and values were socialized by senior leaders to all internal stakeholders of the agency, but the translation was carried out in a less intense manner. Senior leaders need to set performance measures so that the achievement of vision, mission, and values can be measured, analyzed and improved. Based on the research findings, the size and level of success in achieving vision, mission, and values have not been established. The committee has not functioned well; although this is important to avoid the demands of customers and the public against malpractice. In assessing the Malcolm Baldrige National Quality Award, compliance with legal and ethical behavior is very important to be made and implemented by senior leaders. Regarding the achievement of senior leaders of XYZ Government Agency in the areas of vision, mission and values, they are considered to be in the early stages in a systematic approach.

In the Malcolm Baldrige Criteria for Performance Excellence, how senior leaders communicate with all levels of workforce and customers is very important. Senior leaders are expected to encourage honest and two-way communication including the use of effective social media with all workers. Another important thing is that senior leaders need to communicate important decisions and play an active role in motivating the workforce, including participating in awards and recognition programs to strengthen performance and focus on customers.

The communication problem between the leader and staff can be linked to the servqual model, which is widely known as the Gap Analysis Model. This model was developed as a
research survey tool called SerVQUAL. This is based on the thought that consumers can evaluate the service quality of a company by comparing their perceptions and expectations regarding the service. SerVQUAL is considered as a general measurement tool that can be used to analyze the causes of service problems and understand how service quality can be improved and refined.

Strategic planning emphasizes the importance of how an organization addresses and responds to various dynamic and difficult-to-predict environmental changes. The strategic planning process involves senior management and managers from the business unit or other key responsibility centers which are assisted by their respective staff. Malcolm Baldrige Criteria for Performance Excellence explains that the development of strategies must be a reference for organizations to prepare for the future. Strategy development is carried out by existing leaders and teams by utilizing various types of relevant estimates, projections, choices, scenarios, and information to the organization.

Strategy development can be carried out by involving the participation of external partners, customers and other stakeholders. The strategy must be able to be broadly translated by all internal and external components. Strategies are developed/compiled to achieve a goal through a comprehensive approach.

Based on document review, the XYZ Government Agency has determined what is the agency's strategic plan. However, it encountered obstacles that the strategy plan could not be applied. The failure of the implementation of a strategy is caused by four things which include: the vision and strategy cannot be implemented, the strategy is not connected with the goals of the department, team and individuals, the strategy is not connected with the allocation of resources and the feedback is rather tactical than strategic. The main failure in carrying out the strategy is also determined by the lack of socialization strategy. Therefore, the determination of performance in the strategic planning must cover all organizational performance, human, financial, operational and business resources.

The Malcolm Baldrige Concept Criteria for Performance Excellence not only focuses on developing strategic plans, but also emphasizes the ability of organizations and leaders to disseminate these strategic plans and translate them into key indicators that are easily understood and implemented in daily activities. The dissemination of organizational strategies requires a concerted effort from senior leadership and technical leaders to create communicative media so that all parties in the organization can be involved in efforts to achieve the objectives of the strategies that have been previously set.

Basically, XYZ Government Agency already has work plans, but the plan has not synergized with the strategic planning that has been prepared. The work plan is an effort to achieve the agency's strategic objectives. The target of the strategy is set and adjusted to the vision and mission they hold. The target strategy is converted into a work plan. The work plan is then translated into all work units. Every year, the agency evaluates the work plans in order to create a learning process even though it is still in the stage of improvement and generally has not shown any innovation.

The approach of customer focus is still very lacking because it is only based on customer data and has not implemented an approach to the customer. The method that has been carried out is only limited to the field. The results of interview and document review found that data relating to service performance were reported regularly every month in each section, but that was never analyzed to determine market segmentation. Supposedly, to get to know customers more, XYZ Government Agency can approach them through the agency's internal reports from that section every month then customer segmentation can be carried out demographically. Based on the customer characteristics, the agency can carry out customer-focused marketing strategies. Every organization must have a formal process for conducting research on market condition, customer need and expectation, as well as new approaches to improve customer relationship and satisfaction.

Less optimal use of data to segment customers in the agency is caused by limited customer data contained in that section. Then, supporting data to find out customer preferences is also needed by conducting a market survey. The agency needs to identify market segments that they can serve very effectively. One of them is by identifying
preference segments and using approaches that classify consumers demographically in which the variables are more easily measured.

The interview results also showed that the agency also carried out the strategies of gathering information and listening directly to customers at any time. However, complaint data or interview results are never routinely analyzed and evaluated to improve service performance. There is no specific approach that can determine requirements, change expectations and other things related to customers in the form of suggestion boxes and customer surveys.

XYZ Government Agency must continue to develop market-oriented service quality. The survey of service users’ satisfaction levels should be conducted routinely to determine the development of service user satisfaction levels. It should refer to the organization’s goals in the agency’s strategic plan; i.e. by creating satisfied customers, increasing customer loyalty supported by a strategy to improve data quality for customer service, and building partnerships with customers. These are the starting points in making improvements to the customer-focused service process.

Based on the instruments owned by the agency and the work plan that has been made by each work unit, each employee should be able to take measurements independently of the results of their work; however, not all employees can do it well. One of the important notes in the accreditation surveyor’s recommendations is that the employee’s competency improvement is not yet optimal.

In the Malcolm Baldrige Criteria for Performance Excellence, the variables of measurement, analysis and knowledge management are divided into 2 (two) sub-variables which include measurement, analysis, and performance improvement, as well as knowledge, information and information technology management. The existence of this variable plays an important role in synergizing three variables in the Leadership Triad, which includes leadership, strategic planning and customer focus and three other variables in the Result Triad, which include focusing on the team, focusing on organizational performance processes and results. This variable is very critical to produce fact-based and knowledge-driven systems. Measurement, analysis, and knowledge management function as the foundation of a competitive performance management system.

The category of measurement, analysis and knowledge management directs how the agency can select, collect, analyze, manage and improve their data, information and knowledge assets, including how the agency manages its information technology. In addition, this category also emphasizes the importance of the agency in using review findings to improve its performance.

Management information system at XYZ Government Agency is not optimal. Currently, it is only an application for calculating costs (billing system). One sub-system that is needed by an agency management information system is a monitoring and evaluation function. The monitoring phase and evaluation of all program operations/implementation, including planning, need to be absolutely known quickly and accurately so that decision making also becomes more precise and faster. Unlike other business processes, monitoring and evaluation in an agency require an assessment of specific indicators that are universally applicable.

If an increase in the ratio of visits to certain diseases occurs, the management of the agency, besides being obliged to inform the competent institution, can certainly prepare the facilities related to the increase in the visit. In addition, a monitoring and evaluation mechanism in the information system must be equipped with an Early Warning System that will signal performance (operational/managerial) indicators and signals to the Key Performance Indicator so that agency management can immediately take the necessary actions.

In terms of staff recruitment, alignment with agency needs and guidelines for strategic plans are in the initial stages. This need is adjusted to the existing budget. Employee recruitment should be carried out openly with the announcement of staff receipts. Therefore, it may bring in many prospective applicants who will facilitate the selection of the best
candidates. The most important thing is to evaluate the existing recruitment system including work systems, job satisfaction, motivation, loyalty and complaints of the employee.

XYZ Government Agency has planned organizational restructuring which refers to new regional regulations regarding the organizational structure of work procedures by placing human resources who truly have competencies and capabilities in their fields. This is intended so that service performance in XYZ Government Agency can run more optimally and deliver innovative improvement measures. If strategic objectives are established and applied to all levels of the organization, senior leaders and managers can effectively manage employees related to the implementation of tasks.

In terms of measuring the performance of human resources at XYZ Government Agency, the measure used is the assessment of the targets of employee performance, activity, education, position, work period, loyalty, and dedication to the agency. Staff-oriented performance assessment is a simple, easy and inexpensive, but subjective method. This method is usually used by small agencies that have weaknesses because they only focus on the character of the employee, not on the merits of the employee in carrying out the task.

Performance management is sufficient to support compensation practices in the form of incentives by referring to the index system. However, the amount of receipt of incentives is not satisfactory because it does not match the employee’s workload. The role of senior leaders is very decisive in the management of agency human resources to achieve the vision and mission of the organization.

The limitation of human resources is one of the obstacles in the development of education and training. Most functional staff are less motivated to participate in training and human resource development activities; except that the training has something to do with their profession. The measurement and evaluation of training results regularly and periodically has not been carried out by the agency. In this case, the agency needs to pay attention to employee performance and organizational performance in designing training and evaluation. Acquisition of employee motivation to further improve their competence and quality of performance through training development activities must be improved. Senior leaders must emphasize the effectiveness of training; especially those that have the goal of increasing customer satisfaction and loyalty. The implementation of the training review and evaluation is very important to see its effectiveness.

Another important factor that must be considered is the measurement of achieving improved employee safety, security and health. Based on the research findings, the services provided to internal agency customers currently include incentives or medical services, health insurance, annual leave and pension benefits. In its implementation, there has never been a routine and periodic evaluation of agency employee satisfaction. The management should have created a system that can find out expectations and factors that affect employee satisfaction and accommodate complaints or voices of employees as internal customers.

XYZ Government Agency has started to prepare work systems for each agency work unit; however, the limitations of the agency in providing decent working facilities are still an obstacle. Due to the existing limitations, starting with improving human resource, system and work process, Government Agency XYZ began to adjust various standards and good work procedures. The process of determining the main services in XYZ Government Agency has not gone through the identification process based on planning needs which are then analyzed. In addition, it has not accommodated input from internal and external customers. An analysis of costs and benefits has also not been carried out, as a way to ensure that the decision to open the service is appropriate.

Designing the service process must consider customer input, market research, extensive testing, planned analysis and implementation. Regarding the design process, the XYZ Government Agency has not yet used a model. Even though this model is needed to ensure that the right decision is taken. We recommend that several analyzes including cost analysis be made. Then, the team representing customers and suppliers as process owners is selected. This team collects data with various methods such as customer voices, websites, industry trends and local markets, benchmarks, and others. The team then develops an implementation plan including appropriate training for staff and project implementation.
schedules. After that, it is evaluated to see the shortcomings then the process is permanently set.

Supporting processes and operational planning have been carried out through plan, do, check, act. However, the process is not consistent so the implementation is not optimal. The support process is determined through a planning process that encourages staff to provide high-quality services. Supporters and businesses are analyzed to ensure the process runs according to design. It uses automated data collection techniques to minimize errors and costs associated with performance measurement. Technology is integrated in business and supporting processes for accurate and efficient operations. If it matches the size of the quality cost, it can be used as an indicator of the success of the quality improvement program.

The existence of the agency is largely determined by their ability to survive in a competitive environment. Apart from having to prioritize its social functions, as a government service institution, the agency also needs to pay attention to their business functions to maintain their operations in providing services to the community.

The Malcolm Baldrige Criteria for Performance Excellence concept aims to direct the organization to have a good focus on the ongoing process, since with a good focus on work systems and work processes, it will provide added value to organizational progress and improve organizational performance results.

The organization’s ability to measure performance results will be the main benchmark in improving organizational performance in the future. This is carried out through fulfilling the elements in this variable, the principles of integrated quality management or Total Quality Management.

The current development of external factors is very dynamic in which the management cannot anticipate its influence earlier. For this reason, management is required to always be responsive and adaptive, always follow and adapt to environmental conditions. Management needs to build a strong team in determining the way or approach that will be implemented to maintain and develop the organization in an ever-changing environment.

The process approach has not answered the basic requirements of the items including: performance measurement is not consistently carried out, service has not been customer oriented, access to new agency performance data can be seen in financial performance and agency service productivity performance. Service quality performance measurement only focuses on measuring service and the level of efficiency of agency services where comprehensive measurement of service quality has not been carried out.

Regarding customer performance indicators such as customer satisfaction, customer retention, customer profitability, and market share in the target segment, operational performance indicators need to be analyzed to identify customer expectations and needs and pay attention to the drivers of key customer successes such as waiting time and service time. The final conclusion of the performance measurement of the XYZ Government Agency shown by the score illustrates that the performance of the XYZ Government Agency is still not good. Therefore, proactive planning needs to be made and implemented that is not only reactive to the problem.

In the perspective of the Malcolm Baldrige Criteria for Performance Excellence system, categories are divided into leadership triad and result triad. The leadership triad (leadership, strategy, and customers) is used to emphasize the importance of leadership so that it focuses on strategy and customers. Senior leaders set direction and look for future opportunities for the organization. Meanwhile, the result triad (labor, operations, and results) encompasses every work focus process and operational process as well as the performance results achieved by the two processes. Thus, all actions in the Malcolm Baldrige criteria for Performance Excellence are directed at achieving “results”; namely a composition of product and process performance results, customer focus, workforce focus, leadership and governance, finance and markets.

The relationship between each category in the Malcolm Baldrige Criteria for Performance Excellence is defined as “mutually bound structures”, which reflect the interconnected nature of the system as a whole. The two-way arrow between the process
dimension categories and the result categories shows the importance of feedback in an effective performance management system. The highlight of the key role of integration emphasizes that there is no particular part of the system that can operate on its own.

Malcolm Baldrige Criteria for Performance Excellence is a new name used instead of Malcolm Baldridge Criteria for Performance Excellence. The use of the word framework and design changes in the Malcolm Baldrige diagram Criteria for Performance Excellence shows and emphasizes that all categories are inseparable entities within the framework of excellent performance.

It shows a strong relationship between workforce management and customer satisfaction results. These results support the service-profit chain theory and the importance of high-skilled service providers.

Building a better work system, increasing staff training, measuring and evaluating staff performance, all of which are directed in the Malcolm Baldrige Criteria for Performance Excellence, should result in staff satisfaction which will also have an impact on the satisfaction of other customers. The circular effect of staff and customer satisfaction is illustrated in the theory of service-profit chains in which policies that increase staff satisfaction (and henceforth, staff retention and loyalty) will motivate staff to increase the value and quality of their services, leading to increased customer satisfaction.

Institutional performance results are significantly related to staff and process management. This is in line with conditions where all efforts to improve the quality of services are linked to staff. Since staffs are the spearhead that directly make contact to customers, they are direct determinants of service quality. Internal quality of agency is one way to improve the quality of the work environment, which will have an impact on staff satisfaction. Therefore, it is important for the agency to increase their staff satisfaction by providing support for staff to work through communication, engagement and compensation. In addition, the agency needs to develop innovations in staff systems and work processes to improve the efficiency of their tasks.

CONCLUSION

All categories of process dimension have a significant relationship with result categories (p-value<0.01). The category with the highest relationship is workforce with a correlation coefficient of 0.767 (very strong relationship). XYZ Government Agency needs to conduct routine evaluations of the recruitment system that has been available so far including work system, job satisfaction, motivation, loyalty and employee complaint. XYZ Government Agency needs to provide decent working facilities for employees so that they can carry out their work properly. XYZ Government Agency needs to build a strong leadership team in implementing several approaches with systematic method that are appropriate for implementing the process of seven criteria in the Malcolm Baldrige Criteria for Performance Excellence and implementing and evaluating organizations consistently. The agency needs to immediately implement recommendations for improvement follow-up based on the results of the Focus Group Discussion regarding the findings of this research.

REFERENCES

10. Sulistiyanto, S. (2015). Studi Kasus Analisis Penggunaan Media Sosial Dalam Akun Twitter @ChelseaFC_Indo. Essence Jurnal Seni, Desain, Komunikasi Peneliti Muda Vol. 1 No. 1
ABSTRACT
Each people have a trust to the product that they use for daily activity, such as a cellular phone which almost all people are using this product for communicating tool to each other. But not just only for communication purpose, each cellular phone is used by the user for entertaining purpose. Talking about cellular phone, Samsung is one of the most cellular phones that famous in Indonesia, we can see this product everywhere, and many people are using Samsung product, starting from the cheapest one to the most expensive prices, and its users from school age to workers level. As a product, Samsung is one of the famous brands which successful to attract its users and any potential user to use the product. The level of people trust to this product is higher than other products. The trust itself is not coming too easy, Samsung has to convince the customers or potential customers of what benefit that they will get by using Samsung product, and also the fixed product reputation will be able to attract customers’ attention. This research aims to find out the relationship of brand communication, brand image, and brand trust that influences brand loyalty. This research itself is using a statistical the modeling structural equations. The sampling method that applied by the researcher is a random sampling to 130 users (students, workers) of Samsung cellular phone (any types, and prices) in Jakarta, Surabaya, and Tangerang City. The results showed that brand communication influences brand image, brand communication influences brand trust, brand image has an effect on brand trust, and brand trust has an influence on brand loyalty of the Samsung customers.

KEY WORDS
Brand communication, brand image, brand trust, brand loyalty.

Experts in economics believe that strong brand could create greater future value to a company. Brand not only is a useful and efficient tool for managers, brand is also a necessary strategy which could help organization create on-going competitive advantage. The higher the competition in the market, particularly in the services industry, the more companies consider their brand as a competitive advantage (Keller, 1993). Brand is an important communication tool in consumer relationship management, and that is valuable to consumers because (1) it reduces the consumers’ risks and (2) saves decision making cost. Furthermore, brand is the only effective signal in the market that a company could use because of market information asymmetry. Information asymmetry exists within products and services because the risk of loss is on the customer.

For that reason, to reduce or avoid the risk of loss, customers choose the brand that is trust worthy. If customers are disappointed with a brand, all the company’s investment on future earnings would disappear. Brand is an influencing factor for companies to make the right branding strategy. Brand could be viewed as a mechanism to involve buyers and sellers in a long-term relationship. As a result, brand could be used as a defensive tool in marketing to keep existing loyal customers, and as an offensive tool to gain new customers.

The importance of defensive marketing has been identified in this study. The cost to gain a new customer is higher than to retain an existing one (Sweeney & Swait 2008). For that reason, marketers are at an evolutionary stage where marketers not only want to gain new customers, but to also maintain the loyalty of existing ones. Currently, customers’ satisfaction is just not enough and companies cannot rely just on it. Companies must also ensure that satisfied customers are loyal. In this paradigm, the long-term objective is to build
a long-term relationship with concerned parties and most important of all is to maintain larger and loyal customer base.

This would lead to higher brand recognition and higher profitability (Samadi et al, 2009). This concept holds an important role in creating long term value to companies because loyal customers do not need wide spread promotional action and they will happily pay more to get benefits from their favorite brand. That is the reason why brands that emphasize loyalties helps companies to compete effectively with global giant companies to gain market share in the global market (Javadeyn et al, 2010). To that end, it could be said that the most important characteristics of a brand are brand trust and brand loyalty which could gained via brand communications and quality of service.

LITERATURE REVIEW

According to Ghodeswar (2008) brand is defined as a set of customers experiences which resulted from all contact points customers had with the product. Keller (1993) also showed that brand is a mix of psychological symptoms and subjectivity in the mind of consumers which add value to the product or services. These symptoms have to be unique, out of the ordinary and desired. Brand communications is the key to integrated marketing and is the center of all that consumers wanted. Brand communication is the continuous relationship to customers. It is also creating and regulates the tasks that hold key roles in building the relationship between brand and customers. It exposes the customers to the brand and increases customers awareness and memory to the brand so that customers would buy brand with the highest value. That is the reason why brand communication must increase brand loyalty to maintain strong tie between customers and brand from time to time (Duncan & Moriarity, 1998).

Brand communications is the primary integrating element that connect brand to the customers and create the certain attitude to the brand in the mind of customers (Sahin et al, 2012). Brand does impact the buying behavior of consumers. Positive attitude towards a brand such as brand trust and and brand loyalty is very important towards the long-term success of the brand. That is why marketers spend a great deal of effort to create and maintain positive attitude towards their brand (Zehir et al, 2011). In other words, brand communication is seen as a representation of a brand in the mind of customers and is connected to the presentation or perception about the brand by the customers as reflected in brand association (Cretu and Brodie, 2007). So, brand image is the core of service or product.

Brand image is defined as the mental picture in customers’ mind about what is being offered and include all symbolic meanings that customers associated with particular attributes of the product or services (Salinas and Pérez, 2009; Bibby, 2011). Sääksjärvi and Samiee (2012) defined brand image as a series or sum total of brand association that customers remember which created a perception of a brand. Whereas Low and Lamb (200) define brand image as a logical or emotional perception that customers attach to a brand. In the business market brand image can also be expected to play an important role, especially in situations where it is difficult to differentiate quality-based products or services that are real (Mudambi, Doyle and Wong, 1997; Shankar, Azar, and Fuller 2008).

Brand images are usually communicated to customers that make them believe their products are of a certain level and make them decide to buy (Torres and Bijmolt, 2009). Marketers usually assume that the brand image is the basis on which the customer evaluates the quality of the product or service, namely the physical guess about the product (Cretu and Brodie, 2007). The understanding is that customers will use brand image to take a conclusion about a product or service, or to maintain awareness of the quality of a product or service (Bibby 2011). Also, brand image could be seen as a set of relative localization, standard identical quality guarantee and functional attribute of the product or service which resulted in customers view their own self-image and assist them in making their purchase decision (Aghekyan-Simonian, Forsythe, Kwon and Chattaraman, 2012).
Furthermore, in literature there is a mention that products with strong brand image can reduce cognitive risk and increase the value of product or services for customers (Kwon and Lennon, 2009). In these instance customers often use brand image to make conclusion about the quality of the product or services and influence customers’ behavior (Salinas and Pérez, 2009). Thus quality of the brand image indirectly makes customers recognize the quality of the product or services (Sääksjärvi and Samiee, 2012). Ideal use of brand image not only helps companies to have position in the market, but also to defend the brand from competitors (Cretu and Brodie, 2007). That is why companies these days work very hard to maintain brand image and invest effort and money into develop a good image (Shankar, Azar, and Fuller, 2008).

Brand trust as defined by Morgan & Hunt (1994), is a hope that an exchange between trust and image would take place and believe that brand trust would lead to brand commitment because trust has facilitated a relationship exchange. Trust leads to certainty that the other party is trust worthy and it would lead to a cooperation that is strong, honest and beneficial. A good brand is a brand that focuses on real needs of customers that are satisfied by the product or service. Brand Trust that exceeds consumers’ satisfaction level with functional performance will make consumers loyal towards that brand. That is why Brand Trust is proposed as an important element to build long term relationship between consumers and brand which generate brand loyalty (Ha & Perks, 2005). Brand trust is the customers’ willingness to rely on the ability of a brand to deliver the stated functions. Current marketing literature revealed that trust is more important in uncertain situations, when there is information asymmetry and when there is fear of opportunism (Chiu, Huang and Yen, 2010).

Thus the role of trust is to reduce uncertainty, reduce information asymmetry and make customers more comfortable with their brand (Gefen, Karahanna and Straub, 2003; Pavlou, Liang and Xue, 2007). As an example, if customers are aware of the use value and hedonist value of their brand, trust will increase (Carroll and Ahuvia, 2006). In this research brand trust is the willingness of an average customer to rely on their brand to deliver the promised function (Wang and Emurian 2005).

Brand loyalty is, according to American Marketing Association (AMA), a special privilege where a customer repeatedly buys from a supplier instead of from other suppliers. It also said that brand loyalty is a behavioral response that is relatively fanatic when shopping. In this situation consumers have the tendency to buy again the same brand. This reaction is a function of cognitive process that customers revealed when they were faced with the same products in every respect and yet the majority of customers would buy the brand they knew (Vazifedost et al, 2010). According to Chang and Chang (2001), brand loyalty gives an indication about customers’ preference to buy one brand within a product class from a given expected quality, not because of the price. Current literature about branding defines brand loyalty as consist of two dimensions: behaviors and assumptions about the brand (Algesheimer et al., 2005). So, the attitude of a loyal customer who is willing to support the preferred product is different to that of a customer who is forced to buy but not enthusiastic to give a word of mouth support (Ching and Chang 2006). According to research of Morrison and Crane (2006) brand loyalty is defined as commitment to repeat-buy a preferred product or services in the future.

To empirically test the relationship between brand communication, brand trust and brand loyalty, one conceptual model was created based on marketing articles and particularly article in literature about brand management. In this model concept brand communication is a predictor whilst brand image and brand trust are supporting variables or mediator. Brand loyalty is the only output variable.

According to Jones and Kim (2011) states that Brand Communication is when ideas or images of products or services marketed have been identified and recognized by many consumers. Brand communication is not only for building brand recognition, but also building a good reputation and a set of standards that must be surpassed by companies (Sahin, 2011). Marketers need to communicate about other customers’ experiences with brands, for example customer satisfaction using a brand and how it brings joy and comfort that makes
customers wants to buy the brand again. All of this will build a brand image in the customer's mind. So this can be said that the more brand communication increases, the higher the expectations of the brand image that customers conceptualize. Previous empirical evidence has found a positive relationship between brand communication and brand image (e.g., Narayanan and Manchanda, 2009).

\( H_1 \): Brand communication has a lot of positive effects on brand image Samsung Customers.

\[ \text{Figure 1 – Conceptual Model} \]

Kotler (2007) states that Brand Images are perceptions and beliefs carried out by consumers, such as reflecting on associations that occur in consumer memory. When consumers use a particular brand, they will be connected to the brand, meaning consumers will bring along the image of the user as well as the characteristics of the brand (Ferrinadewi, 2008). Therefore, someone who uses a particular brand can interpret and image the brand with a variety of views that vary from one to the other in accordance with his knowledge. Satisfaction with the brand will lead to a positive attitude towards the brand (Shankar, Azar and Fuller, 2008). Therefore, it can be called that the higher brand communication by marketers, the higher brand trust from customers can be expected (e.g., Su and Rao, 2010), so brand communication can be expected to lead to brand trust in Samsung Customers.

\( H_2 \): Brand communication has a positive effect on brand trust in Samsung Customers.

Brand trust can be defined to what extent consumers believe that certain brands can fulfill their beliefs or desires (Zhou et al., 2011). Therefore, trust is considered a very important component in establishing relationships between organizations and consumers cooperatively. Consumer trust in a brand usually arises because consumers value the quality of a product or service with what they see or understand. Therefore, companies need to build consumer confidence in the brand through the products or services they offer, so that the level of consumer trust is higher for the company and creates customer satisfaction. The higher the customer's trust in the brand, the more likely they are to trust the brand. Previous research supports a positive relationship between brand image and brand trust (Cretu and Brodie, 2007). So the better the brand image, the more positive the brand's products will be in the eyes of customers (Bennetta, Charmine and McColl-Kennedy, 2005).

\( H_3 \): Brand image has a lot of positive impact on brand trust in Samsung customers.

Brand loyalty is closely related to experience in using brands. So, the occurrence of Brand Loyalty in consumers is caused by the influence of satisfaction or dissatisfaction with a brand that accumulates continuously in addition to the perception of the quality of the product or service. Consumers who are loyal to a product or service brand will repurchase products with the same brand. Brand Loyalty leads to certain marketing benefits such as reduced marketing costs, 48 more new customers, and greater trade influence (Algesheimer, 2005). According to Agustin and Singh (2005), trust reduces uncertainty where customers feel very weak because customers know they can rely on a trusted brand. So it can be placed that the higher the level of brand trust, the higher the customer loyalty. Previous empirical evidence
has found a positive relationship between brand trust and brand loyalty (Morgan and Hunt, 1994; Doney and Cannon, 1997).

H₄: Brand trust has a positive effect on brand loyalty in Samsung customers.

RESULTS AND DISCUSSION

The sampling method that applied by the researcher is a random sampling to 130 users (students, workers) of Samsung cellular phone (any types, and prices) in Jakarta and others city in Indonesia, such as Surabaya, and Tangerang City. Where this questionnaire was distributed to 130 respondents by using questioner form – paper work. The scale of the research was made operational based on previous research. Modifications are made to fit the context and purpose of the study. "Brand communication" measures the six-item scale taken from Zehir, Sahin, Kitapci and Ozsahin (2011). "Brand image" uses an eight-item scale measure taken from Salinas and Perez (2009). "Brand trust" and "Brand Loyalty" use a four-item scale measure taken from M Chaudhuri and Holbrook (2001). All measurement items are measured in "five-point Likert-type scales" which consists of 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree.

Respondents are asked to provide their demographic information including gender, age, and based on education. Most of the respondents were women (61.1%) and men (38.9%). Age Based Respondents 15 Years - 25 Years (30%) 26 years - 35 years (40%) 36 years - 45 years (20%) and above 45 years (10%) of respondents based on work mostly are Private Employees (64.2%), Self Employed (22.2%), Civil Servants (7.4%), and Students (6.2%).

Most of the respondents were using Samsung as a private communication tool, they bought the product by their own money, thus they are able to measure how cheap and expensive the cost of Samsung product. Some of them always change the old one to the new product for several times, at least they will buy the new product in one e year, for the worker respondent shown us that they bought the expensive one, and for the student bought the cheapest. For women respondent shown us that they bought for style purpose, thus they need the stylish one.

In this study "Structural Equation Modeling (SEM)" the researcher was using LISREL as statistical tool which analyzing the Structural Equation Model (SEM) model. The SEM model is a model that combines factor analysis approaches, structural models, and simultaneous path analysis. The approach with analysis using this software has been widely used in various studies in the world; one of its main functions is to find out the relationship of several variables at once so as to get a comprehensive picture of a case either directly or indirectly with very high accuracy. In general, people using SEM focus more on latent constructs - what is meant is abstract psychological variables, such as "intelligence" or "attitude towards the brand" - compared to manifest variables (indicators) used to measure constructs - the construct.

Measurements are considered difficult and prone to errors. With the modeling error that can occur explicitly, SEM users try to reduce unbiased estimates for the relationship between latent constructs. In the end, SEM allows multiple measurements to be associated with a single latent construct. One of the advantages of SEM is the ability to create construct models as latent variables or variables that are not measured directly, but are estimated in the model of measured variables which are assumed to have a relationship with these variables - latent variables. Thus, this allows the model maker to explicitly know the reliability of a measurement in the model in which the theory allows relations - structural relations between latent variables that are precisely made by a model.

Hair, et al. (2010) suggested that, evaluation of the level of data compatibility with the model was carried out through several stages, namely overall testing and individual testing for structural models and measurement models.

The measurement model analysis is done to specify indicators (observed variables) for each construct variable, and calculate the reliability value for the construct. According to recommendations from Hair, et al. (2010) that the observation variables that are worthy of being used as an operational construct or latent variable must have a
loading factor that is greater than 0.5 so that the model used has a good match, in addition to the t-value. The loading factor must be greater than the critical value (> 1.96).

Good reliability requirements according to Hair, et al. (2010) are having the reliability construct> 0.60 and variance extracted> 0.50. From the calculation, it can be seen that all brand communication variables, brand image, brand trust and brand loyalty have met the reliability requirements well, which is the brand reliability value of brand communication of 0.96, brand image of 0.94, brand trust is 0.86 and brand loyalty is 0.89. The value of variance extracted brand communication is 0.82, brand image is 0.55, brand trust is 0.67 and brand loyalty is 0.68 (variance extracted> 0.50).

CONCLUSION

Based on the research result which has conducted at Jakarta and other 2 cities, Tangerang and Surabaya city, with number of 130 Respondents, the conclusion is The Relationship of Brand Communication, Brand Image, and Brand Trust to Brand Loyalty of Samsung Cellular Phone Product, are having relationship among each other.

REFERENCES

5. Sahin, A. (2012). Does brand communication increase brand trust?
THE RELATIONSHIP BETWEEN ORGANIZATIONAL CULTURE AND JOB SATISFACTION TOWARDS ORGANIZATIONAL COMMITMENT AND EMPLOYEE PERFORMANCE

Maswani, Syah Tantri Yanuar Rahmat, Anindita Rina
Faculty of Economics and Business, University of Esa Unggul, Indonesia
*E-mail: tantri.yanuar@esaunggul.ac.id

ABSTRACT
The purpose of the study is to analyze the relationship between organizational culture, job satisfaction, organizational commitment and employee performance in the Government. In this study the population was 135 employees in the work unit of the Secretary General of the Ministry of Defense in 2018, and in this study, all of them acted as respondents. The data analysis technique uses the Structural Equation Modeling (SEM) analysis method. The results of the study show that organizational culture and job satisfaction have a positive effect on organizational commitment, so good organizational culture and job satisfaction can increase organizational commitment. Organizational commitment has a positive effect on employee performance, the higher organizational commitment can improve employee performance. Organizational culture and job satisfaction have a negative influence on employee performance. This proves that organizational culture and decreased job satisfaction cannot affect employee performance in carrying out the main tasks and functions of the organization.

KEY WORDS
Organizational culture, job satisfaction, organizational commitment, employee performance.

Bureaucratic reform in Indonesia, the point is to make changes to the governance of development towards good governance. Good governance is characterized by, among others, high levels of performance, the existence of public accountability, transparency, efficiency, effectiveness, free from corruption, collusion and nepotism. Good governance is impossible to achieve its goals optimally without the contribution of all employees. Government work programs and budgets, both central and regional, which have been prepared in order to achieve certain targets, can be in vain if they are not supported by optimal employee performance. This shows that performance is a non-negotiable factor in organizational life, because performance is a prerequisite and at the same time the basic capital to build organizational performance. Organizational performance will not be optimal without the support of optimal employee performance.

Organizational culture is a fairly complex challenge in an organization. Organizational culture should be owned by companies including government agencies so that employees have values, norms, references, and guidelines that must be implemented. Organizational culture is also a unifying employee, reducing conflict, and motivating employees to carry out their duties well, so that it has a positive effect on behavior and performance. A company or organization that has a strong culture will produce good performance in the long run. Strong culture means that all employees have the same perception in achieving organizational goals. How to change the old organizational culture that is no longer in line with the new organizational cultural values of all employees for their voluntary desires and employee participation. People will not change by themselves just because they are governed and will only change if they want to be voluntary and conscious. People who are willing to leave the old ways are very few in number. The reality has been that many leaders and state apparatus are not only difficult to change but also often ignore the moral values and organizational culture of state apparatus, even though organizational culture is very important for improving employee performance.
One of the main factors needed to build optimal performance is organizational commitment. This is necessary because high commitment will encourage individuals to strive and struggle as much as possible for the progress of the organization and itself. Moreover, high commitment will also encourage the growth of a loyal, dedicative, innovative, creative and anticipatory attitude that is needed by organizations in an effort to maintain and grow their existence. A person's performance is influenced by the level of job satisfaction that is owned. A person's job satisfaction is also influenced both from within and from outside. For the internal side, of course someone's job satisfaction will involve his commitment to work. Job satisfaction is also influenced by external factors, namely the organizational culture that has been applied in an agency.

(Negara, Makassar, Email, & Basri, 2017) (variable organizational culture and organizational commitment) in the results of his research show that organizational culture will be positively related to employee commitment so that high communication, trust, and innovative culture are each positively related to organizational commitment. (Al-sada, 2017) (variable job satisfaction and organizational commitment) in the education sector shows that job satisfaction has a positive influence on organizational commitment. (Sawitri, Dyah, SE & et al, 2016) (variable organizational commitment and employee performance) in the results of research in the field of electricity shows organizational commitment has a significant positive influence on employee performance. (Barasa et al., 2018) (variable organizational culture and employee performance) the results of the study show there is a positive and significant influence of organizational culture on employee performance. (Ghufran & Khan, 2016) (variable job satisfaction and employee performance) in the field of telecommunications results show that job satisfaction has a positive and significant impact on the perception of employee performance.

Previous research on organizational culture, job satisfaction, organizational commitment and employee performance has been done a lot; however, the research was not jointly examined in one study and research object. So the authors see that there is still a need to re-understand the organizational culture, job satisfaction, organizational commitment and employee performance. Being a suggestion for research objects to conduct research on these variables. Based on the research gap above, the purpose of the research to be achieved is to provide an explanation of the influence of organizational culture, job satisfaction and organizational commitment mediated by the performance of employees in the work unit of the Secretariat General of the Ministry of Defense.

LITERATURE REVIEW

Culture is the attitude and behavior possessed by a group of people who live together (Belias & Koustelios, 2014). The overall function of an organization or institution consists of many dimensions that influence the recruitment and management process, as well as relationships between employees and between employees and superiors. Therefore, certain internal cultures are usually formed in the organizational framework, which is a strategic and coherent approach to valuable assets, where people who work in it individually or together contribute to the achievement of their goals. The role of organizational culture in business organizations aims at the development and planning of human resource management, in recruitment and selection, learning and evolution, labor relations and work climate in business, health, safety, prosperity, compliance with regulatory requirements for employees, equal opportunities, and other matters relating to work relations. (Steven, 1996)

Job satisfaction is a positive and satisfied mood that results from assessing their experience and work (Saari & Judge, 2004) Job satisfaction is the feeling of the employee towards work where the researcher sees it as the attitude of the employee (Davis, 2004). Job satisfaction is classified into three aspects, namely, on identifying the factors that influence job satisfaction such as the work environment, job characteristics and individual attributes. Conversely, retention and turnover are strongly influenced by job satisfaction (Al-sada, 2017) Factors such as supervision, promotion, and coworkers relationships are positively related to job satisfaction. In fact, personal factors such as goal orientation and contextual factors such
as organizational culture and feedback channels lead to job satisfaction which ultimately affects the turnover rate in an organization (Joo & Park, 2009).

According to (Hadian, 2017) said organizational commitment is an attitude that must be owned by every employee to show loyalty to the organization where they work, organizational commitment is closely related to the psychological aspects of acceptance and trust in the values and goals of the organization raised through the desire to maintain membership in organizational organizational commitment implies as something more than just passive loyalty to the organization, in other words implying an organizational commitment to employee relations with the company or organization actively.

Employee performance is the result of work that can be achieved by a person or group of people in an organization, in accordance with their respective authorities and responsibilities, in an effort to reach the relevant organization legally, morally and ethically (Barasa et al., 2018). Job requirements that are fulfilled optimally are indicative of achieving success in work. With this achievement work requirements are an important factor in the success of employee performance (Sutanto, 2016).

**VARIABLES RELATIONSHIP AND HYPOTHESES**

The relationship between organizational culture and organizational commitment is theoretically driven from popular writing. (Peters, T. J., & Waterman, 1986) They suggest that organizational culture influences a variety of organizational and individual outcomes including productivity, performance, commitment, and self-confidence. This theoretical proposition has encouraged many subsequent empirical studies to investigate the relationship between organizational culture and organizational commitment. There are two main approaches adopted by researchers in investigating the relationship between organizational culture and organizational commitment. The first approach argues that there are several types of organizational culture, where people can compare which types of culture will have a positive effect on organizational commitment. The second approach connects the cultural dimension with organizational commitment to see which culture.

Dimensions have a significant relationship. There are a number of interesting empirical studies that use the first approach (Blair, Raymond, Eric, & Karen, 2002) while only a few studies such as by (Jill, Graeme, & Chee, 2003) using a second approach apart from different approaches, there is substantial evidence coming from both approaches related to positive relationships based on the fact that organizational commitment is a basic by-product of organizational culture. When organizational members internalize basic shared values and assumptions, and identify themselves with the organization, their organizational commitment is enhanced. Organizational culture that is characterized as collaborative, brotherhood, compactness; participatory, consensual, constructive, and supportive more likely to increase the level of organizational commitment. Thus, this study hypothesizes a positive relationship between organizational culture and organizational culture organizational commitment to organizational commitment. (Abdullah, Shamsuddin, & Wahab, 2015).

**H1.** Organizational culture is positively related to organizational commitment.

Job satisfaction has a positive and significant influence on organizational commitment. The results of this study are supported by (Lambert, 1999), which states that job satisfaction has a positive correlation with organizational commitment and has the greatest correlation. (Ferdinand, 2006) explained that employees who are satisfied with their work are very committed to the organization, employees with job satisfaction generally see the organization as positive and respectful because they are optimistic about their work to meet their needs and desires. Job satisfaction refers to meeting the needs and values of individuals in the workplace assuming that individual needs and job characteristics are relatively stable.

**H2.** Job satisfaction is positively related to organizational commitment.

Organizational commitment is an attitude of loyalty that supports an organization, Organizational commitment means positive or negative attitudes of workers towards the entire organization and is not limited to tasks or work that must be done (Ghufran & Khan, 2016). In organizational commitment a person has a strong sense of loyalty to the
organization where the organization identifies itself (Correia & York, 2012). To evaluate the relationship between organizational commitment and performance, (Riketta, M., & Landerer, 2002) analyze and conclude a positive relationship between organizational commitment and employee performance. Job satisfaction and organizational commitment have a positive correlation with employee performance (Benkhoff, 1997).

H3. Organizational commitment is positively related to employee performance.

(Sinaga, Asmawi, Madhakomala, & Suratman, 2018) explained that there is a direct positive effect of organizational culture on employee performance. The company's core values contain: Hard work, reliable, respectable, attentive and honest can improve employee performance; leaders and employees always maintain and comply with regulations and enforce a clear code of ethics to improve performance above the target; in general, employees have a work ethic and are diligent and continue to innovate by consistently developing and implementing more effective technologies to contribute to employee performance; Employees always give full dedication and integrity in carrying out their duties and responsibilities and can prioritize common interests and goals rather than personal and group interests in a culture that improves employee performance; leaders and employees always maintain and comply with regulations and enforce a clear code of ethics, creating trust that improves employee performance.

H4. Organizational culture is positively related to employee performance.

(Antoncic, 2011) explained that employee satisfaction has a positive effect on the four dimensions of work (general satisfaction with work; employee relations; remuneration, benefits and organizational culture; and employee loyalty). Therefore, this impact has a positive influence on the growth of the company.

H5. Job satisfaction is positively related to employee performance.

METHODS OF RESEARCH

The study was conducted in December 2018 with the research method being descriptive analysis with a causality model to see the relationships between variables. The method of data analysis in this study uses Structural Equation Modeling (SEM) is an analytical technique used to test a series of complex relationships between simultaneous variables. This complex relationship consists of more than one dependent variable with many independent variables. Each construct is made by an indicator variable (Ferdinand, 2006). mentions that the number of representative samples to use SEM analysis techniques is 100-200. The object of this research was carried out on public employees in the Ministry of Defense Secretariat General Administration Bureau with a total population of 135 respondents. The aspects studied were the influence of work culture variables, job satisfaction, organizational commitment and employee performance. This is an explanatory study that explains causal relationships and hypothesis testing. The data measurement method uses a Likert scale with one to five scale intervals.

In this study there are two exogenous variables namely organizational culture and job satisfaction and two endogenous variables namely organizational commitment and employee performance, but employee performance acts as a moderating variable that affects exogenous and endogenous variables. Measurement of organizational culture variables using dimensions (Smith, 2004), whose dimensions consist of physical, intellectual,
emotional and spiritual dimensions; Job satisfaction variables use and adapt dimensions from (Fu, Deshpande, & Zhao, 2011) which consists of salary, nature of work, supervision and work colleagues; organizational commitment variable using dimensions from (Herscovitch & Meyer, 2002) propose and evaluate multidimensional conceptualizations of commitment to change and to examine the relationships between various forms of commitment and employee behavioral support; while employee performance variables use dimensions from (Mehrzi & Singh, 2016) which revealed that performance appraisal included: (i) The number of jobs is the amount of work done in a predetermined period of time. (ii) Quality of work is the quality of work achieved based on requirements and readiness. (iii) Job knowledge is the breadth of knowledge about work and skills. (iv) Creativity is the authenticity of ideas raised and action skills. (v) Collaboration is the willingness to work with other people. (vi) Dependability is awareness and can be entrusted in terms of attendance and completion of work.(vii) Personal qualities related to personality, leadership, friendliness, and personal integrity.

Validity test is done with Confirmatory Factor Analysis that is by looking at the value Kaiser-Meyer-Olkin Measure of Sampling (KMO) and Measures of Sampling Adequacy (MSA). In this test the value obtained must be greater than 0.5, which means that the analysis of factors is appropriate or suitable for use, and can be further processed (Malhotra, 2004). Validity test is done with Confirmatory Factor Analysis that is by looking at the value Kaiser-Meyer-Olkin Measure of Sampling (KMO) and Measures of Sampling Adequacy (MSA). In this test the value obtained must be greater than 0.5, which means that the analysis of factors is appropriate or suitable for use, and can be further processed (Malhotra, 2004). The organizational culture scale consists of 7 questions and 1 of them is invalid so there are 6 questions left, Job satisfaction scale consists of 6 questions and 2 of them are invalid so there are 4 questions left, the scale of organizational commitment consists of 6 questions and 2 of them are invalid so there are 4 questions left, Employee performance scale consists of 6 questions and 1 of them is invalid so there are 5 questions left. Value reliability test Alpha Cronbach greater than or equal to 0.7 which means reliable that can be said to be operational-operational organizational culture, job satisfaction, organizational commitment and employee performance can be said to be trusted as a tool for collecting data in research. The next stage, the data is processed using the SEM analysis method.

RESULTS AND DISCUSSION

Our research focuses on organizational commitment and employee performance as a consequence of organizational culture and job satisfaction where the results show that from the four hypotheses proposed data obtained supports the hypothesis and data does not support the hypothesis, as we have done SEM testing, can be seen in Figure 2.
Based on Figure 2 above which is the hypothesis in this study, presented in the following structural equation:

Table 1 – Hypothesis Testing Research Model

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Hypothesis Statement</th>
<th>Value T-Value</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>$H_1$</td>
<td>A good organizational culture will increase organizational commitment</td>
<td>2.83</td>
<td>Data supports the hypothesis</td>
</tr>
<tr>
<td>$H_2$</td>
<td>High Job Satisfaction can increase Organizational Commitment</td>
<td>3.11</td>
<td>Data supports the hypothesis</td>
</tr>
<tr>
<td>$H_3$</td>
<td>High organizational commitment can improve employee performance</td>
<td>3.32</td>
<td>Data supports the hypothesis</td>
</tr>
<tr>
<td>$H_4$</td>
<td>Good organizational culture can improve employee performance</td>
<td>-1.41</td>
<td>Data does not support the hypothesis</td>
</tr>
<tr>
<td>$H_5$</td>
<td>High Job Satisfaction can improve Employee Performance</td>
<td>-1.15</td>
<td>Data does not support the hypothesis</td>
</tr>
</tbody>
</table>

**DISCUSSION OF RESULTS**

On the results of testing the first hypothesis ($H_1$), it was found that the results of the analysis supported the $H_1$ hypothesis, that good organizational culture would increase organizational commitment by 2.83. This shows that with the condition of a good organizational culture, the level of organizational commitment of its employees will also be higher. These results further reinforce the research that was previously carried out by (Abdullah et al., 2015) where the results of this study hypothesize a positive relationship between organizational culture and organizational culture organizational commitment to organizational commitment. Thus organizational culture becomes an important part in increasing organizational commitment within the organization.

The results of testing the second hypothesis ($H_2$), it was found that the results of the analysis supported the $H_2$ hypothesis, namely high job satisfaction can increase organizational commitment by 3.11. This shows that the higher the job satisfaction of the employees, the more satisfied their employees will be in carrying out their work. These results further reinforce the research that was previously carried out by (Ferdinand, 2006) explained that employees who are satisfied with their work are very committed to the organization, employees with job satisfaction generally see the organization as positive and respectful because they are optimistic about their work to meet their needs and desires.

The results of testing the third hypothesis ($H_3$), it was found that the results of the analysis supported the $H_3$ hypothesis, namely high organizational commitment can improve employee performance by 3.32. This shows that the higher a person's organizational commitment, the higher the employee's performance towards the organization. This result is also supported by research conducted (Ghufran & Khan, 2016) Organizational commitment is an attitude of ongoing loyalty to an organization, organizational commitment means positive or negative attitudes of workers towards the entire organization and not limited to tasks or work.

The results of testing the fourth hypothesis ($H_4$), It was found that the results of the analysis did not support the $H_4$ hypothesis, namely that organizational culture did not have a significant and positive influence on employee performance, this result further reinforced the research that had previously been done by (Pawirosumarto & Sarjana, 2017). The results of the study explain that organizational culture does not have a significant and positive influence on employee performance. So that the presence of an organizational culture that is not good then the performance of its employees will also be low. Research in the Administrative Bureau of the Secretary General of the Ministry of Defense shows that organizational culture has no significant effect on employee performance, so that the organizational culture in the administration bureau of the Secretary General of the Ministry of Defense does not have a big influence towards improving employee performance, Based on empirical observations in the field, organizational culture in the Secretariat General of the Ministry of Defense functions as social knowledge, identity and behavior of employees. The organizational culture currently in the Ministry of Defense General Secretariat is considered
to be less than optimal for employees, so it is not used as a reference for their behavior and activities in completing work.

The results of testing the fifth hypothesis (H5), It was found that the results of the analysis did not support the hypothesis H5, namely job satisfaction did not have a significant and positive effect on employee performance. This shows that employee performance as perceived by employees at the General Secretariat of the Ministry of Defense is not significantly affected by job satisfaction. The results of this study are supported by (Paaais, Kristen, & Maluku, 2018) states that the insignificant influence between the variable job satisfaction on employee performance is characterized by the value of loading a low factor between job satisfaction and employees with a high probability value.

Based on empirical observations in the field, Job satisfaction felt by employees of the TU Secretariat General of the Ministry of Defense does not affect the performance of employees in carrying out the duties and functions of the organization. This means that if employee job satisfaction decreases, then employee performance has no effect. Conversely, improving employee performance is not always caused by higher job satisfaction felt by employees. Empirically, this fact can be proven that even though employees are dissatisfied, performance continues to run well. The indicator for variable employee performance associated is based on work quality, which is based on position, rank and class of each employee.

MANAGERIAL IMPLICATIONS

In organizational governance organizational culture is the implementation of the noble values of the Pancasila. In government organizations must be realized in all indicators both organizational culture, job satisfaction, organizational commitment and employee performance within the organization. Organizational cultural values that are influenced by elements of the country's philosophy can form a work system and work environment that are disciplined, effective, efficient. Planting a work culture on government organizations is important as the government’s efforts to carry out the people’s mandate in providing protection and services.

In this study, the organization is expected to make changes to organizational culture, job satisfaction by referring to organizational commitment and employee performance. To improve organizational culture, job satisfaction towards organizational commitment and employee performance can be proposed by looking at the dimensions used in this study. The first dimension is the physical, intellectual dimension, emotional and spiritual, which describes employees in the work unit of the Secretariat General of the TU Bureau of TU showing an attitude that obeys the applicable rules, a culture of mutual respect and respect for fellow employees based on class and rank levels so that employees who have a higher rank and class will be respected. The cultural values that apply in the work environment of the Secretariat General of the Ministry of Defense have a good impact on the organization.

Furthermore, the second dimension, namely the salary, the nature of work, supervision and coworkers from employee job satisfaction has decreased due to the increase in government salaries that have not increased in several years, this is of particular concern to the central government. The nature of the work felt by employees is increasingly greater due to the large number of newly built application systems and limited human resources (HR) thus increasing the workload for employees, it is hoped that the government will recruit new employees to assist the organization's duties and functions.

Organizational commitment is seen from the implications of the third dimension, namely proposing and evaluating the multidimensional conceptualization of commitment to change and for testing the relationship between various forms of commitment and support for employee behavior. This approach reflects that an employee's commitment will be stronger if his experience in an organization is consistent with his expectations, and satisfies his basic needs and vice versa. Goal Congruence Orientation of an apparatus within the organization emphasizes the extent to which his personal goals are in line with organizational goals.
Implications of employee performance as the fourth dimension, namely performance appraisal, among others: Number of jobs, quality, knowledge of work, creativity, collaboration, dependability, personal qualities such as leadership and friendliness. To support the realization of a good government, of course a good performance measurement system is needed. This performance measurement system will integrate the process of improving performance through the stages from planning to evaluating its performance. A good performance measurement system will be useful for a variety of things including being able to be used to implement a system of reward and punishment, evaluating the efficiency, effectiveness, and economics of programs and activities, improving performance, and others.

CONCLUSION

The results can be concluded from this study: (1) there is an influence of organizational culture on organizational commitment to the work unit of the administration bureau secretary general of the ministry of defense, Central Jakarta, it can be said that a good organizational culture will increase organizational commitment; (2) there is the influence of job satisfaction on organizational commitment in the work unit of the administration bureau secretary general of the ministry of defense, Central Jakarta, it can be said that high job satisfaction can increase organizational commitment; (3) there is an influence of organizational commitment on the performance of employees in the working unit of the administration bureau secretary general of the ministry of defense, Central Jakarta, it can be said that high organizational commitment can improve employee performance; (4) there is no influence between organizational culture on employee performance in the environment of the administration bureau secretary general of the ministry of defense, Central Jakarta; (5) there is no influence between job satisfaction on employee performance in the administration bureau secretary general of the ministry of defense Central Jakarta environment.

The limitations of the study refer to several weaknesses in this study. Some limitations contained in this study are: (i) This research was only carried out in the work unit of the administration bureau Secretariat General of the Ministry of Defense. (ii) This study only discusses the influence of organizational culture, job satisfaction on organizational commitment and employee performance. (iii) The inconsistency of respondents’ answers in answering the questionnaire (questionnaire) and working conditions that made respondents not comfortable enough when answering the questionnaire (questionnaire) submitted to them. (iv) The form of a digital questionnaire made some respondents over 35 years old quite difficult in the filling process.

Future research development is expected to be able to add other variables that affect work commitment and employee performance. Further research is expected to be carried out by expanding the scope of research, for example by using samples not only from one work unit but more than one work unit and increasing the number of samples studied.

REFERENCES

for research and policy, 26, 1–16.
17. Lambert, E. G. (1999). A path analysis of the antecedents and consequences of job... 
DOI 10.18551/rjoas.2019-04.20

CONSTRUCTION ANALYSIS OF BOTTOM GILLNET AS AN ALTERNATIVE TO BOTTOM TRawl IN PEKALONGAN WATERS

Prihatiningsih Retno Tri*, Fitri Aristi Dian Purnama, Saputra Suradi Wijaya
Coastal Resources Management Program, Department of Fisheries,
Faculty of Fisheries and Marine Sciences, University of Diponegoro, Indonesia
E-mail: retno_trip@yahoo.co.id

ABSTRACT
A bottom trawl is a fishing tool that is not recommended by the government to capture demersal fish resources in Pekalongan waters. Therefore, a bottom gillnet is an alternative substitute for bottom trawl fishing gear in catching demersal fish. This study aimed to technically analyze bottom gillnet fishing gear and the composition of its catch in Pekalongan waters. This research was carried out in the waters of Pekalongan in August 2018 with a 3 GT fishing boat. A bottom gillnet is PA Monofilament 0.4 mm; 4 inch with a specification of upper net length by 30 meters, bottom net length by 42 meters, net height by 35 mesh for one piece of net, and a hanging ratio by 0.41. With these specifications, bottom gillnet can capture 3 dominant fish species such as Scomberoides commersonnianus, Pomadasys maculatus, and Plicofollis dussumieri where 50% of the fish are viable to catch.

KEY WORDS
Bottom gillnet, Pekalongan, technical specifications, viable fish.

Pekalongan waters are one of the potential areas for demersal and pelagic fish distribution in Indonesia. According to the fisheries data in Central Java Province in 2017, the fisheries potential in Pekalongan Regency is 23,089 tons consisting of 6,835 tons of pelagic fish and 16,254 tons of demersal fish. Pekalongan waters have enormous potential of demersal fisheries; the total value of demersal fish production has increased from year to year. In 2011, the fisheries production in Pekalongan amounted to 1063,60 tons and in 2017, the total demersal fisheries production in Pekalongan was increased by 16,254 tons.

So far, to exploit demersal fish resources, Pekalongan local fishermen use bottom trawls that are not recommended by the government. With the large potential of demersal fisheries in Pekalongan, it is important to make an effort to sustainably catch the demersal fish in accordance with the Regulation of the Minister of Marine and Fisheries of the Republic of Indonesia number 71/Permen-KP/2016 dated 30 December 2016 concerning Fishing Lines and Placement of Fishing Equipment in the Fisheries Management Areas of the Republic of Indonesia.

With the Regulation of the Minister of Marine and Fisheries of the Republic of Indonesia, a fishing gear that is in accordance with the conditions set by the Government is needed to catch demersal fish. Gillnet is one of the fishing gears recommended by the government to fishermen in Pekalongan Regency. Based on its operation, the net is divided into surface gillnet, mid gillnet, and bottom gillnet (Sjarif, et.al. 2013). Since the target is demersal fish, the bottom gillnet can be used as an alternative substitute for bottom trawl to capture demersal fish in Pekalongan waters. Thus, it is necessary to have a deeper study of bottom gillnet fishing gear both in terms of its design and construction. The purpose of this research is to analyze technically the bottom gillnet fishing gear in Pekalongan waters.

MATERIALS AND METHODS OF RESEARCH

This study was conducted on August 2018 in Pekalongan waters at a position between S 06° 47.873' - S 06° 49.349' and E 109° 36.432' - E 109° 41.510' with a depth between 8 – 15 meters. This study used a descriptive research method where all data was obtained by
making measurements directly in the field using a bottom gillnet and 3GT fishing boat. Here are the technical specifications of the bottom gillnet that is used to catch demersal fish.

<table>
<thead>
<tr>
<th>No</th>
<th>DESCRIPTION</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Size/Dimension</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Upper net length 1 piece</td>
<td>30 m</td>
</tr>
<tr>
<td>2</td>
<td>Bottom net length 1 piece</td>
<td>42 m</td>
</tr>
<tr>
<td>3</td>
<td>Net height (mesh)</td>
<td>35</td>
</tr>
<tr>
<td>B.</td>
<td>Net Body</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Mesh Size (mm)</td>
<td>4 inch / 101.6 mm</td>
</tr>
<tr>
<td>2</td>
<td>Net material</td>
<td>PA Monofilament</td>
</tr>
<tr>
<td>3</td>
<td>Thread number</td>
<td>0.40</td>
</tr>
<tr>
<td>C.</td>
<td>Rigging</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Head rope</td>
<td>Polyethylene (PE) Ø 6 mm</td>
</tr>
<tr>
<td>2</td>
<td>Buoy rope</td>
<td>Polyethylene (PE) Ø 6 mm</td>
</tr>
<tr>
<td>3</td>
<td>Ground rope</td>
<td>Polyethylene (PE) Ø 3 mm</td>
</tr>
<tr>
<td>4</td>
<td>Sinker rope</td>
<td>Polyethylene (PE) Ø 3 mm</td>
</tr>
<tr>
<td>D.</td>
<td>Buoy</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Material/type</td>
<td>PVC, Y-3H</td>
</tr>
<tr>
<td>2</td>
<td>Buoy amount</td>
<td>43</td>
</tr>
<tr>
<td>3</td>
<td>Distance between buoys</td>
<td>78 cm</td>
</tr>
<tr>
<td>E.</td>
<td>Sinker</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Material</td>
<td>Lead</td>
</tr>
<tr>
<td>2</td>
<td>Ammount of sinker (ore)</td>
<td>256 @ 10 gr</td>
</tr>
<tr>
<td>3</td>
<td>Distance between sinker</td>
<td>15 cm / 2 mesh</td>
</tr>
</tbody>
</table>

Figure 1 – Design of Bottom Gillnet PA Monofilament 0.4 mm; 4 inch

To find out the technical criteria for bottom gillnet construction, a technical calculation was carried out. The calculation consisted of hanging ratio (elongation), installed net height, buoyancy, and sinking force as follows (Prado, 1991).

Upper hanging ratio:

\[ E_{La} = \frac{L_{a}}{L_{0a}} \]
Where: $E_{lb}$ - upper hanging ratio; $L_a$ - length of installed upper net; $L_{0a}$ - length of stretched upper net.

Bottom hanging ratio:

$$E_{lb} = \frac{L_a}{L_{0a}}$$

Where: $E_{lb}$ - bottom hanging ratio; $L_b$ - length of installed bottom net; $L_{0b}$ - length of stretched bottom net.

Upright hanging ratio ($E_2$):

$$E_2 = \sqrt{1 - E_i^2}$$

To find out the position of the net in the waters, it can be calculated using formula:

$$h = H \sqrt{1 - E^2}$$

Where: $h$ - height of the installed net; $H$ - height of stretched net; $E$ - average hanging ratio.

The construction of the bottom gillnet has a buoyancy and sinking force so that the net can stretch vertically in the water. The formula below can be used to calculate the buoyancy and sinking force of the net:

$$B_i = W (\frac{\partial w}{\partial w})$$

Where: $B_i$ - Buoyancy of the component (kgf); $W$ - Weight of the component in the air (kgf); $\partial w$ - Mass type of the component (gr/cm$^3$); $\partial w_0$ - Sea water density (gr/cm$^3$).

Sinking Force:

$$S_i = W_a (1 - \frac{\partial w}{\partial w})$$

Where: $S_i$ - Sinking style of the component (kgf); $W$ - Weight of the component in the air/volume (kgf); $\partial w$ - Mass type of the component (gr/cm$^3$); $\partial w_0$ - Sea water density (gr/cm$^3$).

**RESULTS AND DISCUSSION**

Gillnet is a fishing gear in the form of rectangular net sheets with the same size of mesh that is equipped with buoys, sinker, and head ropes, with or without ground rope to block the swimming direction of the fish. By that, the target fish will be entangled or twisted in the net (Fachrudin et.al, 2014). Bottom Gillnet is a Gillnet which is operated in the bottom area of the waters to catch demersal fish.

The parts of the bottom gillnet can be described as follows:

- A buoy is an object that has a buoyancy and is installed on the upper net and functions as a float (SNI 01-7220-2008). There are various shape and material of the buoy such as Styrofoam, Poly Vinyl Chloride (PVC), plastic, and etc;
- The buoy rope is a rope that is used to place and tie a buoy (SNI 1-7214-2006);
- Head rope is used to hang the body of the net (SNI 1-7214-2006);
- Upper selvedge, a sheet of net attached to the body of the net that functions as a reinforcement of the upper body of the net;
- Net body, rectangular net sheets with equal or even mesh size;
• Lower selvedge, a sheet of net installed under the body of the net that functions as a reinforcement of the bottom body of the net;
• Ground rope (gr), a rope that is used to limit the movement of the net to the side;
• Sinker line (sl), a rope that is used to place and tie the sinker;
• Sinker, objects that have sinking power and are installed in the lower net. It functions as a sinker of the net.

To find out the technical criteria for the construction of the bottom gillnet, a technical calculation that includes hanging ratio (elongation), installed net height, buoyancy, and sinking force was made.

The shape of the mesh when operated is determined by the method of hanging the net material on the rope. The length of the net attached to the top is 30 meters while at the bottom net is 42 meters. Moreover, the length of the net stretched is 80 yards (73.52 meters) with the height by 35 MD (1 piece is cut by 2).

The calculation for the upper hanging ratio is:

\[ E_{lu} = \frac{L_u}{L_{ua}} \]
\[ = \frac{30}{73.15} \]
\[ = 0.41 \]

\[ E_{(top)} = 0.41 \]

The calculation for the bottom hanging ratio is:

\[ E_{lb} = \frac{L_b}{L_{lb}} \]
\[ = \frac{42}{73.15} \]
\[ = 0.57 \]

The calculation for the upright hanging ratio is \( E_2 \):

\[ E_2 = \sqrt{1 - E_i^2} \]
\[ = \sqrt{1 - 0.41^2} \]
\[ = 0.91 \]

\[ E_{(upright)} = 0.91 \]

The height of the net installed in the water can be known, namely:

\[ H = \text{height of the net stretched} = 35 \text{ MD} \times 4 \text{ inch} = 3.55 \text{ m} \]
\[ h = H \sqrt{1 - E_i^2} \]
\[ = 3.55 \times 0.91 \]
\[ = 3.23 \text{ meter} \]

The construction of gillnet has a buoyancy and sinking force so that the net can stretch vertically in the water. The calculation of buoyancy and sinking force depends on the density of each component material. If the density of the material is smaller than the density of seawater (1,025 gr/cm\(^3\)), then the material has a buoyant force (able to float). The gillnet designed is a basic gillnet so that the ratio needed is a smaller buoyancy and larger sinking force.
Overall, conformity the accordance sheets works the position net operated habits 2016:

### Table 2 – The weight of the material in the air and in seawater

<table>
<thead>
<tr>
<th>No.</th>
<th>Element</th>
<th>Weight in the air (kg)</th>
<th>Weight in seawater (Kgf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Head rope PE Ø 6 mm</td>
<td>30 x 0.0169</td>
<td>0.507</td>
</tr>
<tr>
<td>2.</td>
<td>Buoy rope PE Ø 6 mm</td>
<td>30 x 0.0169</td>
<td>0.507</td>
</tr>
<tr>
<td>3.</td>
<td>Ground rope PE Ø 3 mm</td>
<td>42 x 0.0042</td>
<td>0.177</td>
</tr>
<tr>
<td>4.</td>
<td>Sinker rope PE Ø 3 mm</td>
<td>42 x 0.0042</td>
<td>0.177</td>
</tr>
<tr>
<td>5.</td>
<td>Webbing</td>
<td>0.317</td>
<td>0.10 x 0.317</td>
</tr>
<tr>
<td>6.</td>
<td>Buoy 43 Pl, Y-3Ht, buoyancy by 25 grf</td>
<td>43 x 25</td>
<td>1.075</td>
</tr>
<tr>
<td>7.</td>
<td>Sinker Pb @ 10 gr, 256 bh</td>
<td>256 x 10</td>
<td>2.56</td>
</tr>
</tbody>
</table>

### Table 3 – Buoyancy and Sinking Force

<table>
<thead>
<tr>
<th>No.</th>
<th>Element</th>
<th>Buoyancy / Sinking Force (kgf)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Head rope</td>
<td>0.040 (-)</td>
<td>(-): Floating objects</td>
</tr>
<tr>
<td>2.</td>
<td>Buoy rope</td>
<td>0.040 (-)</td>
<td>(+): Sinking objects</td>
</tr>
<tr>
<td>3.</td>
<td>Ground rope</td>
<td>0.0142 (-)</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Sinker rope</td>
<td>0.0142 (-)</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Webbing</td>
<td>0.032 (+)</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Buoy</td>
<td>1.075 (-)</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Sinker</td>
<td>2.330 (+)</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Total buoyancy</td>
<td>1.143 (-)</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Total sinking force</td>
<td>2.418 (+)</td>
<td></td>
</tr>
</tbody>
</table>

Comparison of buoyancy with sinking force = 1.143 kgf: 2.418 kgf = 1: 2.04

### Table 4 – Technical provision for bottom gillnet

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Value Calculation</th>
<th>SNI 3 – 2016 Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>E</td>
<td>0.41</td>
<td>0.30 – 0.70</td>
</tr>
<tr>
<td>2.</td>
<td>Lb/La</td>
<td>1.40</td>
<td>1.00 – 1.20</td>
</tr>
<tr>
<td>3.</td>
<td>H</td>
<td>3.23 m</td>
<td>1m – 8 m</td>
</tr>
<tr>
<td>4.</td>
<td>dt</td>
<td>0.4 mm</td>
<td>0.1 mm – 1.8 mm</td>
</tr>
<tr>
<td>5.</td>
<td>B per La</td>
<td>38.1 gf/m</td>
<td>16 gf/m – 40 gf/m</td>
</tr>
<tr>
<td>6.</td>
<td>SF per Lb</td>
<td>57.57 gf/m</td>
<td>30 gf/m – 85 gf/m</td>
</tr>
<tr>
<td>7.</td>
<td>MS</td>
<td>101.6 mm or 4 inch</td>
<td>25.4 – 203.3 mm or 1 – 8 inch</td>
</tr>
</tbody>
</table>

Based on the table above, it can be seen that PA monofilament bottom gillnet 0.4 mm; 4 inch is in accordance with the technical provisions from SNI 3-2016. The overall technical requirements for PA monofilament bottom gillnet 0.4 mm; 4 inch is still in the range of SNI 3-2016: Fishing gear - basic gillnet, except for the length ratio of head rope and ground rope by 1.40. The difference in value occurs because the length of the ground rope is 14 m longer than the head rope. This is due to the adjustments to the fishing area conditions and the habits of local fishermen to lighten the withdrawal of the net.

From the analysis, it is known that the bottom gillnet performance, in general, can be operated properly. The process of dropping/setting the net takes 5-8 minutes. The buoy on bottom gillnet can work well because it is able to withstand the sinking force of the net. It means that the buoyancy functions properly. This is shown from the condition of the upper net that is not twisted when the hauling of the net took place which then followed by the position of the net sheets that was stretched in the waters. The sinker of bottom gillnet also works well because it is able to compensate the buoyant force so that it can stretch the net sheets in the waters. Besides that, the hanging ratio on bottom gillnet by 0.41 is in accordance with the technical provisions (Prado, 1991) for basic gillnet. Hanging the net with the hanging ratio makes the fish trapped and or twisted on the net. The fish captured are in conformity with the target that is to capture large fish, based on the mesh size of the net that is 4 inches.

Based on the observations, there are several types of fish caught on bottom gillnet. Overall, the fish caught on bottom gillnet can be seen in the following table:
Table 5 – The Composition of Bottom Gillnet Catch

<table>
<thead>
<tr>
<th>No</th>
<th>Species</th>
<th>Amount (fish)</th>
<th>Total weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Scomberoides commersonnianus</em></td>
<td>172</td>
<td>98.68</td>
</tr>
<tr>
<td>2</td>
<td><em>Pomadasys maculatus</em></td>
<td>30</td>
<td>19.35</td>
</tr>
<tr>
<td>3</td>
<td><em>Arius thalassinus</em></td>
<td>21</td>
<td>13.48</td>
</tr>
<tr>
<td>4</td>
<td><em>Lutjanus johni</em></td>
<td>14</td>
<td>6.66</td>
</tr>
<tr>
<td>5</td>
<td><em>Alectis ciliaris</em></td>
<td>11</td>
<td>6.54</td>
</tr>
<tr>
<td>6</td>
<td><em>Eleutheronema tetractylum</em></td>
<td>11</td>
<td>2.91</td>
</tr>
<tr>
<td>7</td>
<td><em>Portunus pelagicus</em></td>
<td>13</td>
<td>3.67</td>
</tr>
<tr>
<td>8</td>
<td><em>Psettodes erumeri</em></td>
<td>1</td>
<td>0.38</td>
</tr>
<tr>
<td>9</td>
<td><em>Cynoglossus lingua</em></td>
<td>2</td>
<td>0.20</td>
</tr>
<tr>
<td>10</td>
<td><em>Saurida tumbil</em></td>
<td>4</td>
<td>0.38</td>
</tr>
<tr>
<td>14</td>
<td><em>Plotus canius</em></td>
<td>1</td>
<td>1.53</td>
</tr>
<tr>
<td>15</td>
<td><em>Chirombicus dorab</em></td>
<td>3</td>
<td>1.52</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>283</td>
<td>155</td>
</tr>
</tbody>
</table>

The target catch of bottom gillnet is demersal fish. On one operational testing of bottom gillnet in Pekalongan waters in August 2018, there were several demersal fish caught including *Pomadasys maculatus*, *Arius thalassinus*, *Lutjanus johni*, *Alectis ciliaris*, and *Eleutheronema tetractylum*. Whereas, *Scomberoides commersonnianus* is a group of tropical pelagic fish whose habitat is on the coast and offshore reefs (Griffiths, et al. 2005). Therefore, *Scomberoides commersonnianus* can be caught with a bottom gillnet in Pekalongan waters at a depth of 8-15 meters.

Based on the description above, there are 3 dominant species which were caught with a bottom gillnet, namely *Scomberoides commersonnianus*, *Pomadasys maculatus*, and *Plicofollis dussumieri*.

Table 6 – The size of the fish caught compared to the literature

<table>
<thead>
<tr>
<th>Species</th>
<th>Testing Min Length (cm)</th>
<th>Testing Max Length (cm)</th>
<th>Common Length (cm)</th>
<th>Max Length (cm)</th>
<th>Length at first maturity/Lm (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Scomberoides commersonnianus</em></td>
<td>30</td>
<td>55</td>
<td>90</td>
<td>120</td>
<td>38.5</td>
</tr>
<tr>
<td><em>Pomadasys maculatus</em></td>
<td>29</td>
<td>34</td>
<td>30</td>
<td>59.3</td>
<td>15</td>
</tr>
<tr>
<td><em>Arius thalassinus</em></td>
<td>33</td>
<td>45</td>
<td>70</td>
<td>185</td>
<td>36</td>
</tr>
</tbody>
</table>

Source: www.fishbase.org.

The proportion of biologically viable fish is known based on the size of the Fork Length (FL) of first-mature-gonad fish. The size of the catch is needed to determine the length of the first-mature-gonad or Length at First Maturity (Lm). The proportion of biologically viable fish is known by measuring the Fork Length (FL) of the fish and then compared with the Lm in the literature.

Based on the maximum Fork Length (FL) of the fish which were caught on bottom gillnet, the three major species can be said to be viable to catch because it meets the provisions of Lm: 38.5 cm for mature *Scomberoides commersonnianus* (the *Scomberoides commersonnianus* fish caught on bottom gillnet were 55 cm); 15 cm for mature *Pomadasys maculatus* (the *Pomadasys maculatus* fish caught on bottom gillnet were 34 cm); 36 cm for mature *Arius thalassinus* (the *Arius thalassinus* fish caught on bottom gillnet were 45 cm).

Table 8 – The size proportion of bottom gillnet catch

<table>
<thead>
<tr>
<th>Criteria</th>
<th><em>Scomberoides commersonnianus</em></th>
<th><em>Pomadasys maculatus</em></th>
<th><em>Arius thalassinus</em></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount (fish)</td>
<td>Amount (fish)</td>
<td>Amount (fish)</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>&gt; Lm</td>
<td>108</td>
<td>62.79</td>
<td>19</td>
</tr>
<tr>
<td>&lt; Lm</td>
<td>64</td>
<td>37.21</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>172</td>
<td>100</td>
<td>30</td>
</tr>
</tbody>
</table>
Based on the catch proportion of bottom gillnet, the three dominant species caught are viable to catch. 62.79% of *Scomberoides commersonnianus* are viable to catch while the other 37.21 % are not. Besides that, 63.33% of *Pomadasys maculatus* species as well as 61.91% of *Arius Thorassinus* also viable to catch.

**CONCLUSION AND SUGGESTIONS**

The technical specifications of bottom gillnet fishing gear with PA Monofilament 0.4 mm; 4 inches are hanging ratio by 0.41 with head rope and bottom rope length by 1.40; the height of the net installed in the waters by 3.10 meters with a ratio of buoyancy per head rope by 38.1 gf/m and the ratio of sinking force per ground rope by 57.57 gf/m.

The dominant species caught by bottom gillnet are *Scomberoides commersonnianus, Pomadasys maculatus*, and *Arius thalassinus* where 50% of these fish are viable to catch.

Bottom gillnet fishing gear with PA Monofilament 0.4 mm; 4 inches is recommended to be used to catch demersal fish in the waters of Pekalongan with a depth between 8-15 meters in August at a position between S 06° 47.873' - S 06° 49.349' and E 109° 36.432' - E 109° 41.510'

**REFERENCES**

DOI 10.18551/rjoas.2019-04.21

CONSTRaining Resources Preventing the Optimal Profitability By Goat raisers in Cameroon

Folefack Achille Jean Jaza1*, Meutchieye Felix2, Tsafack Perle Priscillia1, Kamajou François1

1Department of Agricultural Economics, University of Dschang, Dschang, Cameroon
2Department of Animal Production, University of Dschang, Dschang, Cameroon

*E-mail: ajazafol@yahoo.fr

ABSTRACT
Cameroon is on the way to render its pastoral sector more productive by 2035 through the alleviation of the main problems faced by breeders. Because of the interest of most breeders to raise goat, this paper evaluates the constraints faced by goat raisers in the Centre region of Cameroon. From the field results, land and labour are available in sufficient quantity for goat raising activity. Their zero marginal productivity testify that these two resources are not exhausted/non-scarce in comparison to the five other constraining factors (credit, capital, transport to markets, health and food) which are exhausted/scarcce hence displaying non-zero marginal productivities in linear programming model. In conclusion, if the government aims at improving the farmers’ returns, then resources with the highest marginal productivities should be allocated in priority to goat raisers i.e. credit at first, followed in order by capital, transport to markets, health, food, land and labour. Concrete governmental actions would be the creation of agricultural banks necessary to grant credit or capital facilities to breeders, veterinary hospitals and centers for training personnel to prevent illnesses and vaccination of goats, to develop road infrastructures and marketing channels for goat activity, to provide goat raisers with quality and sufficient food for their animals.

KEY WORDS
Goat raisers, gross margin, linear programming, marginal productivity.

The agricultural sector, which includes the food and cash crops, livestock and fishery, is considered as the mainstay of the Cameroon’s economy. It employs 70% of the population, provides 25% of country’s foreign currency and brings about 15 to 20% of the State revenue/returns. During the previous decades, the livestock sub-sector employed 30% of rural people, contributed to about 2.1% of the country’s GDP and 30% of the revenue earned by the rural population (Ministry of Livestock, 2018).

The livestock sector is particularly important because it provides products of several categories such as cattle, sheep, goats, pigs and poultry which contribute to sustain the food-self sufficiency and the healthiness of the population of the country and the surrounding CEMAC1 zone (FAO, 2010; Tsafack, 2016; Jaza et al., 2018). For this reason, livestock keeping is nowadays taken into consideration in Cameroon because of its role and importance in the socio-economic life of poor households and is more and more developed by households to ensure food security and to generate revenue (Upton, 2004; Rooyen and Homann, 2007; FAO, 2012). Hence, the livestock numbers have been at steady increase since 1988 and livestock products are mainly consumed domestically in form of milk and dairy products, meat, eggs and table birds (Tchotsoua and Gonne, 2009; Ministry of Livestock, 2018).

In Cameroon, breeders carried on a particular attention on goat because of its easiest adaptability and low cost of investment (ILCA, 2005; Tsafack, 2016; Jaza et al., 2018). Also, goat meat constitutes an alternative source of protein supply (FAO, 2010). Despite these characteristics and the number that are reared (3.8 million of goats in 2015), Cameroon

1CEMAC=Communauté Économique et Monétaire d’Afrique Centrale (Central Africa Economic and Monetary Community).
appeals to high imports of goat products. This is to face problems of scarcity and rising prices of goat products due to the increase of the country’s population and urbanisation. Inversely, Cameroon’s exportation of goat products is very slight and restricted to neighbouring countries (Tsafack, 2016; Jaza et al., 2018). As a matter of fact, the current goat production of the country is unable to satisfy the national demand and exports because the goat activity knows serious problems (Ministry of Livestock, 2018). Although owners appreciate goats for their multiple functions, they invest little in management technologies that would secure goats’ survival in dry seasons or even to achieve higher performance of their herds and as a result, goat productivity remains low and farmers have fewer goats available for use (Rooyen and Homann, 2007; Tsafack, 2016; Jaza et al., 2018).

In sum, the low goat productivity arises from the multiple constraints faced by breeders engaged in the goat raising sector. Among them, we can cite the low labour productivity, a limited number of market-oriented enterprises, the traditional or archaic system of breeding animal, the low capital or limited access to credit for investment, the limited number of infrastructures for collecting, processing, storage and marketing of goat products, the low organization of the market of goat products, the low diseases control in goat production, the low respect of law, regulation and norms in goat production, the low training of goat raisers, etc (Upton, 2004; ILCA, 2005; Rooyen and Homann, 2007; Tchotsoua and Gonne, 2009; FAO, 2010; FAO, 2012; Jaza et al., 2018; Tsafack, 2016; Ministry of Livestock, 2018). Nevertheless, the national production of the goat activity could be improved if some of these constraints are alleviated (Tchotsoua and Gonne, 2009; Ministry of Livestock, 2018).

The government is aware of these constraints and has elaborated a Strategic Document for Growth and Employment in order to enable the country to become emergent by the year 2035. The livestock and goat raising sector is of particular importance in that document so as to face the above named constraints of the sector. In order to follow up the implementation of this challenge, the goat project was launched in 2013 in the country in order to exploit genetic characteristics of goats, improve productivity and generate revenue. As the constraints faced by goat raisers are numerous and in order to enable the project or decision makers to tackle the main constraining ones, this study was undertaken so as to highlight and assess the extent of each constraint on the farmer’s returns. More specifically, the study seeks to evaluate the main resources needed by goat raisers in order to improve their gross margin.

**MATERIALS AND METHODS OF RESEARCH**

The field survey was carried out from 1st April to 30th June 2016 in the Centre region of Cameroon. The following six divisions of the region were surveyed: Mfoundi, Haute-Sanaga, Mefou-Atamba, Mefou-Âkono, Mbam-et-Kim and Lekié. These divisions were chosen in order to benefit from the facility offered by the goat project implemented in these areas since 2013. Furthermore, the survey intended to help the goat project to build up a strong database by collecting information on goats in the Centre region.

At each division, 26 to 27 goat raisers were selected so as to survey a total of 160 farmers throughout the whole study area. The selected goat raisers were farmers practicing the goat raising as main activity during the previous two to three years (since the launch of the goat project in 2013). Using a structured questionnaire and interview-schedule, cross-sectional primary data of the calendar year 2015/2016 were collected from the selected farmers. Based on the literature review of the constraining factors to goat raising activity, the data collected from each farmer were the goat herd/flock size, the fodder production, the availabilities of land, labour, capital and credit limit, the health and food expenses, the land use for fodder production and goat raising activity, the cost, revenue and gross margin gained from goat raising activity, etc.

In order to achieve the study objective, a linear programming (LP) technique is more convenient to complement the descriptive statistics arising from field survey. According to Hazell and Norton (1986), a linear programming model requires a specification of the farm activities, resources constraints and the forecasted gross margin (GM) (Hazell and Norton, 1986).
1986). As the study assumes that fodder is solely planted for goat nutrition, we need to know the farm size to be used for planting fodder (for feeding goat) and the number of goats to be raised by each breeder so as to maximize his gross margin (GM), and given the constraints of available resources of land, labour, capital, credit limit, health costs, food expenses, and transport to market costs. Hence, the activities which enter into the programming model are the number of hectare of fodder to produce ($X_1$), the number of goat to raise ($X_2$) and the amount (in FCFA) of credit to borrow for raising goat ($X_3$). The problem is summarized in the linear programming tableau of Table A.1 in Appendix.

The Right Hand Side (RHS) includes data on the farmer’s yearly resource availabilities according to the field survey data. These are 7.68 ha of land, 8,064 mandays of labour, 102,688 FCFA of capital, 34,235 FCFA as health expenses, 79,000 FCFA for feeding cost, and 11,800 FCFA for transport cost to markets. Besides, the study considers that, the production of 1 ha of fodder requires 600 mandays of labour and 50,000 FCFA of capital. Likewise, the breeding of one goat requires 0.15 ha of land, 750 mandays of labour, 60,000 FCFA of capital, 20,000 FCFA for health expenses, 30,000 FCFA for feeding cost and 1500 FCFA of transport to markets’ cost. The forecasted gross margins (GM) of activities are: 30,000 per hectare of fodder produced and 50,000 FCFA per goat raised. Additionally according to the field reality, some breeders are members of common initiative groups/local banks where they can borrow money to sustain their goat raising activities at an annual interest rate of 18% and the maximum credit amount is generally limited to 88,667 FCFA per year.

The detailed mathematical equations of the linear programming model for this study are:

Objective function:

$$\text{Max GM} = 30,000X_1 + 50,000X_2 - 0.18X_3 \quad (1)$$

Subject to the constraints:

$$1X_1 + 0.15X_2 + 0X_3 \leq 7.68 \ [\text{Land availability}] \quad (2)$$

$$600X_1 + 750X_2 + 0X_3 \leq 8,064 \ [\text{Labour availability}] \quad (3)$$

$$50,000X_1 + 60,000X_2 - 1X_3 \leq 102,688 \ [\text{Capital availability}] \quad (4)$$

$$0X_1 + 0X_2 + 1X_3 \leq 88,667 \ [\text{Credit limit}] \quad (5)$$

$$0X_1 + 20,000X_2 + 0X_3 \leq 34,235 \ [\text{Health}] \quad (6)$$

$$0X_1 + 30,000X_2 + 0X_3 \leq 79,000 \ [\text{Feeding}] \quad (7)$$

$$0X_1 + 1500X_2 + 0X_3 \leq 11,800 \ [\text{Transport to markets}] \quad (8)$$

The set of equations (1) to (8) were subsequently integrated into the GAMS (General Algebraic Modeling System) software for resolution. The GAMS software was mainly used to estimate the endogenous or decision variables from the linear programming model which are: Max GM: maximum gross margin (FCFA); $X_1$: Fodder area (ha); $X_2$: Goat number (n°); $X_3$: credit borrowed (FCFA); and the marginal productivities (shadow prices) of land, labour, capital, credit limit, health expenses, food cost and transport to markets’ cost.

**RESULTS OF STUDY**

Table 1 presents the flock size from selected goat raisers in the study area. The flock size is the number of goats owned permanently by herders at any period of the year. On average, the goat raisers from the Centre region own permanently 34 goats per year. The large standard deviation of 52 indicates the wide variation of the flock size from one goat
raiser to another. The highest number of animals owned by any goat raiser is 300 goats while the smallest herd owned by any breeder is 2 goats. As fodder is the main food to raise goat in the Centre region, the goat raisers tend to produce it to supplement various food eaten by goats during their divagation. In the study area, the fodder production ranges from 8 to 38 tons/ha with an average of 22.7 tons/ha.

Table 1 – Goat flock size and fodder production per farmer in the Centre region (N=160)

<table>
<thead>
<tr>
<th></th>
<th>n/n</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goat flock size</td>
<td>2</td>
<td>300</td>
<td>33.9</td>
<td>52.7</td>
<td></td>
</tr>
<tr>
<td>(number)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fodder production</td>
<td>8</td>
<td>38</td>
<td>22.7</td>
<td>7.63</td>
<td></td>
</tr>
<tr>
<td>(tons/ha)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2 testifies that every goat raiser in the study area (Centre region) owns a parcel of land which is used either for ranching or fodder production. The ranching land is generally an open space where goats could freely divagate in order to find pasture or any other ingredient to eat in the nature. Since the surveyed areas are less populated (24 inhabitants/km²) as compared to the overcrowded Yaoundé-city where the population density is very high (3,802 inhabitants/km²), the mean land availability of 7.68 ha (Table 2) owned by goat raiser is justified. This is relatively high as compared to the average size of agricultural exploitation of 1.8 ha per farmer in the whole country, 1.61 ha in the Centre region and 0.61 ha in the Yaoundé urban and peri-urban area (Jaza, 2005).

The labour availability is high in the study area as testified by the minimum figures (every farmer has at least 3,028 mandays of annual labour) (Table 2). The high unemployment rate in Cameroon (about 30%) associated to the very high in-labour migration of the population into the Centre region (which owns Yaoundé, the capital city of Cameroon) is a good justification for these figures. However, this high labour availability is a great advantage to the goat raisers as active labour hand is needed to tie, graze, hunt, chase away, displace or carry out the goats from one place to another, depending on the necessity (Jaza et al., 2018). But generally in the study area, most goat raisers use mainly familial/unskilled labour with occasional recruitment of hired/skilled labour to take care of their goats when diseases occur or at the peak moment of vaccination of their goats.

Table 2 – Resource availability per goat raiser in the Centre region (in unit per year) (N=160)

<table>
<thead>
<tr>
<th></th>
<th>n/n</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land (ha)</td>
<td>0.02</td>
<td>100</td>
<td>7.68</td>
<td>13.8</td>
<td></td>
</tr>
<tr>
<td>Labour (manday)</td>
<td>3,028</td>
<td>19,580</td>
<td>8,064</td>
<td>6,345</td>
<td></td>
</tr>
<tr>
<td>Capital (FCFA)</td>
<td>25,000</td>
<td>500,000</td>
<td>102,688</td>
<td>53,143</td>
<td></td>
</tr>
<tr>
<td>Credit (FCFA)</td>
<td>0</td>
<td>200,000</td>
<td>88,667</td>
<td>5,335</td>
<td></td>
</tr>
<tr>
<td>Health expenses</td>
<td>0</td>
<td>56,350</td>
<td>34,235</td>
<td>2,455</td>
<td></td>
</tr>
<tr>
<td>Food costs (FCFA)</td>
<td>35,000</td>
<td>200,000</td>
<td>79,000</td>
<td>19,220</td>
<td></td>
</tr>
<tr>
<td>Transport to markets’ cost (FCFA)</td>
<td>600</td>
<td>30,000</td>
<td>11,800</td>
<td>5,300</td>
<td></td>
</tr>
</tbody>
</table>

As Table 2 shows, the capital used by goat raisers ranges from 25,000 to 500,000 FCFA with an average of 102,688 FCFA. The low capital investment testifies that money is a constraining factor to the goat raising activity as it would be analysed in the next section of the linear programming model. Since the goat raisers lack enough capital amount for undertaking their activity, credit appears as a supplement to capital and the amount of credit contacted by breeders to sustain their activity averaged 88,667 FCFA. However, some farmers do not use credit (minimum=0) while the maximum credit borrowed by any farmer is 200,000 FCFA (Table 2).

As regards to the health expenses (Table 2), the minimum is zero probably because most farmers raise their goat in archaic conditions lacking money for paying medicines to treat or vaccinate their goat against diseases. Only a few farmers could afford to take care of their goats (at maximum health care expenses by following the vaccination calendar. However, with the arrival of the goat project in the study area, we expected that most
breeders would pay attention to the health of their goats because they would receive further
dividences and even occasional support/subsidy to take care or vaccinate their goats.

The food expenses range from 35,000 to 200,000 FCFA with an average of 79,000
FCFA per year. This small range of food expenses is justified by the field reality according to
which, only a few goat raisers cultivate the fodder to raise their goat. Most breeders choose
the free of charge option which consists to leave their goats in divagation in the nature where
every goat would try alone to feed itself. This divagation practice is economic to goat raisers
who save much of the money they would have used to buy food for feeding their goats.

As Table 2 shows, an average of 11,800 FCFA is spent per goat raiser every year for
transporting their goats to the markets. This small amount could be justified by the fact that,
most breeders are discouraged by the bad state of roads for transporting theirs goats to the
markets. As roads are dusty in dry seasons and muddy in rainy seasons, the breeders prefer
to liquidate their goats to other neighboring farmers or rather sell their goats to small markets
at the vicinity of their exploitations where they do not need to pay high transport costs.

As the baseline linear programming (LP) model results nearly reflected the field reality,
the model was validated (Hazell and Norton, 1986). Hence, this section presents the
baseline LP model results for the activities and resources necessary to solve the problem.

The baseline LP model results show that with 7.68 ha of land availability owned
by any goat raiser in the study area, 22% of this land area (1.69 ha) is used for
fodder production, 63% (32.3x0.15=4.84 ha) of it is used as divagasion plot6 for goats while
the remaining parcel (7.68 ha minus 1.69 ha minus 4.84 ha =1.15 ha) representing 15% of
the whole area is left on fallow/unused. The computed flock size (32.3 goats) is nearly similar to
the number of goats owned permanently by farmers in the field (33.9 goats), thereby
testifying the validity of the LP model results.

<table>
<thead>
<tr>
<th>Plot types</th>
<th>Optimal solution</th>
<th>Used land area in hectares (% land used in brackets)</th>
<th>Marginal productivity of plot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plot for divagation of goats (ha)</td>
<td>32.3</td>
<td>4.84 (63%)</td>
<td>0</td>
</tr>
<tr>
<td>Plot for fodder production (ha)</td>
<td>0</td>
<td>1.69 (22%)</td>
<td>0</td>
</tr>
<tr>
<td>Plot in fallow/unused land (ha)</td>
<td>0</td>
<td>1.15 (15%)</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>32.3</td>
<td>7.68 (100%)</td>
<td>0</td>
</tr>
</tbody>
</table>

Notes:
- One goat requires 0.15 ha of land i.e. 4.84 ha for 32.3 goats.
- The gross margin earned by goat raiser is: 122,820 FCFA per year.

Table 3 displayed zero marginal productivity for all plots' types which explains that,
land is available in sufficient amount so as to maximize the farmer's gross margin. Hence, a
goat raiser does not need supplementary plot type since any increase of land use would not
change its gross margin (Hazell and Norton, 1986). The optimal gross margin earned by goat
raisers by considering the three utilisations of land (plot for divagation of goats, plot for fodder
production, plot in fallow/unused land) is on average 122,820 FCFA per year.

Table 4 shows that there exist scarce and non-scarce resources for goat raising activity
in the study area. By definition, scarce resources are fully used up or exhausted during the
production process whereas non-scarce resources are not completely used up, thus leaving
a remaining quantity at the end of the production process (Debertin, 1986; Doll and Orazem,1978).

According to Hazell and Norton (1986), the scarce resources are those whose marginal
productivities are greater than zero whereas the non-scarce resources are those whose
marginal productivities are equal to zero (Hazell and Norton 1986). In general, the higher the
marginal productivity of a resource, then the scarcer is that resource (Hazell and Norton,

6The breeding of one goat requires 0.15 ha of land i.e. 4.84 ha for 32.3 goats.
1986; Jaza, 2005). Hence, scarce resources by order of rarity in this paper include credit, capital, and transport to markets’ cost, health expenses and food expenses (Table 4). For these resources, the goat raiser must increase their use in his activity if he would like to further increase his gross margin. But resources whose marginal productivities are zero are non-scarce resources (including land and labour) to goat raisers because any increase in their amount of utilization would not change the gross margin. Hence, for these resources, the goat raisers must scrupulously respect the quantities recommended by the model.

**Table 4 – Recommendations of the model and marginal productivities of resources used for the goat raising activity**

<table>
<thead>
<tr>
<th>Resources</th>
<th>Available quantity (upper limit)</th>
<th>Recommended amount (optimal solution)</th>
<th>Marginal productivity</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land (ha)</td>
<td>7.680</td>
<td>6.528</td>
<td>0</td>
<td>6\textsuperscript{th} ex</td>
</tr>
<tr>
<td>Labour (manday)</td>
<td>8.064</td>
<td>2.348</td>
<td>0</td>
<td>6\textsuperscript{th} ex</td>
</tr>
<tr>
<td>Capital (FCFA)</td>
<td>102,690</td>
<td>102,690</td>
<td>2.65</td>
<td>2\textsuperscript{nd}</td>
</tr>
<tr>
<td>Credit (FCFA)</td>
<td>88,667</td>
<td>88,667</td>
<td>2.87</td>
<td>1\textsuperscript{st}</td>
</tr>
<tr>
<td>Health expenses (FCFA)</td>
<td>34,235</td>
<td>34,235</td>
<td>1.70</td>
<td>4\textsuperscript{th}</td>
</tr>
<tr>
<td>Food expenses (FCFA)</td>
<td>79,000</td>
<td>51,353</td>
<td>1.40</td>
<td>5\textsuperscript{th}</td>
</tr>
<tr>
<td>Transport to markets’ cost (FCFA)</td>
<td>11,800</td>
<td>11,800</td>
<td>2.20</td>
<td>3\textsuperscript{rd}</td>
</tr>
</tbody>
</table>

Results from the previous section already show that (Table 3), out of the 7.68 ha of land owned by the goat raisers, 1.69 ha (22%) is used for fodder and 4.84 ha (63%) is used as parcel for goat divagation, making a total land use at 6.53 ha. Hence, the land is not exhausted since an amount of 7.68 minus 6.53=1.15 ha (15%) remains unused. The zero marginal productivity of land confirms its non-exhaustion and suggests that, if one more hectare of land is available, the gross margin of goat raiser would remain the same.

The same interpretation could be made to the zero marginal productivity of labour explained by the non-exhaustion of this resource. Probably the high in-labour migration and unemployment rate around the Centre region of the country could justify why labour is not fully used (zero marginal productivity): out of 8,064 mandays available, only 2,348 mandays (29.12%) of it is used to solve the problem (Table 4). This testifies the low labour productivity which was already highlighted among the constraints faced by breeders of this sector. As most farmers are not trained, the labour provided is mainly unskilled labour leading to lower productivity.

In Table 4 results, resources were classified by order of priority in function of the value of their computed marginal productivities. From that ranking, the scarce resources occupy the top positions among the goat raising constraints to be alleviated in priority whereas the non-scarce resources such as land and labour occupy the bottom positions because of their zero values marginal productivities. With its highest marginal productivity (Table 4), credit is the 1\textsuperscript{st} most constraining factor to the goat raising activity in the study area. The credit is exhausted as the 88,667 FCFA amount of borrowed money is fully used. The non-zero marginal productivity of credit (valued at 2.87 FCFA) testifies this exhaustion and is a proof that credit is a very important resource to improve the gross margin of goat raisers. The economic interpretation is that, any 1 FCFA increase in credit borrowed by goat raiser would improve the gross margin by 2.87 FCFA. This is not a surprising result as a previous study by Jaza (2018) in the same area found that, credit opportunities are rare and only 8.12% of goat raisers used credit for financing their activities in that region. Hence, credit should be treated as an important constraint which prevents the goat raising activity in the Centre region of Cameroon.

The capital is however exhausted (the totality of 102,690 FCFA is used); hence the model displays a marginal productivity of 2.65 FCFA for this resource. Thus, capital is the 2\textsuperscript{nd} most constraining factor as regards to its position among all other production factors. This might be attributed to the poor living conditions of these goat raisers. The computed shadow price of capital indicates that, any additional 1 FCFA of capital granted to these goat raisers would increase 2.87 FCFA in their gross margin because such amount could help them to purchase more productive inputs (food, health/vaccination expenses, housing, etc) (Table 3).
The transport to markets’ cost is also exhausted i.e. the amount of 11,800 FCFA allocated for it is fully used. In Table 4, the 3rd position that the transport to markets’ cost occupies among all other production factors is due to the high value of marginal productivity (valued at 2.20 FCFA) of this resource. Hence, if 1 more FCFA of transport to markets’ money is made available to farmers, and then the gross margin would increase by the value of 2.20 FCFA.

In Table 4, health expenses appear to be the 4th most constraining factor to the goat raising activity. The computed marginal productivity of health expenses implies that, 1 FCFA amount of money invested in the health of goat would improve the gross margin of goat raiser by an amount of 1.70 FCFA. Similar interpretation is valid to the food expenses’ constraint (5th position) where, 1 FCFA amount of money invested in goats’ food would increase the gross margin by an amount of 1.40 FCFA.

To sum up according to computed marginal productivities of resources (Table 4), the most constraining factor to the goat raising activity is credit (1st position), followed in order by capital (2nd position), then by transport to markets’ cost (3rd position), then by health expenses (4th position), then by food expenses (5th position), and lastly by both the land and labour which display a zero marginal productivity justifying their last positions (Table 4). Hence, apart from land and labour which are not very important resource necessary to improve the gross margin, care should be taken to all other production factors so as to increase the returns of goat raisers.

**DISCUSSION OF RESULTS**

According to the field reality, every goat raiser owns on average 7.68 ha of land (Table 2) subdivided into three parts: 1.69 ha (22%) as fodder land, 4.84 ha (63%) as goat divagation’s land and 1.15 ha (15%) left in fallow (Table 3).

The results of the linear programming (LP) model show the excess of land resource in the study area, as testified by the zero value of land marginal productivity (Table 4). Hence, the goat raisers do not need supplementary land area for their activities. These results are easily understood from a socio-demographic and historical perspective by considering the population density, non-pastoral nature and farm size in the Centre region.

**Population density:** The Centre region extends over 70,000 km² out of the 475,000 km² of surface area covered by the whole Cameroon i.e. about 14.74% of country’s area. Its population density is 24 inhabitants/km² as compared to 60 inhabitants/km² for the whole country. Hence, apart from the crowded Yaoundé capital-city where the population density is very high (3,802 inhabitants/km²), other parts of the Centre region have enough space which could advantageously be valorised by goat raisers to undertake their activity (Jaza, 2005; Tchotsoua and Gonne, 2009; Jaza et al., 2018).

**Non-pastoral region:** Contrary to the northern part of the country, the Centre region is still a non-pastoral region by nature meaning that this area was not invaded in the past by herdsmen (Tchotsoua and Gonne, 2009). Thus, a lot a free space is still unoccupied and could potentially be valorised for breeding animals. Hence any goat raising activity in open land or divagation system would not face a major difficulty in this zone.

**Farm size:** The average size of agricultural exploitation is 1.8 ha in Cameroon and 1.61 ha in the Centre region. But the field reality shows an average of 7.68 ha of land owned by goat raisers (Table 2), testifying that those currently engaged in goat raising activity have enough land at their disposal as compared to other farmers of the Centre region and to other producers in the country in general (Jaza, 2005).

From the field survey results, only 29.12% (2,348 out of 8,064 mandays) of the available labour force is currently used for goat raising activity in the study area (Table 2). These findings are confirmed by the LP model results displaying the zero marginal productivity (shadow price) of labour, which indicates the surplus of this resource in the study area (Table 4). The zero labour marginal productivity was already interpreted by showing that any additional labour employed in goat raising activity would not improve the gross margin because the existing available labour was not fully used. In other terms, it would not be
profitable to employ supplementary labour since it is not a scarce resource in the study area. The very high unemployment rate in Cameroon (30% of the total population) and the in-labour migration of the country’s population in the search of jobs towards the Centre region which contains the capital city (Yaoundé, also county-town of the Centre region) could justify this excess of labour resource.

Our results are similar to Tsafack findings (2016) according to which, the use of remunerated working hand was negatively correlated to high revenue earned by goat raisers, meaning that, the use of labour implies additional charges for a breeder (Tsafack, 2016). In other words, the employment of salarial workers does not provide enough of outcome in such a way to help a goat raiser to have a high revenue given that the flock size owned is generally small (33.9 goats on average) for goat raisers in the Centre region.

The fact that the labour was not exhausted in the LP model forced us to focus on the low productivity of this resource. The unproductive labour is a consequence of the bad labour quality because goat raisers are unskilled or not trained in most cases. In the field, the employed people to take care of goats are generally recruited among relatives to the family and/or friends who never undertook any technical vocational and educational training (TVET). However, investment on the quality rather than on quantity labour by implementing the TVET education to goat raisers would enable the employment of trained, skilled or productive labourers rather than using large number of unskilled/unproductive labourers as currently observed in the field.

In the study area, respondents reported lack of capital as the major hindrance in improving their business. These are testified by low figure for capital availability (102,690 FCFA per year on average) (Table 2) as well as the high value marginal productivity of capital (2.65 FCFA), which implies that any increase in the capital amount would increase the farm returns (Table 4). These results go with Rooyen and Homann (2007), who found that effort to increase breeders’ level of production and introduce improved management systems (e.g. better housing, nutrition and genetic resources) are impeded by the lack of funds to purchase the necessary inputs.

The field survey results already indicate that, the amount of credit granted to goat raisers is very low (88,667 FCFA) (Table 1) and this insufficient credit amount justified its exhaustion in the linear programming model (Table 4). In Table 4, credit is the resource with the highest marginal productivity (2.87 FCFA) proving that it is the scarcest resource to goat raisers. Hence, its 1st position among all other production factors is justified and credit should therefore be treated as the most important constraint which prevents the goat raising activity in the Centre region of Cameroon. Since the goat raising activity requires little investment in management technologies that would secure goats’ survival in dry seasons, any use of small credit amount would quickly boost this business in comparison to other livestock or farming activities (Rooyen and Homann, 2007). In the same view, Atieno (2007) demonstrated that, the credit could easily help any breeder to compensate the investment costs spent for its goat raising activity and quickly improve the farm returns.

As a matter of fact, the scarcity of credit in the study area could be justified by the country's economic situation which still suffers from the consequences of economic crisis of the early 1990s. That crisis led to the closure of agricultural bank institutions which granted subsidized credits to farmers. Hence, it would be important for the government to revamp the agricultural finance sector including the creation of agricultural banks which could offer subsidized credit to farmers with a viable project such as goat raising activity.

From the field survey results, the low amount of health expenses (34,235 FCFA per year) spent by goat raisers to their animals testifies the lack of serious they consider while taking care of their animals. Farmers which were surveyed reported the goats’ diseases as the main cause of their mortality due to inadequate or lack of veterinary cares. Hence, health is a major constraint faced by goat raiser and this is further testified by the high marginal productivity of health (1.70 FCFA) which also occupies the 4th position occupied among the production factors. Hence, 1 FCFA invested in veterinary cares brought to goats would increase the gross margin by 1.70 FCFA (Table 4).
Previous researches already confirm this assertion. For instance, a study by Mwacharo and Drucker (2005) revealed that diseases are a major constraint to the improvement of the goat industry in the tropics as they decrease production, increase morbidity and mortality, and negatively affect the farmer’s returns. These results also go with Mahmoud (2010) findings, who found that disease was a major cause of losses in goat production. Consequently, this makes owner’s flock size to decrease in number and to lose in terms of benefit. According to FAO (2010), up to 30% of livestock production in developing countries is lost as a result of disease. A major part of the lack of veterinary care is due to the absence of veterinary officers in the study area, long distance that separates one house to the other and lack of financial means to call for one. Owing to the lack of confidence in the adequacy and continuity of the public animal health services, the producer tends to have less incentive to protect animals through government animal health services as compared with traditional methods (ILCA, 2005).

According to the field reality, the main source of goats’ feeding was natural pasture/fodder and crop residues. We already said that every farmers owns a plot size (7.68 ha) containing a subdivided part (1.69 ha i.e. 22%) especially devoted for fodder/pasture production which yields 22.75 tons/ha on average (Tables 1 and 4). As fodder is locally produced to feed the raised goats, the food expenses are valued on average at 79,000 FCFA per year in the study area (Table 2). Furthermore, it was noted that, the production system predominant in the study area is the traditional production system where goats are permanently in divagation to look any food items to eat in the nature. Besides this, there were few goats keepers rearing goats in tying stall housing. Hence, a few goats were fed according to this production system commonly known as stabulation. Thus, the food availability was reported to be one major problem which prevented the goat raisers to adopt divagation rather than stabulation. The choice of divagation rather than stabulation was justified by the difficulty of goat raisers to afford food as testified by the exhaustion of food expenses in the linear programming model (Table 4). The food marginal productivity of 1.40 FCFA implies that the gross margin of goat raiser would be improved if further amount of money is spent for purchasing food for goats.

According to the traditional production system, goats were poorly fed. This is explained by the fact that goats are in constant divagation to look alone for their food what brings someone to say that they are neglected. A study of Mahmoud (2010), confirms that goats are often neglected in comparison with cattle and sheep. So far, the same author shows that part of this attitude towards them can probably be due to recognition of their capability, rather any prejudice against them, as it is believed that goats are intelligent, independent, agile, tolerant to many diseases and parasites and can look after themselves much better than other livestock species. Consequently with this system, goats incur the risk to be stolen. While in stabulation, owners search and bring food to goats. Because of this production system, some goats keepers (especially those in union) developed a system of fodder production on small area where various species of fodder/pasture are planted (Pennisetum purpureum, Bracaria ruzisiensis, Stylosantes). This helps them to feed goats in rotation during a given period in shed.

However, it would be necessary to consider all systems from feeding the goats in order to avoid the disadvantages of divagation and stabulation which vary from one season to another. For instance, although the system of divagation is cheap to goat raisers, it is however difficult because of the long duration of dry season (four months i.e. from November to February) in the study area, which renders the fodder/pasture to become more scarce and the exercise of feeding animal very difficult. Hence, practicing divagation in rainy season and stabulation in dry season would enable the goat raiser to better feed their goats at any period of the year.

The field survey results show that, on average 11,800 FCFA are yearly spent by goat raisers as transport to markets’ expenses (Table 2). The LP model results recommend the transport to markets as the 3rd most constraining factor for the goat raising activity (Table 4). The same results suggest that any 1 FCFA invested in order to alleviate the transport to markets’ constraint would increase the farm returns by an amount of 2.20 FCFA. Hence,
goats’ transportation and marketing should be seriously taken into account for implementing the goat raising activity in the study area.

According to FAO (2012), markets are major determinants of livelihoods in modern economies, and improved market access has proved to be a potent catalyst for poverty alleviation in transition economies. But in the study area, reality is different because one can note the inadequacy and scarcity of markets. The markets found in the study area are generally unapproachable due to the poor state of road. This confirms Upton findings (2004), according to which in many rural areas, markets are poorly developed, reflecting the limited infrastructure of roads, railways, general communications and lack of appropriate market institutions. Owing to these and the cost of transport, many goat keepers sell their goats at door steps. The main markets (Yaoundé markets) are supplied by the North and the Centre region of Cameroon. But due to poor road, high cost of transaction and small number of goats supplied by the Centre region, some buyers were rather going to the Far North to supply the market in goats.

**CONCLUSION AND RECOMMENDATIONS**

Despite the huge number of goats that are reared over the country, the factors constraining the productivity of goat, their systems of production and commercialization has received little attention in research and development endeavors. Hence, this paper studies the extent to which the goat raising activity in the Centre region of Cameroon is affected by various constraints such as the availabilities of land, labour, capital, credit, health, food and transport to markets’ expenses. The impact of these production factors on farmers’ returns is assessed by using the descriptive and linear programming (LP) model approaches.

According to the field survey results, land and labour are available in sufficient amount to goat raisers. These two resources are not exhausted and display zero marginal productivity in the LP model, testifying their non-scarcity in the study area. However, the non-zero marginal productivities of the five remaining production factors (credit, capital, and transport to markets, health and food) testify the exhaustion or scarcity of these resources to the goat raisers. Economically explained, any additional use of the non-scarce resources (land and labour) would not change the gross margin whereas a supplementary investment in the scarce-resources (credit, capital, and transport to markets, health and food) would improve the farm returns to some extent.

Based on the computed values of the marginal productivities of resources from LP model, if the government would like to alleviate the goat raisers’ constraints under its limited means, then priority should be given to the resource with the highest value of marginal productivity. On this basis, credit appears as the most constraining production factor to the goat raising activity hence should be granted to farmers at first position. This is followed in the order by capital, transport to markets, health, food and lastly by both land and labour which are not constraining factors at all. These results are easily explained from the field reality according to which goat owners have little money for investment, lack markets to sell goat or encounter difficult access on existing markets, lack medical care to their animals, raise their goat in divagation, etc.

However, because the goat sector has been recognized as having great potential to contribute to poverty alleviation and improved livelihoods for farmers in Cameroon, the importance of the goat sector from a global perspective needs to be sustained by researchers and government for its development, because most of the goat breeders live in the rural areas and their livelihood depend on the revenue of livestock and agricultural products. Hence, the government should implement policy measures which enable the breeders to have a good mastery of their herds. Examples of such measures are the creation of agricultural bank necessary to grant credit or capital facilities to breeders, the creation of animal medical centers for training personnel to prevent case of illnesses and vaccination of goats, to develop road infrastructure and marketing channels for goat activity, to provide goat raisers with quality and sufficient food for their animals. These measures would help to keep constant the goat supply and satisfy its demand all over the country and CEMAC zone.
AKNOWLEDGEMENTS

The authors are grateful to the goat project for the financial support which enabled the collection of data during the field survey.

APPENDIX

Table – Linear programming tableau of the problem

<table>
<thead>
<tr>
<th>Objective function</th>
<th>Fodder area (ha)</th>
<th>Goat number (n°)</th>
<th>Credit borrowed (FCFA)</th>
<th>RHS (Goal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(GM in FCFA per unit)</td>
<td>[X_1]</td>
<td>[X_2]</td>
<td>[X_3]</td>
<td>Maximize</td>
</tr>
<tr>
<td>Land (ha)</td>
<td>30,000</td>
<td>50,000</td>
<td>-0.18</td>
<td>≤7,68</td>
</tr>
<tr>
<td>Labour (mandays)</td>
<td>0.15</td>
<td>0</td>
<td>≤8,064</td>
<td></td>
</tr>
<tr>
<td>Capital (FCFA)</td>
<td>600</td>
<td>750</td>
<td>0</td>
<td>≤102,688</td>
</tr>
<tr>
<td>Credit limit (FCFA)</td>
<td>50,000</td>
<td>60,000</td>
<td>-1</td>
<td>≤88,667</td>
</tr>
<tr>
<td>Health (FCFA)</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>≤34,235</td>
</tr>
<tr>
<td>Feeding (FCFA)</td>
<td>0</td>
<td>20,000</td>
<td>0</td>
<td>≤79,000</td>
</tr>
<tr>
<td>Transport to markets (FCFA)</td>
<td>0</td>
<td>30,000</td>
<td>0</td>
<td>≤11,800</td>
</tr>
</tbody>
</table>

Notes: GM=Gross Margin; RHS=Right Hand Side.
Source: Prepared according to Hazell and Norton (1986).

REFERENCES

3. Doll J.P. and F. Orazem. 1978. Production economics theory with applications. Kansas State University, Ohio, USA.


OPTIMALISATION THE USE OF HOUSEHOLD-SCALE WATER PUMP MACHINES WITH THE ARDUINO NANO V3.0 CONTROL SYSTEM

Idkhan A.M., Triyono M.B., Iskandar S., Anwar B.*
University of Negeri Makassar & University of Negeri Yogyakarta, Indonesia
*E-mail: soet_54mks@yahoo.com

ABSTRACT
The need of clean water keep increasing, therefore some energy sources that are classified in the renewed energies such as solar energy, wind energy, etc. This research is conducted to analyse usage of water pump engine by using the automatic switches of controller arduino nano v.3.0 and solar energy as the homebased scale pump actuator. The experimental research against the automatic switches usage and solar energy with battery photovoltaic (P-V) for water pump actuator electric energy generator is done in the Renewable Energy Laboratory at Mechanical Engineering Department of State university of Makassar. The result of research shows the sun intensity excelsior, hence battery generator output power PV obtained excelsior to also. Maximum current of PV is obtained at 13.35 Central Indonesia Time Zone (local time) 599 Watts. Current or generator output power PV obtained hardly having an effect on to performa pump and water debit yielded. Water debit yielded by pump at 08.00 until Pukul 16.00 is 0.8 Liter/minute. The controller system with this PV generator is able to deliver water to reservoir with head 3.5 meter.

KEY WORDS
Control, water pumps, photovoltaic cells, energy sources.

The clean water is one of a real important energy source in human life, where a lot of clean water applied for various human activities so that the activity to take care of clean water availability needs to be done and guarantee human life proceeding every day. To guarantee the availability of clean water we need to do the thrift effort and its usage way so that the renewed energy will be more economic that move the water pump. The usage of various technologies to guarantee the water pump performance so the technology application to produce the energy endurance is renewed by using the water pump actuator.

By guarantying the availibility of electric energy through usage of battery photovoltaic and when its operation, it is determinable based on availibility of electric energy at battery, so we must apply the microcontroller technology and usage of various censor types which can arrange all commands and source which will be processed to become an output to guarantee the functioning of a water pump.

LITERATURE REVIEW
Energy is human basic need, keep increasing in line with the level of life. Oil fuel/fossil energy is one of energy source that has character of non renewable energy sources which during the time is pledge in order to fulfill requirement of energy of diatomic in various activity sectors. Besides that, the energy resources in Indonesia covers water power (hydropower), geothermy, ground gas, embers stone, turf, biomass, biogas, wind, sea energy, sun, etc, can be used as the alternative energy.

Sun panel or solar cell is device to convert solar energy into electric energy, technology photovoltaic works to change or convert the radiation of the sun and becomes electric energy in, photovoltaic usually a unit which able to be named module, in a photovoltaic consisted of many solar cell which are able to be compiled in form of break evenly and also parallel. Beside solar energy is a semi element of conductor which solar energy conversion can become electric energy on the basis of effect photovoltaic.
Control systems is processing which consist of a group of apparatus and equipments - equipments of electronic capable to handle stability, accuracy, and elimination of transition of dangerous status in the production process. Each control system component plays an important role, for example, if there is no censor or destroyed or doesn't work, hence process control systems will not know what is going on in running process (Ogata, 1995).

Pump is one of engine type that functions to remove fluid substance from a place to the purposed place. The fluid substance such as water, oil or lubricating oil, and other fluid substance of which is not compressed. Pump which is used by many industries use the aid equipment that is important for production process. For example at steam power electric revival, pump is used to supply the feed water to the boiler or assists the water circulation which will be evaporated in boiler.

The greatness of energy or power that is required to turn around the pump axis influences by pump capacities, pump total head, fluid specific gravity pumped, and the pump total efficiency.

This device design uses control systems and bases on arduino nano v 3.0 that is expected to make easier in controlling the water pump when it started to work till it stop. Arduino is not just a development toolkit, but it is combination trap of hardware, programming language and sophisticated integrated development environment (IDEA) IDEA is a software a real stands to write program, compiles to become binary code and upload into memory microcontroller.

Censor is the equipment that is used to change from a magnitude physical into electrical magnitude so that analyzable with certain electrical circuit. Almost all equipments of the electronic has censor in it. Nowadays, the censor has been made with very small size to facilitate its usage and economizes energy.

Most of censors that used nowadays can really communicate with the electronic peripheral which will do the measurement and recording. Censor is part of a real common for us in daily life. (Rafiuuddin syam, 2013)

Battery as source of concurrent electric current (DC) can be grouped to become two kinds, that are dry element battery and wet element. Battery can be called as also with term of accu or accumulator that means muster. Battery is a tool which can yield electrical energy through chemistry process.

Battery has 2 electrodes that are: positive electrode and negative electrode. A payload of incircuit with battery electrodes, the chemical electro will arise and happened current flow electric from positive pole towards negative pole. (Teknika, Vol 4: 2012).

LCD is one of electronic components that functions as appearance facility of a data, included character, letter, or graph. LCD requires the small strain and power so that it is often used for application at calculator, digital watch, and instrument of electronic such as digital multimeter.

Silicon and gallium are in the form of liquid crystal as light transmitter. At LCD, every matrix is arrangement of two pixel dimensions which are divided into battery and column. Thus every meeting of battery and column consisted of LED at background area (backplane) which is backside of glass ingot with inside part is closed over by the transparency electrode layer. Under normal circumstances, the used fluid has bright colour.

Then the colour of certain districts at the fluid will turn into black when strain is applied between flat areas and electrode cupola is found on the side in front part glass. Excellence
uses LCD is consumption of energy that is small relative and draws small current (some ampere microes), so that device or system becomes portable because it can apply small energy allowance. Other excellence is LCD size that is fix namely not undersize and not too big, then appearance showed from legible LCD easily and clearly (Setiawan, "Mikrokontroler ATMEGA 8535 Bascom-AVR", 2010: 24-27).

RESULTS AND DISCUSSION

The data specification of measurable photovoltaic at Standard Testing Condition (STC) with radiation intensity of the sun reaches 1000 W/m² and solar panel temperature 25 °C are as follows:

- Model: XHGD-50W;
- Open circuit voltage (Vₚₒ): 21.36V;
- Short circuit current (Iₚₛ): 3.13As;
- Maximum power voltage (Vₚₘₐₓ): 17.8V;
- Working temperature: -45 to +85 °C;
- Tolerance: ±3 %;
- Maximum power (Pₘₐₓ): 50W;
- Length solar cell: 67cm = 0.67m;
- Width solar cell: 58cm = 0.58m;
- Solar cell surface area: 0.38m².

Data obtained from assaying will be calculated and analysed to get photovoltaic efficiency. During research, the data taken started at 08.00 – 16.00 Wita.

Result data observation cell photovoltaic at Saturday, 9 November 2017 12.05 WITA that as calculation example as the next:

- Water debit (Q) = 111 L/minit;
- Wide cell photovoltaic (A) = 0.38 m²;
- Radiation intensity of the sun (E) = 1265.2W/m²;
- Brief connection current (Iᵢₛ) = 4.5 A;
- Opened connection strain (Vᵢₒ) = 20 V;
- Current (Iₘ) = 5.0A;
- Strain (Vₘ) = 12 V;
- Water specific mass (ρ) = 993,898 kg/m³;
- Water specific heat (Cₚ) = 4,178 kJ/kg °C.

After taking the data and analyzing the data and result of calculation at research, the sun intensity influence to pump efficiency which can be converted to become electric energy at housing pump, can be seen. These things are explained more detail at some graphs the relation of following:
The relation of the sun intensity (E) and time (t) can be seen at the above graph. The graph of the First day, Thursday 9 November, and Tuesday, 14 November 2017 shows the sun intensity from 08.00 o’clock to 11.20 keep increasing:

But it is noted at 12.45 the intensity suddenly declines because of overcast weather condition. There are 2 days of data taking and it is noted the highest intensity on Thursday and Tuesday, 14 November 2017 at 12.30 that is 898.5 W/m². From inferential graph can be concluded that increasing of highest the sun intensity at 12.35 until 12.40, so it can be concluded that that weather state influence the reducing and increasing of the sun intensity that read based on the measurement instrument.

On Thursday, 9 November 2017 water power from 10.55 to 13.25 increased, but it is noted at 13.45 water power reduced because of the overcast weather condition in 2 days of data taking is noted by highest water power noted on Thursday, 9 November 2017 at 13.40 increased. It can be concluded that increasing of the highest water power at 13.25 until at 13.40. The weather Condition and the sun temperature influence the reducing and the increasing of water power.
In executing this research there are 3 principal components that function as the electric revival generator, that is photovoltaic and Pump as water distributor from reservoir 1 to reservoir 2 and controller device automatically of third pump of principal components inil which will make a system pumping of clean water which the generator from p-v with energy source comes from the sun.

![Diagram of controller device](image1)

**Figure 5 – Design controller device**

Known that the sun intensity hardly having an effect and base on direction angle to come it the sun, maximum power there is at angle of 90° (vertical with wide of panel), but every region has angle of latitude different, for region Makassar photovoltaic is attached with angle of dip (β) 15° to get angle of latitude 90°.

![Diagram of photovoltaic system](image2)

**Figure 6 – Scheme prototype and point of measuring**
CONCLUSION

The electric revival used is the type of solar panel 50 WP polycrystal with the width of 0.38 m² has 2 panels and the pump is modified with revolution 4800 rpm with its motor efficiency equal to 80% and is attached with angle of dip (β) 20° in order to get angle of latitude 90° and flows water from floor 1 to floor 2 as high as 3.5 meter.

From the calculation analysis resykr can be seen that output power from photovoltaic hardly influences pump performance. With usage of the controlling device when pump works, it can be regular according to the available level battery. The result of testing of device and analysis and graph reading indicated that usage of pump can be regular by using the controlling that there are in this device.

It is better for the next testing, the research to be done with dip of different photovoltaic that we can know the maximum absorpion energy.

REFERENCES

DOI 10.18551/rjoas.2019-04.23

THE INFLUENCE OF MANDIRI SHARIA BANK SAVINGS PROMOTION ON INTEREST SAVING PEOPLE OF PALEMBANG CITY

Nawawi Zaidan*
University of Sjakhyakirti, Palembang, South Sumatra, Indonesia

Supriadi: Azizah, Wadjdi Farid, Har M. Senen, Sadikin Ali
Institute of Economic Science APRIN, Palembang, South Sumatra, Indonesia

Syaeful Windiarto
Raden Fatah State Islamic University, Palembang, South Sumatra, Indonesia

*E-mail: zaidannawawi0809@gmail.com

ABSTRACT
The aim of this study to find out how much interests in saving people in the city of Palembang, especially saving in a Sharia-based regional bank, namely the Mandiri Sharia Banking. This research was conducted for two months, this study used primary data by distributing questionnaires, location of the study was in the city of Palembang and data analysis in this study by using multiple linear regressions. The results of this study were advertisements have an effect on peoples' saving interest on Mandiri Sharia Banking Palembang.

KEY WORDS
Promotion, advertisement, publicity, sales promotion, personal selling, saving.

Competition banking industry in Indonesia is increasingly tight. Where the development of the number of private banks and also Islamic banks continues to increase rapidly. Competition in the banking industry in Indonesia is increasingly tight. Where the development the number of private banks and also Islamic banks continues to increase rapidly such as Bank Muamalat, CIMB Bank, Bank Mandiri Syariah, BRI Syariah, and other banks that continue to emerge. The occurrence of such competition means that there have also been changes in promotional strategies in order to optimize banking services. The increasing prospect of the banking industry requires banking institutions to have the right strategy in marketing their banking products and services. One form of supporting marketing strategy is the use of a promotional mix. It is expected that by implementing the right promotion strategy through advertising, sales promotion, personal selling, public relations, and direct marketing the company can immediately reach the desired target market and at the same time create a good image for the company. In line, with the development and growth of the Shariah banking industry, Islamic Commercial Banks (BUS) compete fiercely to attract the public to save at their respective banks. Various strategies were used so that people who had saved became loyal and to attract other banks to move their deposits from other banks to the bank. One strategy that is carried out is to promote by offering products owned by a bank to the public through print or electronic media and so on (Ortega and Alhifni, 2017).

The diversity of products and services offered by banking institutions not only provides wider opportunities for consumers to choose a banking institution that suits their needs, but also raises doubts because there are too many choices offered by these banking institutions. Consumer decision making processes in purchases vary depending on the type of purchasing decision. The decision to buy a motorbike, bath soap, car, clothes, buy credit and others are very different things. Purchases that are complex and expensive goods often lead to more buyer considerations than purchases that are not complicated and inexpensive. On the other hand, consumers' penchant for seeking information from various sources before deciding to save in a bank are some things that must be considered by the company.
Therefore, financial institutions need to conduct field surveys to monitor consumer behavior in making decisions that are considered if they will save at the bank. Based on the phenomena and previous research that the researchers have explained and mentioned above, the researcher will submit a research proposal with the title of the influence of the savings promotion of sharia independent banks on the interest in saving people in Palembang.

LITERATURE REVIEW

According to Stanton (2013), promotion is an element in the company's marketing mix that is utilized to notify, persuade, and remind about the company's products. Promotion becomes a medium of information to recognize all things related to products that the company will offer to consumers. The effectiveness of sales promotion activities will greatly determine the product image and corporate image in the eyes of the public, especially consumers, in the end will greatly affect the level of consumer demand for the products offered by the company. That is why the activity of promoting goods to be sold, including the selection of advertising media in accordance with the trading section, is a very important activity for an entrepreneur. According to Swastha and Irawan (2008). Promotion is a flow of information or persuasion in one of direction to direct an individual or organization to actions that create exchange in marketing. Promotion is one of the variables in the marketing mix that is very important to be implemented by companies in marketing service products.

Advertising does not merely convey information about a commodity (object or service), but has the nature of encouraging and persuading that we like, choose and buy it. According to Kusumawati (2010), Advertising is an activity of delivering news delivered on the order of the party who wants the product or service in question to be liked, chosen and purchased. Sawant (2012) in his research, advertising provides support to prospective consumers who have doubts about buying a product, so that the doubts of prospective customers will decrease and eventually will become convinced and buy the product. Advertising must be carried out on a scale large enough to make an effective impression on the market. Advertising is also all forms of non-personal presentation and promotion of the idea of goods or services by certain sponsors that must be paid. Advertising is a cost-effective way to deliver messages, to build brand perceptions or to educate people (Kotler and Keller, 2012).

Sales promotion is a short-term incentive to encourage desire and to try or buy a product / service (Kotler and Armstrong, 2008). Sales promotion is an activity that is an invitation, provides added value or an incentive to buy products, to retailers, sellers, or consumers. This means that sales promotions are consumer-oriented directed at end users of goods and services. Companies use sales promotion tools to create stronger and faster responses. Sales promotions can also be used to encourage sales that are sluggish and dramatize offers, especially if for example it is done by means of a sales demonstration.

Publicity is the driving force of non-personal demand for a product, service or idea by using commercial news in the mass media and sponsors are not directly burdened with a fee (Harini, 2008). Publicity as a form of communication management that functions to influence the company's image which is usually focused on positive things from the company concerned (Onditi, 2012). Publicity is an editorial space in all media that is read, seen or heard to help achieve sales goals and not be paid. Publicity is also called public relations. A news, statement or commentary in the media, both print and electronic media that can be trusted and familiar is very influential for the reader on the impression of the company and its goods.

According to Kotler and Keller (2012) stated that the implementation of personal selling involves the main role of the salesperson who in direct implementation faces the buyer, so that a salesperson does not only function as a salesperson of the company's products but must act as an ambassador or company representative. Salespeople are trained with high-pressure sales techniques such as selling encyclopedias or cars. These techniques include exaggerating excess products, criticizing competing products, using sophisticated presentations, marketing themselves, and offering an agreement to get orders. Personal
selling, among others, according to Buchari (2010) states that personal selling are oral presentations in a conversation between one person or more with prospective consumers who aim to create sales.

Consumer behavior is actions that are directly involved in obtaining, determining products and services including the decision-making process of saving and following these actions (Tjiptono, 2002). Interest is the tendency in an individual to be interested in something object or like something (Suryabrata, 2006). Interest will arise if we have a form of choice or view of an object or object that can be reached by the senses or that is born of individual thoughts.

**METHODS OF RESEARCH**

The sample is a portion of the population or in mathematical terms can be referred to as a subset or subset of the population (Sugiyono, 2014). The population in the study was the entire community in the city of Palembang. The analysis aims to determine the relationship between the dependent variable and the independent variable. In this study, researchers used multiple linear regression analysis, then presented in the form of a frequency distribution table. The following regression equation: $\text{a} = \text{Constant}; \ Y = \text{Interest saving}; \ X_1 = \text{Advertisement}; \ X_2 = \text{Publicity}; \ X_3 = \text{Sales promotion}; \ X_4 = \text{Personal selling}; \ b_1 = \text{multiple linear regression coefficient between} X_1 \text{and} Y; \ b_2 = \text{multiple linear regression coefficients between} X_2 \text{and} Y; \ b_3 = \text{multiple linear regression coefficient between} X_3 \text{and} Y; \ b_4 = \text{multiple linear regression coefficient between} X_4 \text{and} Y; \ e = \text{error term}.$

**RESULTS AND DISCUSSION**

The following are the results of the analysis of the normality test using the Kolmogorov-Smirnov test that researchers have done:

<table>
<thead>
<tr>
<th>Model</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Statistic</td>
<td>.057</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.200</td>
</tr>
</tbody>
</table>

*Source: Research Data, Processed 2019.*

Kolmogorov-Smirnov test value obtained is 0.057, so it can be concluded that the data is normally distributed (Ghozali, 2009). Based on the results of the analysis, the classic assumption of autocorrelation is obtained as follows:

<table>
<thead>
<tr>
<th>Model</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durbin Watson</td>
<td>1.848</td>
</tr>
<tr>
<td>Probability</td>
<td>0.000</td>
</tr>
</tbody>
</table>

*Source: Research Data, Processed 2019.*

The Durbin Watson value is 1.848, this value is between -2 to 2, meaning that there is no autocorrelation problem (Santoso, 2006). Good regression models should not occur between correlations of independent variables (no multicollinearity):

<table>
<thead>
<tr>
<th>Model</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertisement</td>
<td>1.432</td>
</tr>
<tr>
<td>Publicity</td>
<td>1.657</td>
</tr>
<tr>
<td>Sales Promotion</td>
<td>1.409</td>
</tr>
<tr>
<td>Personal Selling</td>
<td>1.259</td>
</tr>
</tbody>
</table>

*Source: Research Data, Processed 2019.*
Based on table 4.7, it is known that the tolerance value of all independent variables is > 0.10. Whereas for VIF values all independent variables < 10.00. Based on the criteria in decision making, it can be concluded that there is no multicollinearity (Ghozali, 2009). Heteroscedasticity tests that have been carried out, with the following results:

![Heteroscedasticity Test with Scatterplots](Source: Research Data, Processed 2019)

Based on the picture above, the pattern of the analysis results spread, not forming a group such as zigzag, the circle in the middle and gathering around 0 to - 0, which means there is no problem of heteroscedasticity.

The F test is used to determine the effect of independent variables together (simultaneous) on the dependent variable if significant means the relationship that occurs can apply to the population.

Table 4 – Simultaneous Influence Test (Test F)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Regression</td>
<td>365.739</td>
<td>4</td>
<td>91.435</td>
<td>43.647</td>
<td>.000</td>
</tr>
<tr>
<td>Residual</td>
<td>199.011</td>
<td>95</td>
<td>2.095</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>564.750</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Research Data, Processed 2019.*

From table 4 above, the value of Fcount is 43,647 with a probability value (Sig) = 0.000. The value of Fcount (43,647) of Ftable (2,11), while the value of sig is smaller than the probability value of 0.05 or 0.000 <0.05, based on the results of the analysis it can be concluded that there is a significant influence between advertising, publicity, sales promotion and personal selling in general towards the interest of saving people.

Testing can also be with the t test or t-test, which compares the count with t-table. If t-table < t count < t table, then H0 is accepted, that is, the independent variable has no effect on the dependent variable, if t count > t table or -t count > -t table, then H0 is rejected which means the independent variable has a significant effect on the independent variable.

Table 5 – Inter Variable Partial Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>T Value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertisement</td>
<td>6.988</td>
<td>.000</td>
</tr>
<tr>
<td>Publicity</td>
<td>5.114</td>
<td>.000</td>
</tr>
<tr>
<td>Sales Promotion</td>
<td>.123</td>
<td>.902</td>
</tr>
<tr>
<td>Personal Selling</td>
<td>.361</td>
<td>.719</td>
</tr>
</tbody>
</table>

*Source: Research Data, Processed 2019.*

If t count > t table, then H0 is rejected and Ha is accepted and vice versa t count < t table, then H0 is accepted and Ha is rejected. The number of t table with the provisions dk = n-k (100-8) = 92 observations. From these provisions, a number from t table is 1.986.
The influence of advertising on interest in saving, the value of t count 6.988> from 1.986, with a significance value of 0.000 <0.05, then the conclusion is H1 accepted or the first hypothesis is accepted, which means that advertising affects the interest in saving. Based on the results of the analysis, the research is in accordance with the Mahmudah (2014) study which found a relationship between advertising to the customer's saving interest.

The influence of publicity on interest in saving, the value of t count is 5.114> 1.986, with a significance value of 0.000 <0.05, then the conclusion is H2 is accepted, or the second hypothesis is accepted, which means publicity influences the interest in saving. Based on the results of the analysis that has been carried out, this result is consistent with the research of Maisya (2013) which states that advertising and public relations (publicity) have a significant influence on saving decisions.

The effect of sales promotion on interest in saving, sales promotion has a value of t count 0.123 <1.986, with a significance value of 0.902> 0.05. So, H3 is rejected or the third hypothesis is rejected, which means that the sales promotion variable does not affect the interest in saving. The results of this study are in accordance with Pulungan's research (2011) which concluded that promotion does not affect the customer's saving decisions.

The effect of personal selling on saving interest, personal selling has a value of t count 0.361 <1.986, with a significance value of 0.719> 0.05. Then the conclusion H4 is rejected or the fourth hypothesis is rejected, which means that the personal selling variable does not affect the interest in saving. Based on the results of the analysis, previous studies that are in accordance with the results of the researchers namely Yudhiartika and Haryanto (2012) personal selling and display studies have no significant effect on the variable awareness of the interest in buying product brands.

CONCLUSION

Based on the results of this study, it can be concluded that advertising influences people's saving interest, meaning that the more attractive advertisements offered to the public, the advertisement will affect the community's saving interest. Publicity influences people were saving interest, with the bank's relationship with the community, will have a reciprocal effect on the company's image. Sales promotion has no effect on people's interest in saving, the possibility of a sales promotion is less effective, by distributing brochures, and peoples' interest in reading leaflets is certainly reduced, especially in a digital era like this. Personal selling also have no effect on interest in saving, direct sales in the form of services are less effective when viewed in terms of time and energy, because people who are actually busy with their works.

REFERENCES


THE OWNERSHIP RIGHTS OF THE ASSETS EXCHANGEED IN BRIDEPRICE (BELIS)
ACCOUNTING PRACTICES IN BELU

Manehat Beatrix Yunarti*
Master Program of Accounting, Faculty of Economics and Business, University of Brawijaya, Indonesia

Irianto Gugus, Purwanti Lilik
Faculty of Economics and Business, University of Brawijaya, Indonesia

*E-mail: humas@ub.ac.id

ABSTRACT
This study aims to understand to whom the ownership rights on assets exchanged as a bride price and repayment of marriage payments in Belu-Indonesia are given. This is important to be known by the parties who will issue assets in order not to harm one party considering the assets exchanged are classified as large. This study used a phenomenology method with seven informants who had direct subjective experience in customary marriages. The results of the study showed that from the two dozen costs with cultural values that formed the magnitude of the brideprice in Belu the bride did not has the rights to the assets of the brideprice. The parties that obtained ownership rights on the assets of the brideprice were the parents of the bride, biological uncle and family of the bride, religious leaders and local government. On the other hand, those who obtain ownership rights on the repayment of marriage payments given by women to men are the family of men. The man who will get married in the marriage also does not have the right on the assets from the repayment of marriage payment.

KEY WORDS
Ownership, bride price, repayment of marriage payments, Belu.

Transfers from male families to female families at the time of marriage occurred in two-thirds of the population recorded at Murdock (1967) World Ethnographic Atlas of 1167 preindustrial societies. The Indigenous Tribe of Uma Duakun, Belu Regency, East Nusa Tenggara-Indonesia is also one of the tribes who participated in the brideprice transfer. In Belu Regency brideprice is called belis. Uniquely, on the brideprice payment in Belu District, which adheres to the patrilineal culture where men should pay brideprice (belis), the women apparently also provide assets at the time of marriage in return for marriage payments to men. Both parties exchange assets in the customary marriage. Brideprice given by men to women is usually varied in amount, for example, Rp. 60.000.000 from men to women, which is a form of 12 types of underlying costs and conversely the women give traditional/indigenous cloth and other forms of assets to men.

Considering the large amount exchanged in customary marriages, then it is important for men as the "giver of the brideprice" and the women as the "giver of repayment of marriage payments" to find out the target of their gift. The parties issuing the assets can know clearly to whom the brideprice is given, so that they can trust and issue assets in a certain amount for brideprice payments (belis). The clarity of the ownership rights of the brideprice (belis) and the repayment of marriage payments will minimize the bad view of the other party regarding "buying and selling transactions" which began to be widely discussed in the wedding tradition. This understanding will minimize the loss of the parties who exchange these assets because there is also concern regarding Dery's (2015) research in Ghana which found that infrequency often occurred in determining the brideprice where the brideprice was used as a means for female families to get out of their poverty zone.
In recent years, this practice was criticized, especially in Africa. A number of objections have been raised both in the media and in political discourse. Concerns about this arbitrariness make the practice of brideprice deemed contested as seen in examples in African newspapers that criticize this practice including Kelly (2006), IRIN News (2006), and Eryenyu (2014). Objection comes from the view that the transactional nature of the practice produces commodification of women and has adverse consequences. This research was conducted to trace the ownership rights of assets exchanged in the customary marriage of the Uma Duakun Indigenous Tribe in Belu District, either in the form of brideprice (belis) paid by men to women and in return for marriage payments given by women to men so all parties know clearly the ownership rights and purpose of the exchange of assets in the accounting practices of brideprice (belis) in customary marriages in Belu.

METHODS OF RESEARCH

Phenomenology focuses on human consciousness which is formed by a process by which humans feel, think about, and do what they believe according to Husserl (1970). The subjective experience of the informants about the establishment of the ownership rights of brideprice (belis) and the repayment of marriage payments form a quality of information that describes the situation that the informant actually feels. The informants in this study were seven people who had experienced and had direct experience regarding brideprice (belis) ownership rights and repayment of marriage payments. Ownership rights on the assets exchanged will be explored through the experience of the informants. The informant are the bride's father, the bride's mother, biological uncle of the bride, The groom's father, the mother of the groom, the groom and the bride. Data collection in this study was conducted in three ways namely direct observation, interviews and documentation studies. In this study the writers chose data analysis techniques that are in accordance with the phenomenological study approach as outlined by Sanders (1982). There are four stages in phenomenological analysis. The first stage is the researcher doing a description of the phenomenon based on the experience and awareness of the informant from the transcript of the interview results. The second stage researchers identified a theme that emerged based on the description in the first stage. The third stage researchers developed noema and noesis. Fourth stage researchers conducted a phenomenological data analysis by abstracting the essence of the correlation between noema and noesis. This abstraction process is called eidetic reduction.

RESULTS AND DISCUSSION

The ownership rights of the brideprice (belis) are given to the parents of the bride. The description of brideprice's (belis) ownership rights can be illustrated in the interview snippet with Mrs. M as the mother of the bride as follow:

"Yes, the money belongs to the parents. That's the parents’ properties. The ownership rights on the belis belong to the parent. Belongs to father and mother".

The description of the interview (noema) above shows that the brideprice (belis) given by the male to female will be the property/ ownership rights of the bride's parents. The ownership rights of the bride price from the transfer made belong to parents in the Uma Duakun Indigenous Tribe, Belu Regency in accordance with what happened in Africa as stated in Anderson (2007) "Brideprice transfers, where the bride’s parents receive the payment, are the norm in sub-Saharan Africa". This practice also corresponds to the distribution of brideprice's property/ ownership rights in marriage in Zimbabwe where the bride's mother at least gets the benefit of the brideprice payment for example in the form of a cow (Magen and Ndlovu, 2013).

The repeated mention of parents' names by Mrs. M implies that brideprice (belis) is the full right of the bride's father and mother. The Intentional analysis is that the assets given by men with various types of costs that make up the brideprice of women are delegated to the parents of women given the great services of parents who have cared until marry off their children. This price is a favor to the parents of the bride.
This gift will continue to be carried out as an implication. This understanding also occurs in the understanding of the nai' money in the Bugis tribe, Indonesia as a form of male family appreciation for the family of women for educating their daughters well (Rahayu and Yudi, 2015). The eidetic reduction that researchers can conclude is the manifestation of parental services to the bride as their child from childhood to adulthood making the parent

<table>
<thead>
<tr>
<th>No.</th>
<th>Value Name</th>
<th>Amount of Payment from male party to female</th>
<th>The amount of payment from the female party to the male</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Parent Services (Breast milk)</td>
<td>Rp 40.000.000</td>
<td>1 piece of Indigenous cloth</td>
</tr>
<tr>
<td></td>
<td>1 piece of sofen (gold money)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 cow that has 1 younger brother 1 cow that has 2 younger brother</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Deku Dere (Knock the door):</td>
<td>Rp 1.000.000</td>
<td>1 piece of Indigenous cloth</td>
</tr>
<tr>
<td></td>
<td>Odamatan Lor (Front door)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Odamatan Rai (Back door)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Krima (virginity):</td>
<td>Rp 1.000.000</td>
<td>1 piece of Indigenous cloth</td>
</tr>
<tr>
<td></td>
<td>Abat ulun (Head tip)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Abat air (Toe tip)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Nae Bili Rai Kosin (a sign of official bond)</td>
<td>Rp 1.000.000</td>
<td>1 piece of Indigenous cloth</td>
</tr>
<tr>
<td>5.</td>
<td>Toos molik uma maran (groom’s readiness)</td>
<td>Rp 250.000</td>
<td>1 piece of Indigenous cloth</td>
</tr>
<tr>
<td>6.</td>
<td>Kous Fini (the entry of women in the circle of life of the groom and ready to use what has been prepared by the groom)</td>
<td>Rp 250.000</td>
<td>1 piece of Indigenous cloth</td>
</tr>
<tr>
<td>7.</td>
<td>Uma Rua (the union of the two brides’ families)</td>
<td>Rp 1.000.000</td>
<td>1 piece of Indigenous cloth</td>
</tr>
<tr>
<td>8.</td>
<td>Matebian (ancestral spirits of ancestors).</td>
<td>Rp 250.000 plus 1 pieces of abelak (can be in the form of sofen / gold or silver money) worth Rp 6.000.000</td>
<td>1 piece of Indigenous cloth</td>
</tr>
<tr>
<td>9.</td>
<td>Aman no nan (thanks to uncles and all families who have taken the time to attend the event and act as speakers in customary marriages)</td>
<td>Rp 7.000.000</td>
<td>1 piece of Indigenous cloth</td>
</tr>
<tr>
<td>10.</td>
<td>Inan Kaliuk Aman Kaliuk this is (notification to the village government): Village Head Hamlet Chief</td>
<td>Rp 500.000</td>
<td>1 piece of Indigenous cloth</td>
</tr>
<tr>
<td>11.</td>
<td>Chairman of the Environment (Religious Leader)</td>
<td>Rp 250.000</td>
<td>1 piece of Indigenous cloth</td>
</tr>
<tr>
<td>12.</td>
<td>Humur Malu Ibun Kaer malu Lian (Trust and unity of the two families)</td>
<td>Rp 250.000</td>
<td>1 piece of Indigenous cloth</td>
</tr>
</tbody>
</table>

| Source: Research results. |

| Total Value of Brideprice (Belis) & Repayment of Marriage Payments | Rp 60.000.000 |

12 pieces of Indigenous cloth (12 pieces of Indigenous fabric x Rp. 500.000 / cloth = Rp. 6.000.000). Costs incurred for purchasing koba (a place to store sirih-pinang), tenasak (place to store food) and food and drinks according to the number of people present and the menu that want to be served.

Koba (a place to store sirih-pinang): Per Koba (a place to store sirih-pinang) Rp 30.000. The total is adjusted by the number of dulang (nampan) of the groom’s delivery during traditional/customary nights.

Tenasak (place to store food): Per Tenasak Rp 25.000. Total tenasak needed depends on the number of people who attended the traditional/customary event.

The cost of eating and drinking to entertain male families (rice, vegetables, side dishes, sirih pinang, cakes, etc.): This fee is adjusted to the number of people present.

This gift will continue to be carried out as an implication. This understanding also occurs in the understanding of the nai' money in the Bugis tribe, Indonesia as a form of male family appreciation for the family of women for educating their daughters well (Rahayu and Yudi, 2015). The eidetic reduction that researchers can conclude is the manifestation of parental services to the bride as their child from childhood to adulthood making the parent...
possess the ownership rights of the brideprice. The meaning of appreciation and respect for parents is implied in the provision of these assets.

The views on property/ownership rights above are complemented by the statement of Mr. I as the bride's father stating that the biological uncle of the bride also has the right to brideprice paid by men and women as the main actor in the marriage does not have the right on the assets that paid by the man in the marriage. Furthermore, Mr. I based on his understanding also added a statement about the rights of brideprice (belis) as follows:

“That, usually to the uncle. So whoever sits at that time, so the woman has uncles who sit talking about customs, sit and talk about belis, ha that is usually given. Then there was a little appreciation given to the parents of women and their brothers. Ha. The money will be shared later. Not for the woman's party. Ha. Sort of. This means that it is from the policy”.

Noema of Mr. I illustrates that in the assets paid as brideprice by men to women there is a "part of assets" intended for biological uncles of the bride. Uncle (uncle) of the female bride is entitled to some of these assets because he has authority in the customary rules of the Indigenous Tribe of Uma Duakun Belu Regency as a figure who sets and talks with male families when customary sitting by sharing the negotiation process. This understanding of Mr. I was obtained when he was the father of the bride. Mr. I, based on his experience, appreciated the presence of biological uncles of the bride for his authority in accordance with the customary practices that occurred in the Indigenous Tribe of Uma Duakun Belu. This is an intentional analysis why the noesis of Mr.I understands that the bride's uncle has the right to the brideprice. The implication in each marriage at the Indigenous Tribe of Uma Duakun Belu, biological uncle of the bride will get the rights to some of the assets of the brideprice.

The conclusion that can be the writer abstraction from the phenomenology study on Mr. I (eidetic reduction) is that Mr. I follows the prevailing customs traditions. Compliance with the customary rules that make Mr. I always run the distribution of assets to the biological uncle of the bride as a form of appreciation to him for his great authority as the leader of settlers and indigenous speakers. Distributing the brideprice to the biological uncle of the bride's and making him possess his ownership rights is different from the practice in Italy and France, namely the bride is the party that gets the ownership rights to the brideprice as stated by Anderson (2007) "by the time the law codes were issued, the Visigoths (who ruled southwestern France and the Iberian peninsula) seem to have totally incorporated their ancient brideprice into the award grooms made to their brides. Similarly, the Lombards' (who conquered northern Italy) code of law made explicit a required dower to be given directly to brides, as did Frankish customs inthe Carolingian period (eighth to ninth century). This pattern is also reflected inthe traditional Chinese practice of transferring a brideprice directly to the bride's parents, who then return a portion of this as dowry to their daughter. This amountis kept by the daughter as personal property throughout the marriage".

Mr. S based on his experience as the groom's father regarding the ownership rights of brideprice (belis) stated that the distribution of assets to the biological uncle was the authority of the bride's parents. The bride's parents have the authority to divide.

"They want to share or not it's up to the parents of the lady. If necessary, the uncle can get a cow, only now adjusted the parents will give to the uncle how much the uncle will receive. Whatever this parent has the right. Uncle, the one that talking about, so it's impossible, definitely want to get a little money".

The description (noema) above states that the property/ownership rights of brideprice (belis) is owned by the female parent in this case the biological father and mother of the bride and does not belong to the married bride. The biological parents of the bride have the full right to own and share brideprice (belis). When the researcher asked more about the uncle's rights to the brideprice, Mr. S added (noesis) that if in the past the brideprice (belis) belonged to the biological uncle of the bride fully, today it is no longer valid. *Uncle of the bride will only get the money in accordance with the policies from the parents of the bride.* Not only the uncle of the bride but all close family members sit on traditional/customary mats and also talk about setting the brideprice (belis) must be given a part. The biological uncle gets a part because he is a figure who in the customary rules has the highest authority to determine and discuss the value of brideprice (belis) of the bride. The property/ownership rights described
by the informants as a reality in the Indigenous Tribe Uma Duakun Belu Regency has differences with the practice of Burgundia people according to Hughes (1985) research which states that by the fifth century, the Burgundians (who settled in Gaul) awarded one-third of their brideprice to their wives and two-thirds to their wives’ kinsmen.

Complementing the statements of the informants above Mr. M as the uncle of the bride spelling out (noema) in more detail about the costs of brideprice (belis) which are the property/ownership rights of the uncle based on his understanding.

“The money of Aman no nan. He thanked. Em, used to be like this. In the past, such as 7 million, not given like this. The kind I mentioned earlier, silver money. For example the leader, 10 silver, given separately. Uh, the vice how much he want? Want ?? There are levels. The other can be 5. Can be 4 silver, small children can 1-1 silver or 2 people gather 1 silver that is so”.

Based on the understanding (noema), Mr. M above, the researcher can understand that the part of the brideprice which is specifically the property/ownership rights of the bride's uncle is the cost of aman no nan. Intentional Analysis is as the meaning of the costs of aman no nan which means the costs of thanking uncles and all families who have taken the time to attend the event and act as speakers in traditional/customary marriages namely respect for the families present are also prioritized in brideprice (belis) payments. Every family that attend especially the biological uncle of the woman who has the authority to sit on the custom mat and talk about brideprice (belis). As a form of appreciation to all those present at the customary wedding ceremony, all will get money from the payment of brideprice (belis). Everyone is given money according to his position in the family. For example, the leader of the tribe will get more money than the vice leader of the tribe. Even though the numbers are not the same, all the families present get money. Thus, the ownership rights on the cost of aman no nan is right if given to the uncle of the bride. From the total Rp. 7,000,000 which is part of the cost of aman no nan, the bride's parents have the authority to share in any amount and to each uncle and family who sit on custom mats. The statement of the informants again made the researchers conclude that the bride did not have the rights to the brideprice in her marriage. Not obtaining this ownership rights is in accordance with what stated by Anderson (2004) that In contrast to bridal bequests, women have no ownership rights over these more modern “groom-price” transfers.

The ownership rights on the repayment of marriage payments given by the female family to the male party explained based on the following understanding of Mr. I:

“Ha. Cloth. That later woman will return the custom, and then she will give. It already has rules too. Later she wants to give to whom to the brother of the female or repay to the mother. Or who will be present the point represents their moment. Ha, what are they usually. O, the time of the event that the item exchanged for the ring, the customary night, ha, who will accompany the lady later, maybe she has a brother, she has parents, especially she has that one uncle, ha it's usually those who get cloth. Ha, so that later they must get it.

Noema of Mr. I pointed out that ownership rights to cloth given to men by women in return for marriage payments will be given to uncles, brothers, mothers of the groom until the family of men who at the time of customary marriage accompanies the bride as a close family of the groom. If there is a form of reply in the form of money given by a female family to a male party, then the money will be distributed to the companion. On the other hand if the amount of money given in small amounts and is felt to be insufficient to be distributed to all male families who are assigned as a companion, then the money will be used to eat together by the entire male family.

In addition to replies in the form of indigenous cloth, repayment of marriage payments are also in the form of koba (a place to store sirih-pinang), tenasak (place to store food), and food and beverage costs. Tenasak (place to store food) indeed it was counted as a repayment of marriage payments but did not belong to men but still belonged to the family of women because it was only used as a food container for men during traditional/customary nights and not taken home by men. This can be seen from Mr. M's following interview:

“People eat, just a little must be in tenasak”.

Mrs. M as the mother of the bride answered Mr. M's question as follows:
“Tenasak Rp 25,000. Koba like that 30 thousand. Eat it should be put in tenasak, not in plastic. If in the customary night put in tenasak this kind of stuff. Find tenasak Makerek, not the ordinary. Otherwise we don’t want to”.

The opinions conveyed by the informants based on the experience and awareness they carried out and experienced showed that tenasak (a place to store food) was owned by men in the sense of being a place to eat but not taken home by men. Tenasak (a place to store food) is owned by men and their families as a form of appreciation from women customarily giving food in tenasak the high value eating places in the eyes of the Indigenous Tribe of Uma Duakun in Belu Regency. Getting an appreciation by eating at Tenasak (a place to store food) rather than a plastic container made the men get an appreciation. The implication in traditional/customary marriage is that guests are not served food using dishes but are served food using tenasak (a place to store food) and serve sirih pinang using koba (a place to store sirih-pinang).

Can be concluded (eidetic reduction) by the writer that the ownership rights obtained by men and their families by eating using tenasak (a place to store food) is a sense of appreciated and honored which is certainly greater than any amount of money. The sense of being appreciated, accepted and honored also becomes the property/ownership rights of men and their families when served sirih-pinang in koba. Koba is a place to store sirih-pinang in the Indigenous Tribe of Uma Duakun, Belu Regency. Same as tenasak (a place to store food), koba is a high-value object that is considered to be a symbol of appreciation, acceptance and honor to anyone who is welcomed and served with sirih-pinang in koba when visiting. Koba (a place to store sirih-pinang) provided to welcome male families is the best quality koba (a place to store sirih-pinang), not just any koba (a place to store sirih-pinang). This good selection of koba (a place to store sirih-pinang) again implies the meaning of appreciation in the koba (the place to store sirih-pinang). Men in the end did not have tenasak (a place to store food) and koba (a place to store sirih-pinang) in physical form but the value of the appreciation with the two containers made the men gain appreciation, respect and acceptance.

Payment of brideprice (belis) and repayment of marriage payments is a must in customary marriage. In addition to money, animals and other tangible objects that are exchanged in the tradition of customary marriage, there are also immaterial assets exchanged in traditional/customary marriages so that it becomes the property/ownership rights of both parties. Immaterial wealth which certainly cannot be measured by the value of money is something that is reflected in words and actions, feelings experienced by both parties as a result of the payment of brideprice (belis) and repayment of marriage payments. Immaterial property/ownership rights exist as a positive consequence obtained by both parties if they are able to pay brideprice (belis) and repayment of marriage payment, namely the good name and social status that retained its kindness. Marriage will be held well through the agreement of the two big families. This can be seen from the interview snippet (noema) of Brother Arnol as the groom following:

“The first is certainly feels proud means that this is a custom that must be fulfilled its meaning as a man proud to be able to pay. This means that this can also be a good name too. For belis, it has become the culture of the Timor that must be completed. Whoever, if in Timor, wants to marry someone’s child, means that belis must be paid, it becomes an obligation. Now if we pay it becomes a pride, it means that our self-esteem can be valued by women”.

Arnol’s statement was supported by the opinion of Mr. I (noema) as the father of the bride as follow:

“Ha, that means that even if the belis is not, want to get married for free without the belis as a man, that is one self-esteem that he actually does not become he does not feel that he is a man. Because this belis is also part of a man’s self-esteem that when he wants to get married he is capable, not only able to manage his family, but also the customary tradition that he has also long inherited from. Whether a little but at least it must be made. That's because it already concerns self-esteem. Male self-esteem is measured through that too. So basically this man is a prestige, so how can he if he doesn't pay for it and how is he
to other men, then for a moment if there is a slight problem, surely it will be a shame for him, already married for free for my daughter, don’t keep my daughter. If there is a man who wants a free marriage, this type of unemployed man so he wants free. What is clear is a time like that male family is ashamed, it must be”.

Furthermore, Mr. S added the feeling (noema) that he felt from experience while paying brideprice (belis):

“Happy. Father and mother are happy because what is fully responsible has been finished so the father and mother are happy. Feel sad for what? Means that I am responsible”.

This was also supported by the experience of Sister Years as the woman who paid the repayment of marriage payments as follows:

“First there is pride. Why is there pride? Because from there a man showed himself that he was ready and able to be married after that felt the second proud because in front of the woman’s own family she felt that the man she chose was able to fulfill the obligations of a man before going on to the next stage. The point is there is a sense of pride, happy, proud and happy”.

The understanding of the informants above shows that self-esteem, good name, pleasure and pride become the property/ownership rights of the groom Self-esteem illustrates how far the man considers himself to be capable, meaningful, valuable and competent. A man will get self-esteem as his property/ownership rights. The man feels he finds himself as a strong figure that capable of being responsible for brideprice's payment (belis). Men will feel gain pride and pleasure when he is able to pay the “value” of the woman he will marry. The good name of the man becomes elevated because of his ability and capability to pay the bride price (belis) that has been determined. Men are able to maintain the prestige inherent in him where he is able to demonstrate ability through payment of brideprice (belis). On the other hand, men feel able to give appreciation to the women and their families thus they are figures who cannot be underestimated or taken for granted by other parties. Immaterial property/ownership rights in the form of this appreciation are also traditionally felt in brideprice payments in Zimbabwe where appreciation and commitment are the main keys in brideprice payments (Mangena and Ndlovu, 2013). The payment process that is closely related to maintaining one's personal dignity is also in accordance with the values of the wisdom of South Sulawesi Culture stated by Poelinggomang (2014).

Men feel that paying brideprice (belis) is an obligation that has become a culture in marriage and thus must be carried out in traditional/customary marriage. Furthermore, immaterial property/ownership rights for parents namely will feel happy if they are able to pay brideprice (belis) because they feel their responsibility has been completed. Feeling has reached the stage where the child is able to build a new family. Parents have been able to maintain, guide, raise and educate their children until they reach the marriage stage. Parental happiness as a manifestation of responsibility that has been carried out so far. The bride as the person to be married feels a sense of pride and pleasure. Both of these are property/ownership rights of woman because they feel they have chosen the right man who is able to be responsible as a man for paying brideprice (belis) obligations according to the prevailing customary tradition. The woman also proud because she had gotten a man who actually showed his readiness to foster a household and who was declared ready to become the head of the family not only in the eyes of the bride personally but was able to prove it to the whole family.

In addition to the description above the other immaterial property/ownership rights owned by the parents is such as the statement of Mrs. T as the groom's mother the following:

“Ha, that is mutual respect for one another. Women respect us men. We men respect women. Happy too. Yes, happy. Means that is our customary tradition must be run. Impossible o nawan sae ema, happy, glad. Mother is happy because gets a son-in-law, can’t say it’s sad that’s for the happiness of our children”.

Respect is emphasized as property/ownership rights acquired by both parties in this customary marriage process. By issuing large amounts of money for brideprice (belis) in marriage parents do not feel angry but feel great happiness as a form of making children
happy and getting new family members. Happy feelings arise because brideprice (belis) is not used as a burden that interferes with the course of marriage but is seen positive as the good culture that must be carried out for legally as husband and wife.

On the other hand there are consequences that must be borne by men if they are unable to pay brideprice (belis). The same consequences will also be borne by the woman if she is unable to give the repayment of the marriage payment. The consequences obtained were in the form of social sanctions which would be received by the two big families from the community. Both families will be the talk of the community. Shame will be borne for a lifetime by both families. Their inability to pay brideprice (belis) will be discussed as a weakness. Another consequence that will also be obtained is the cancellation of marriage. The cancellation of marriage will disrupt the psychology of man and woman who will marry.

Furthermore, the negative consequences obtained if a man cannot afford brideprice (belis) will be borne by man and their families. The man will feel not being a man in front of other people, especially risking their good name with other man. Another consequence that is obtained in the form of feelings of inferiority, ostracized from the association of several parties, underestimated until undervalued by the female family and the people around will be felt as a result of the inability of a man to pay brideprice (belis). This can be seen in the interview snippet with Brother Arnol's as the groom as follows:

“The perceived impact is the first that we automatically feel inferior. The second was ostracized from a people, became people's speeches, and became the material for the neighbors to talk. The third is that we are less valued. Appreciated by the female family means that underestimated”

Similar negative consequences will also be felt by the woman if unable to give the repayment of marriage payments. This is evidenced by the description of Sister Years' interview as the bride following:

“If can not give indigenous cloth or can't entertain, of course, the feelings feel discouraged. Discouraged for what? Because it can't, the point is like, cannot accept the family of men who have come well. So if it is not fulfilled the female family also feels sad because cannot give feedback to the male family well. The point is, for example, if a female family cannot repay a male family by entertaining or giving traditional/indigenous cloth, it means that the female family is also not ready to continue the proposal, because if for instance is ready the family for both parties it means that the female family has also ready to give obligations to a male family or banquet”.

The description above shows that women will also feel a feeling of being discouraged if they are unable to give repayment of marriage payments. This is felt as a result of the inability to balance the good things that have been done by men and their families. Women will be sad and feel they are not ready to do the marriage if they have not been able to conduct the repayment of marriage payment. This also indicates that both parties must prepare themselves properly, not only imposing on the male side or vice versa imposing on the woman if want the marriage is to be carried out. The readiness of both parties also became the main key in marriage.

CONCLUSION

The ownership rights of the brideprice (belis) given by the men are owned by the bride's parents and there are certain costs given to the family in this case the bride's uncles, government figures and religious leaders. Property/ownership rights on the tangible assets given as brideprice namely in the form of money by men to women are the parents' rights to the bride. As for assets that are the property/ownership rights of the parents are the money of parents' fees/services (Breast Milk), Deku Dere (Knock the Door): Oda Matan Lor (Front door), Oda Matan Rae (Back door), Krima (virginity): Abat Ulun, Abat Ain, Nae Biti Rai Kusin(a sign of official bond), Toos Molik Uma Maran (groom's readiness), Kous Fini (the entry of women in the circle of life of the groom and ready to use what has been prepared by the groom), Uma Rua (the union of the two brides' families), Matebian (ancestral spirits of ancestors), and Humur Malu Ibun Kaer Malu Lian (trust and unity of the two families). Thus
the total assets that became the ownership rights of the bride's parents from the value of the brideprice (belis) paid equal to Rp. 51,250,000. The property/ownership rights on the other assets which categorized as the cost of Aman No Nan (thanks to uncles and all families who have taken the time to attend the event and act as speakers in traditional/customary marriages) is the property/ownership rights of biological uncle of the bride. Assets in the form of money that become the property/ownership rights of the bride's uncle equal to Rp 7,000,000. The money of Inan Kliuk Aman Kliuk (the cost of permits and notifications to the village government) became the property/ownership rights of the government apparatus namely Rp 750,000, and the Chairman of the environment (religious leaders) becomes the property/ownership rights of the chairman of the environment (religious leader) with an amount of Rp 250,000.

Furthermore, for repayment of the marriage payment paid by the female to the male, the ownership rights to the assets in the form of traditional/indigenous cloth given as the repayment of the marriage payment given by the male are the property of the parents of the groom and the male family who accompany bride on customary night. The number of indigenous cloth obtained are as many as 12 pieces of indigenous cloth with good quality. Other property/ownership rights obtained by men and their families by eating using tenasak (a place to store food) is a sense of respected and appreciated which is certainly greater than any amount of money even though physically koba (a place to store sirih-pinang), tenasak (a place to store food) not owned by men and their families. Sense of being appreciated, accepted and valued that became the property/ownership rights of men and their families when served sirih-pinang in koba as well as food with good quality in tenasak. As for the number of koba (a place to store sirih-pinang), tenasak (a place to store food), as well as the cost of banquet and drinking for a male family according to the number of families that present and enjoying the food prepared by a female family.

In addition to tangible assets, immaterial wealth is also exchanged by both families involved in customary marriages. The property/ownership rights on the immaterial wealth obtained by the two families in the form of the sense of respected, sense of honored, self-esteem, good name, pride, pleasure, are the rights that belong to all those involved in the customary marriage of the Indigenous Tribe of Uma Duakun in Belu Regency. The inability of both parties to fulfill brideprice (belis) payments and repayment of marriage payments will also have negative consequences in the form of shame, feeling excluded, not respected, being the material of people's speech also become the property/ownership rights of both families involved. For further research, researchers suggest conducting research that focuses on the source of capital used for payment of marriage by men and repayment of marriage payments by women.

REFERENCES

THE INFLUENCE OF THE EFFECTIVENESS OF FARMER GROUP ON INNOVATION ADOPTION OF INTEGRATED CROP MANAGEMENT MODEL OF THE NATIONAL STRATEGIC FOOD CENTER IN KAPAUS REGENCY, CENTRAL KALIMANTAN PROVINCE OF INDONESIA

Prajawahyudo Tri
Doctoral Program of Agricultural Science, University of Brawijaya, Malang & Faculty of Agriculture, University of Palangka Raya, Central Kalimantan, Indonesia

Hidayat Kliwon, Yuliati Yayuk, Cahyono Edi Dwi
Faculty of Agriculture, University of Brawijaya, Malang, Indonesia

*E-mail: prajawahyudotri@yahoo.com

ABSTRACT
Variable of the effectiveness of farmer groups (exogenous) is one of the variable that affect the level of innovation adoption (endogenous) of integrated crop management model of lowland rice. The effectiveness of farmer groups consists of 4 (four) indicators, namely performance, satisfaction, quality and commitment. The effect of the effectiveness of farmer group variables can result in a decrease in the level of adoption of technological innovations in farmer groups. The component of integrated crop management model innovation adoption consists of two technological components, namely basic technological components and selected technological components. This study aims to analyze the influence of farmer group effectiveness on the level of adoption of innovation with the integrated crop management model approach of national strategic food centers in Kapuas Regency, Central Kalimantan. The results of the descriptive statistical analysis of the average value of the effectiveness of farmer groups variable equal to 3.874 are included in the good category, while the average value of the innovation adoption level variable equal to 4.475 includes the category of very appropriate recommendations. Data processing using the PLS-SEM (Partial Least Square-Structural Equation Modelling) method. The fact of the study results prove that the effectiveness of farmer group variable has a significant effect on the level of innovation adoption of farmer groups, where the T-statistic value 7.643 > T-table 1.96 (Two tailed) and the path coefficient of 0.305 shows that there is a significant and positive influence, meaning that the higher the effectiveness of the farmer group will lead to the higher influence of the level of innovation adoption. The value of determination coefficient of 0.093 shows that the level of innovation adoption is influenced by the effectiveness of farmer groups of 9.30%, the rest 90.70% is influenced by other factors which not contained in the model.

KEY WORDS
Effectiveness of farmer group, level of innovation adoption, integrated crop management.

Food production centers, especially rice in Indonesia, are uneven. Based on data on the national midterm plan for food and agriculture in 2015-2019, in 2012 rice production of around 53% was on Java island, Sumatra Island 23%, Sulawesi island 11%, Kalimantan island 7%, Nusa Tenggara island 5%, and only 1% in Maluku and Papua. In addition to the agricultural sector, Java island is also experiencing progress in other sectors every year. Centralization of various development sectors in Java island has caused many paddy fields to be converted into other sectors, such as housing, industry, roads and other sectors (Rusono, 2014). Van Tran (1998), Kaputra (2013), Xuan (2018), Dasgupta et al. (2018), Berg & Tam (2018), Zarić et al. (2018), found that the cause of the decline in rice production was an increase in population, changing patterns of consumption of the population, narrowing of paddy fields due to land conversion, and the shrinking of land productivity levels. In order to maintain the continuity of production, the expansion of the rice planting area must be
immediately diverted to outside Java where the land is still quite extensive. The government’s efforts to maintain food self-sufficiency are by improving the quality of intensification, extensification, diversification and rehabilitation of agricultural land. Extensification program through opening new fields, especially in areas that already have irrigation networks outside Java. Although the cost of clearing of paddy fields is quite expensive, with the application of the right technology package and appropriate it is expected that rice production will increase.

The quality of human resources plays an important role in agricultural development activities (Rosenzweig, 1977; Kidd et al., 2000; Swanson, 2005; Xie and Zhong, 2006; Xuan, 2018; Zarić et al., 2018). Existing social reality indicates that the main actors of agricultural development in Indonesia are small farmers (planters, breeders, and fishermen). The perpetrators are still categorized as weak entrepreneurs, either in capital, education, skills, technology, and in their mental spirit to progress and develop. Thus, the main actors and business actors are expected to be able to build competitive and sustainable farming so that they can increase their bargaining position. Therefore, the capacity and capability of farmer groups must be continuously improved, one of them is through extension activities with a group approach (Ministry of Agriculture of the Republic of Indonesia, 2013).

Empowerment of national strategic food center farmer groups, namely rice, corn, soybeans, various chilies, shallots, sugar cane and beef, the effectiveness is still doubtful. Achievement of the target of seven national strategic commodities must be supported and maintained. Agricultural HR Development and Extension Agency responsible for preparing agricultural human resources either extension agents, officers and farmers to become reliable actors through an integrated farmer empowerment movement supported by counseling, education and training. The empowering activity of farmer groups of national strategic food center conducted in 24,000 (Agricultural Extension Work Areas) in 34 (Thirty-four) provinces which sourced from the 2016 Extension Center Deconcentration Fund (Ministry of Agriculture, 2015). Kapuas Regency Central Kalimantan Province is one of the locations of national strategic food centers in improving the quality of human resources for the achievement of the target of seven national commodities. In order to achieve rice production targets, effectiveness is a key factor. The effectiveness of farmer groups is very important and is related to the level of adoption of innovation, because effectiveness involves the effort to achieve the stated goals. The effectiveness of farmer groups in the location of national strategic food centers in Kapuas Regency, Central Kalimantan Province can influence the level of adoption of integrated crop management models of lowland rice, so that it will have an impact on an increase in production.

**RESEARCH FRAMEWORK**

The group behavior model to achieve group effectiveness is influenced by elements of input, process, and environment. Input at the group level consists of group composition and group structure. Group composition consists of skills, position, and heterogeneity, while in group structure consists of clarity of roles, clarity of goals, norms, tasks, measures, and leadership. Processes at the group level consist of openness of communication, support, conflict, strategy, role behavior, leadership, and decision making (Umstot, 1988). The Umstot group behavior model to achieve group effectiveness is influenced by elements of input, process, environment, and output. In the group behavior model, it appears that group effectiveness can be measured from 4 (four) indicators namely performance, quality, satisfaction, and commitment. Group effectiveness is influenced by various factors, both group internal factors and external or group environment (Umstot, 1988). (figure 2). Whereas according to Yunasaf (2007) group effectiveness is the success rate of the group to achieve its objectives. Some indicators of the effectiveness of the group include, among others, consist of; group productivity, group morals, and satisfaction levels of the members.

In the case of weighting there is no distinction between indicators of the forming of group effectiveness, because the indicators of the forming of the effectiveness is an inseparable unit. This means that each indicator is integrated and contributes equally to the forming elements of group effectiveness. Some of the results of previous studies indicate that
the effectiveness of farmer groups influences the adoption of innovation. This means that if the farmer group is not effective it will result in a less optimal innovation adoption level so that it will have an impact on the increase in production and farming productivity. Research on the estimation of the effect of farmer group effectiveness with indicators of performance, satisfaction, quality and commitment to the level of innovation adoption of integrated crop management which consisting of basic technology components and selected technology components in Kapuas Regency is very important to be conducted, this is to examine how much influence of the farmer group effectiveness on the level of innovation adoption.

**METHODS OF RESEARCH**

This research was conducted in Kapuas Regency Central Kalimantan Province. Geographically, Kapuas Regency is located between 0°8′48” until 3°27′00” South Latitude and 113°2′36” until 114°44′00” located on the equator. The climate in Kapuas Regency includes tropical and humid climates with minimal temperatures ranging from 21-23°C and maximum 36°C. The intensity of solar radiation is always high and water resources are quite high.

Figure 1 – Frame of Research Conceptual

Figure 2 – Map of Location and Research Activities

The hypothesis of this study:

H0. The effectiveness of farmer groups does not have a significant effect on the level of innovation adoption of integrated crop management models of national strategic food centers.
The most rainfall falls in December, ranging from 886-1.789 mm per year, while the dry month (dry season) occurs in April-August (Kapuas Regency BPS, 2017). The research location is one of the national strategic food centers which carried out in 34 provinces throughout Indonesia. Besides that, Kapuas Regency is a food center and has the largest contribution (41.59%) compared to other regencies in Central Kalimantan Province.

The measurement of farmer group effectiveness and innovation adoption level uses a Likert scale, and the unit of analysis is farmer groups. The method of the sample determination is proportionate stratified random sampling, where farmer groups in the research area are recorded and made a list, then grouped into group strata according to the criteria of Department of Agriculture of the Republic of Indonesia. Next, each strata is taken as a group sample (respondents) randomly with the distribution of the number of groups representing the strata of the beginner class and advanced classes namely equal to 11% respectively. According to Arikunto (2006) if the number of subjects (samples) is large> 100, it can be taken between 10-15% or 20-25% or more. While for the Partial Least Square (PLS) analysis, the sample size is at least 30 (Ghozali, 2014). Then 5 (five) members (farmers) randomly selected from each selected farmer group, namely 2 administrators and 3 non-management members, so that the number of respondents from the two classes of ability of the selected farmer groups totaled 155 farmer respondents (Table 1).

<table>
<thead>
<tr>
<th>No</th>
<th>Farmer Group Ability Class</th>
<th>Number of Farmer Groups</th>
<th>Number specified</th>
<th>Number of group sample</th>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Beginner Class</td>
<td>234</td>
<td>11%</td>
<td>26</td>
<td>130</td>
</tr>
<tr>
<td>2</td>
<td>Advanced Class</td>
<td>42</td>
<td>11%</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>276</td>
<td></td>
<td>31</td>
<td>155</td>
</tr>
</tbody>
</table>

*Source: The Agriculture Service of the Kapuas Regency processed (2018).*

<table>
<thead>
<tr>
<th>No</th>
<th>Name</th>
<th>Year Established</th>
<th>Class</th>
<th>Total members</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Maju Bersama KP</td>
<td>2015</td>
<td>Advanced</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>Berkat Sepakat</td>
<td>2012</td>
<td>Advanced</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>Karya Bersama II</td>
<td>2012</td>
<td>Advanced</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>Hatantiring</td>
<td>1980</td>
<td>Advanced</td>
<td>37</td>
</tr>
<tr>
<td>5</td>
<td>Berkat Bersama</td>
<td>1981</td>
<td>Advanced</td>
<td>31</td>
</tr>
<tr>
<td>6</td>
<td>Berkat Makmur</td>
<td>1977</td>
<td>Beginner</td>
<td>63</td>
</tr>
<tr>
<td>7</td>
<td>Sehaluan</td>
<td>1987</td>
<td>Beginner</td>
<td>49</td>
</tr>
<tr>
<td>8</td>
<td>Taruna Mukti</td>
<td>2011</td>
<td>Beginner</td>
<td>21</td>
</tr>
<tr>
<td>9</td>
<td>Sumber Hasil</td>
<td>2002</td>
<td>Beginner</td>
<td>40</td>
</tr>
<tr>
<td>10</td>
<td>Terusan Sakti</td>
<td>1992</td>
<td>Beginner</td>
<td>30</td>
</tr>
<tr>
<td>11</td>
<td>Karya Hanua aya</td>
<td>1994</td>
<td>Beginner</td>
<td>30</td>
</tr>
<tr>
<td>12</td>
<td>Sri Rejeki</td>
<td>1992</td>
<td>Beginner</td>
<td>25</td>
</tr>
<tr>
<td>13</td>
<td>Karya Sadar</td>
<td>1990</td>
<td>Beginner</td>
<td>40</td>
</tr>
<tr>
<td>14</td>
<td>Subur Makmur</td>
<td>1989</td>
<td>Beginner</td>
<td>30</td>
</tr>
<tr>
<td>15</td>
<td>Berkat Keluarga</td>
<td>2004</td>
<td>Beginner</td>
<td>25</td>
</tr>
<tr>
<td>16</td>
<td>Bina Bersama</td>
<td>2002</td>
<td>Beginner</td>
<td>72</td>
</tr>
<tr>
<td>17</td>
<td>Eka Karya</td>
<td>1990</td>
<td>Beginner</td>
<td>27</td>
</tr>
<tr>
<td>18</td>
<td>Hijau Berseri</td>
<td>2005</td>
<td>Beginner</td>
<td>28</td>
</tr>
<tr>
<td>19</td>
<td>Putra Dewata</td>
<td>1994</td>
<td>Beginner</td>
<td>25</td>
</tr>
<tr>
<td>20</td>
<td>Dharma Karya</td>
<td>1983</td>
<td>Beginner</td>
<td>30</td>
</tr>
<tr>
<td>21</td>
<td>Budi Karya</td>
<td>1985</td>
<td>Beginner</td>
<td>35</td>
</tr>
<tr>
<td>22</td>
<td>Tunas Mekar</td>
<td>1986</td>
<td>Beginner</td>
<td>40</td>
</tr>
<tr>
<td>23</td>
<td>Budi Jaya</td>
<td>1984</td>
<td>Beginner</td>
<td>37</td>
</tr>
<tr>
<td>24</td>
<td>Tani Muki</td>
<td>1987</td>
<td>Beginner</td>
<td>30</td>
</tr>
<tr>
<td>25</td>
<td>Karya Sadar</td>
<td>1987</td>
<td>Beginner</td>
<td>52</td>
</tr>
<tr>
<td>26</td>
<td>Sido Dadi</td>
<td>1985</td>
<td>Beginner</td>
<td>40</td>
</tr>
<tr>
<td>27</td>
<td>Margo Rejo</td>
<td>1985</td>
<td>Beginner</td>
<td>34</td>
</tr>
<tr>
<td>28</td>
<td>Suka Maju</td>
<td>1987</td>
<td>Beginner</td>
<td>20</td>
</tr>
<tr>
<td>29</td>
<td>Margo Mulya</td>
<td>1990</td>
<td>Beginner</td>
<td>34</td>
</tr>
<tr>
<td>30</td>
<td>Borneo Makmur</td>
<td>2015</td>
<td>Beginner</td>
<td>27</td>
</tr>
<tr>
<td>31</td>
<td>Berkat Cangkal</td>
<td>2017</td>
<td>Beginner</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td></td>
<td></td>
<td>29.85</td>
</tr>
</tbody>
</table>

*Source: Research data processed, 2018.*
Based on table 2, it can be seen that the year of establishment or formation of farmer groups ranges from 1977 - 2017, so the age of the most recent farmer groups is 1 (one) year and the longest is 41 (forty one) years. The number of members of farmer groups in each group ranged from 15 - 72 people, while the average number of members of farmer groups was 29,65. If referring to the guiding regulations, the ideal number of members of the farmer group is between 20-25 people or according to local circumstances. The farmer group as a unit of analysis consists of 2 (Two) ability strata namely advanced class and beginner class.

Data collected in this study are primary data and secondary data. Primary data is data obtained from respondents through interviews using questionnaires arranged on a Likert scale. Data collection uses a technique triangulation method of the problem to be collected. Triangulation method is a technique of collecting data through interviews, observation, questionnaires, and documentation (Sugiyono, 2015).

**Processing and analysis of Data.** The construct validity shows how well the results obtained from the use of a measurement are in accordance with the theory (concept) used to define a construct. A strong correlation between constructs and statement items and a weak relationship with other variables is one way to test the construct validity. The construct validity test can be measured by loading score parameters. Rule of Thumb > 0.70 and use the AVE parameter, Communality. AVE score must be > 0,50, and Communality > 0.50. Reliability test to measure the consistency of measuring instruments in answering statement items in research instruments (Cooper et al., 2006, and Hair et al. 2017). Test reliability is measured by the value of Cronbach's Alpha and Composite Reliability. Rule of Thumb the value of Alpha or Composite Reliability must be >0,70, even though the value of 0,60 is still acceptable. But CR is better used in PLS techniques to estimate the internal consistency of a construct (wijono, 2011; Abdillah and Jogiyanto, 2015) (Table 3).

<table>
<thead>
<tr>
<th>Model Test</th>
<th>Output</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outer Model (Indicator Test)</strong></td>
<td>a. Convergent Validity</td>
<td>a. The value of loading factor 0.50-0.60 (already considered sufficient)</td>
</tr>
<tr>
<td></td>
<td>b. Discriminant Validity</td>
<td>b. The value of cross loading correlation with its latent variables must be greater than the correlation with other latent variables</td>
</tr>
<tr>
<td></td>
<td>c. Average Variance Extracted (AVE)</td>
<td>c. The AVE value must be &gt; 0.50</td>
</tr>
<tr>
<td></td>
<td>d. Composite Reliability</td>
<td>d. The value of Cronbach's alpha or Composite Reliability that is good must be &gt; 0.70, even though the value of 0.60 is still acceptable</td>
</tr>
</tbody>
</table>

*Source: Hair et al. (2017).*

The principle of structural model examines the effect of one latent variable with other latent variables both exogenous and endogenous (Testing the hypotheses). Testing is done by looking at the percentage of variance described, namely R² (coefficient of determination) for endogenous latent variables modeled. The value of R² measures the level of variation in changes of exogenous variables towards endogenous variables. the higher the R² value means the better the prediction model of the proposed research model. Stability (measurement consistency) of estimation is tested using a statistical t-test obtained through a bootstrapping procedure (Wijono, 2011) (Table 4).

<table>
<thead>
<tr>
<th>Model Test (Hypothesis Testing)</th>
<th>Output</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. The coefficient of determination (R²) for endogenous latent variables</td>
<td>a. The coefficient of determination (R²) value is between 0 - 1 (0% - 100%) the higher the value of R², the higher the contribution to endogenous latent variables due to exogenous latent variables.</td>
<td></td>
</tr>
<tr>
<td>b. Parameter coefficient, and t-statistics</td>
<td>b. Estimated values for path relationships in the structural model must be significant, which can be obtained by bootstrapping procedures</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Hair et al. (2017).*
RESULTS AND DISCUSSION

The effectiveness of the farmer group is the success of the business carried out by the farmer groups in the process of achieving the stated objective. Indicators of effectiveness of farmer groups are measured based on the Umstot model (1988), namely: 1) performance; 2) quality; 3) satisfaction; and 4) commitment (Table 5).

Table 5 – Measurement of Farmer Group Effectiveness

<table>
<thead>
<tr>
<th>Variable</th>
<th>Indicator</th>
<th>Measurement Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness of farmer groups</td>
<td>Performance measured based on aspects of ability: a) planning activities; b) carry out and obey the agreement; c) use tools and agricultural machinery; d) marketing the production, and e) developing the production.</td>
<td>5. very good</td>
</tr>
<tr>
<td></td>
<td>Quality is measured based on the ability of farmer groups to provide more value for group members.</td>
<td>4. good</td>
</tr>
<tr>
<td></td>
<td>Satisfaction is measured based on the production produced, provision of production facilities, eradication of plant pests and diseases, credit facilities, openness and availability of information and income earned.</td>
<td>3. fairly good</td>
</tr>
<tr>
<td></td>
<td>Commitment is measured based on the potential which owned by the group to progress and develop (sustainability)</td>
<td>2. less good</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. very not good</td>
</tr>
</tbody>
</table>

The effectiveness of farmer groups is very important for the sustainability of farmers’ groups (Nyang’au et al., 2018; Bachev, 2019; Wuepper et al., 2018; Knickle et al., 2018; Gabel et al., 2018; Wijaya et al., 2018; Hidayat et al., 2018; Giomi, et al., 2018; Bloomfield et al., 2018), because by their effectiveness existence, the farmer groups objectives can be achieved. The effectiveness of farmer groups makes farmer groups able to analyze group goals that have not been achieved so that the planning of group activities will run in a more productive and effective direction. The urgency of the effectiveness of an organization, as proposed by Drucker in Hersey and Blanchard, (2004) states that effectiveness is the basis for organizational success, including at the group level (Hopkin, 2018; Kirschenbaum, 2019; Sherman et al., 2018). The level of innovation adoption is the level of application of technological components of the Integrated Crop (Jerop et al., 2018; Jamil et al., 2018; Silva et al., 2018; Stevenson et al., 2019; Peshin et al., 2019). Management model of lowland rice farming through Movement of Integrated Crop Management Application on farmer response indicators from those not recommended until as recommended for: a) basic technology components; and b) selected technology components (Ministry of Agriculture of the Republic of Indonesia, 2016) (Table 6).

Table 6 – Measurement of the Level of Innovation Adoption of Farmer Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Indicator</th>
<th>Measurement Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of Innovation Adoption of Integrated Crop Management</td>
<td>Measured based on the level of adoption of the recommended technology components consisting of: a. Basic technology components: Use of superior varieties, quality and healthy seeds, administration of organic materials, fertilization, integrated pest control b. Selected technology component: tillage, crop management, irrigation, weeding with porcupines (gasroki), handling of harvest and post-harvest.</td>
<td>5. very recommended</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. as recommended</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. fairly recommended</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. less recommended</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. very not recommended</td>
</tr>
</tbody>
</table>

Based on a survey on 155 respondents taken from 2 (Two) Sub-districts in Kapuas Regency, Central Kalimantan Province, namely Selat Sub-districts and Bataguh Sub-districts. In general, the characteristics of the respondent farmers namely regarding with age, education level, cultivated land area, side jobs, tribe or ethnicity, and farming experience (Table 7).

The age characteristics of farmer group members vary between 20 - 69 years. Distribution of categories of respondents with the age range between 35 - 49 years was the
most dominant at 74 people (47.75%). Cumulatively 144 (92.90%) respondents were in the productive age category. This fact is supported by Burhansyah (2014) which states that productive age is capital in conducting farming activities. The average respondent is 46.98 years old.

The distribution characteristics of the respondents were most dominant at the junior high school level (SLTP) namely equal to 47.74%. Then followed by respondents with elementary school education (SD) of 25.81%, high school (SMU) educated of 22.58%, and about 3.87% have an education of Diploma or College. Hapsari (2012) states that education can make people think logically, systematically, and wisely. With higher formal education will be better able to analyze the benefits that will be obtained from the activities to be carried out. The characteristics of cultivated land area of farmers or the most respondents are in the area of medium cultivated land, namely the range between 1–3 ha which is equal to 87.74%. Then followed by farmers who have a large area of cultivated land which is above 3 (>3) equal to 9.03% and respondents with the ownership of narrow-scale cultivated land area that is less than 1 ha (<1) equal to 3.23%. While the productivity of agricultural lowland rice area is an average of 4.43 tons/ha. Wahed (2015) stated that land area is one of the main factors in increasing production which affects the welfare of farmers, which in turn can also improve the welfare of farmers. The most dominant side job of members of farmer groups is as merchant/stall business at 35.60%. Next working as a builder or construction worker is 27.12%, farm laborers/hodge by 22.03%, tailor amounted to 6.78%, fishermen or fish keepers at 6.78%, and chicken breeders at 1.69%. The characteristics of respondents distribution based on the most dominant tribe or ethnic are the Javanese, 45.81%. Then followed by the Banjar tribe 33.54%, Balinese tribe amounted to 11.61%, Dayak tribe equal to 8.39%, and the least is the Batak tribe, only around 0.65%. While the longest experience of farming is between 21–30 years (46.64%). This is supported by Putri's findings (2016) stating that the experience gained by someone can add to the knowledge and skills that are appropriate to the field of work involved.

Table 7 – Characteristics of Respondents

<table>
<thead>
<tr>
<th>Description</th>
<th>Category</th>
<th>Respondents</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>20 – 34</td>
<td>18</td>
<td>11.61</td>
</tr>
<tr>
<td></td>
<td>35 – 49</td>
<td>74</td>
<td>47.75</td>
</tr>
<tr>
<td></td>
<td>50 – 64</td>
<td>57</td>
<td>36.77</td>
</tr>
<tr>
<td></td>
<td>≥ 65</td>
<td>6</td>
<td>3.87</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>155</td>
<td>100</td>
</tr>
<tr>
<td>Level of education</td>
<td>Elementary School (0 – 6)</td>
<td>40</td>
<td>25.81</td>
</tr>
<tr>
<td></td>
<td>Junior high school (7 – 9)</td>
<td>74</td>
<td>47.74</td>
</tr>
<tr>
<td></td>
<td>High School (10 – 12)</td>
<td>35</td>
<td>22.58</td>
</tr>
<tr>
<td></td>
<td>Diploma / College (13 – 17)</td>
<td>6</td>
<td>3.87</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>155</td>
<td>100</td>
</tr>
<tr>
<td>Cultivated Land Area</td>
<td>Narrow (&lt; 1)</td>
<td>5</td>
<td>3.23</td>
</tr>
<tr>
<td></td>
<td>Moderate (1 – 3)</td>
<td>136</td>
<td>87.74</td>
</tr>
<tr>
<td></td>
<td>Large (&gt; 3)</td>
<td>14</td>
<td>9.03</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>155</td>
<td>100</td>
</tr>
<tr>
<td>Side job</td>
<td>Hodge</td>
<td>13</td>
<td>22.03</td>
</tr>
<tr>
<td></td>
<td>Merchant (stall business)</td>
<td>21</td>
<td>35.60</td>
</tr>
<tr>
<td></td>
<td>Tailor</td>
<td>4</td>
<td>6.78</td>
</tr>
<tr>
<td></td>
<td>Chicken farmer</td>
<td>1</td>
<td>1.69</td>
</tr>
<tr>
<td></td>
<td>Builders (Building workers)</td>
<td>16</td>
<td>27.12</td>
</tr>
<tr>
<td></td>
<td>Fisherman (raising fish)</td>
<td>4</td>
<td>6.78</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>59</td>
<td>100</td>
</tr>
<tr>
<td>Tribe or Ethnicity</td>
<td>Jawa</td>
<td>71</td>
<td>45.81</td>
</tr>
<tr>
<td></td>
<td>Dayak</td>
<td>13</td>
<td>8.39</td>
</tr>
<tr>
<td></td>
<td>Banjar</td>
<td>52</td>
<td>33.54</td>
</tr>
<tr>
<td></td>
<td>Bali</td>
<td>18</td>
<td>11.61</td>
</tr>
<tr>
<td></td>
<td>Batak</td>
<td>1</td>
<td>0.65</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>155</td>
<td>100</td>
</tr>
<tr>
<td>Farming experience (years)</td>
<td>&lt;10</td>
<td>22</td>
<td>14.19</td>
</tr>
<tr>
<td></td>
<td>10 – 20</td>
<td>53</td>
<td>34.19</td>
</tr>
<tr>
<td></td>
<td>21 – 30</td>
<td>72</td>
<td>46.46</td>
</tr>
<tr>
<td></td>
<td>&gt; 30</td>
<td>8</td>
<td>5.16</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>155</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Research data processed (2018).
The analysis results of statistical description of the effectiveness of farmer group variables (Y1) obtained the majority of respondents' answers are good answers with an average item between 3,477 to 4,174 (Table 8). This shows that the respondent gave a positive response to the variable item of the effectiveness of the farmer group (Y1). As for the effectiveness of farmer groups are as follows: a. average performance indicator 4.014, b. average quality indicator 3.790, c. the average satisfaction indicator is 3.866, and d. average commitment indicator 3.825. Meanwhile the variable average value is 3.874, included in the good category. The facts prove that the effectiveness of lowland rice farmer groups on performance indicators is the highest. From the analysis results of the variable description of the effectiveness of farmer group that need to be considered by farmer groups are several indicators including quality, satisfaction, and commitment. On quality indicators, namely on the item "crop quality as a result of farmer group activities" and "quality of agricultural production facilities which available in farmer groups" still have a low average value when compared to other items on the same indicator. On the satisfaction indicator, the item "ease for capital credit" still has a low average value, when compared to other items on the same indicator. Furthermore, on the commitment indicator, namely on the item "frequency of cooperation activities of farmer groups with cooperatives", and "frequency of farmer group cooperation activities with banks" still have a low average value, when compared to other items on the same indicator. But if we look at the overall results the average value of the effectiveness variable of the farmer group is in the range of hesitation and close to the agreement with the indicators of performance, quality, satisfaction and commitment, therefore it can still be increased to achieve an average value of strongly/ very agree. (Appendix 1).

The results of the description of the level of innovation adoption (Y2) obtained by the majority of respondents' answers is that the answers are sufficiently appropriate to be very appropriate with the average item between 2,852 to 4,813. This shows that the respondent gave a very positive response to the item variable of the level of innovation adoption (Y2). As for the level of innovation adoption are as follows: a. basic technology component indicators the average is 4.350, and b. selected technology component indicators on average of 4.599. While the average value of the innovation adoption level variable is 4.475, including in the very recommended category (Appendix 2). The level of innovation adoption of integrated plant management program/program through the Integrated Crop-Management Implementation Movement is the level of application of technological components in rice farming by farmers or farmer groups which consists of 2 (Two) components namely: 1) basic technology components, and 2) selected technology components. Basic technology components are components that must be applied (highly recommended) in the implementation of integrated crop management model of lowland rice, while the selected technology components are several components that can be selected based on location needs (conditions, willingness, and capabilities of local farmers) (Ministry of Agriculture, 2016). The results of this analysis indicate that it is necessary to pay attention to the basic technological component indicators, namely on items a.4"Fertilizing based on plant needs and soil nutrient status and the use of the BWD (Based on Leaf Color) method to measure N (Nitrogen) content and Rice Field Test Equipment to measure P (Phosphorus) & K (Potassium) content received a very low response (2,852) from respondents' assessment or farmer group members. This is because farmers feel that the available technology is still very limited and the price is too expensive. Besides that, in the selected technology component indicator, a small number of farmers still have not implemented the jajar legowo system and weeding is still done manually, by hand and machete.

**Measurement Model Test (Outer Model).** The result of measurement model test (outer model) on the effectiveness of farmer groups (Y1) and the level of innovation adoption (Y2) by the measurement of the reflective model obtained all indicators (observed variable) fulfill the feasibility test with the value of loading factor (Original Sample) > 0,50 so that the indicator can be used. Discriminant validity is measured using cross loading with the criteria if the value of the loading factor in a corresponding variable is greater than the value of the
indicator correlation in other variables then the indicator is declared valid in measuring the corresponding variable. Cross loading calculation results (Table 8).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Y1</th>
<th>Y2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y1.1</td>
<td>0.794</td>
<td>0.314</td>
</tr>
<tr>
<td>Y1.2</td>
<td>0.830</td>
<td>0.225</td>
</tr>
<tr>
<td>Y1.3</td>
<td>0.804</td>
<td>0.204</td>
</tr>
<tr>
<td>Y1.4</td>
<td>0.599</td>
<td>0.097</td>
</tr>
<tr>
<td>Y2.1</td>
<td>0.258</td>
<td>0.843</td>
</tr>
<tr>
<td>Y2.2</td>
<td>0.253</td>
<td>0.835</td>
</tr>
</tbody>
</table>

_Source: Research data processed (2018)._

The result of measurement model test (outer model) on the variable of effectiveness of farmer groups (Y1) and the level of innovation adoption (Y2), with a reflective measurement model obtained all indicators meet the feasibility test with the value of loading factor (Original Sample) > 0.50 so that the indicator can be used (Table 9).

<table>
<thead>
<tr>
<th>Indicator Variable</th>
<th>Original Sample (O)</th>
<th>Sample Mean (M)</th>
<th>Standard Deviation (STDEV)</th>
<th>Standard Error (STERR)</th>
<th>T Statistics ([O/STERR])</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y1.1 &lt;- Y1</td>
<td>0.794</td>
<td>0.791</td>
<td>0.041</td>
<td>0.041</td>
<td>19.140</td>
<td>0.000</td>
</tr>
<tr>
<td>Y1.2 &lt;- Y1</td>
<td>0.830</td>
<td>0.824</td>
<td>0.029</td>
<td>0.029</td>
<td>28.214</td>
<td>0.000</td>
</tr>
<tr>
<td>Y1.3 &lt;- Y1</td>
<td>0.804</td>
<td>0.797</td>
<td>0.044</td>
<td>0.044</td>
<td>18.311</td>
<td>0.000</td>
</tr>
<tr>
<td>Y1.4 &lt;- Y1</td>
<td>0.599</td>
<td>0.596</td>
<td>0.076</td>
<td>0.076</td>
<td>7.881</td>
<td>0.000</td>
</tr>
<tr>
<td>Y1.1 &lt;- Y2</td>
<td>0.843</td>
<td>0.842</td>
<td>0.039</td>
<td>0.039</td>
<td>21.613</td>
<td>0.000</td>
</tr>
<tr>
<td>Y1.2 &lt;- Y2</td>
<td>0.835</td>
<td>0.829</td>
<td>0.050</td>
<td>0.050</td>
<td>16.830</td>
<td>0.000</td>
</tr>
</tbody>
</table>

_Source: Research data processed (2018)._ Calculations to test the reliability of latent variables (constructs) are discriminant reliability(AVE), Cronbach’sAlpha (CA) and Composite Reliability (CR). The test criteria states if the AVE has the value > 0.50, CA has the value > 0.60 and CR must has the value > 0.70 then the construct is declared reliable. The results of the AVE, CA and CR calculations indicate that variable reliability meets the requirements and can be used (Table 10).

<table>
<thead>
<tr>
<th>AVE</th>
<th>Composite Reliability</th>
<th>Cronbachs Alpha</th>
<th>Communality</th>
<th>R Square</th>
<th>Redundancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y1</td>
<td>0.581</td>
<td>0.845</td>
<td>0.773</td>
<td>0.581</td>
<td></td>
</tr>
<tr>
<td>Y2</td>
<td>0.704</td>
<td>0.827</td>
<td>0.580</td>
<td>0.704</td>
<td>0.093</td>
</tr>
</tbody>
</table>

_Source: Research data processed (2018)._ Hypothesis Testing: Influence of the effectiveness of farmer groups (X) on the level of innovation adoption (Y).

<table>
<thead>
<tr>
<th>Original Sample (O)</th>
<th>Standard Error (STERR)</th>
<th>T Statistics ([O/STERR])</th>
<th>P-value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y1 -&gt; Y2</td>
<td>0.305</td>
<td>0.040</td>
<td>7.643</td>
<td>0.000</td>
</tr>
</tbody>
</table>

_Source: Primary research data processed (2018)._ Structural model equation (Inner Model)

<table>
<thead>
<tr>
<th>Original Sample (O)</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y1 -&gt; Y2</td>
<td>Y2 = 0.305 Y1 + ε</td>
</tr>
</tbody>
</table>

_Source: Research data processed (2018)._
The result of Hypothesis test and structural model equations that the test of the influence of farmer group effectiveness variables (Y1) on the level of innovation adoption (Y2) obtained the value of T-statistic 7.643> T-table 1.960 (Two tailed) (Table 11) means that there is a significant influence of the effectiveness of the farmer group variables (Y1) on the level of innovation adoption (Y2) with a significance level of 5% (hypothesis accepted). In equation Y2 = 0.305Y1 + path coefficient value (0.305) (Table2) indicates a positive influence meaning that the higher the effectiveness of farmer groups (Y1) will lead to higher influence on the level of adoption of innovations (Y2). The equation also shows that the effectiveness of farmer groups (Y1) with the level of adoption of innovation directly or linearly proportional (Y2). Adoption of lowland rice technological innovation is known based on the results of the application of technology by farmers.

Some studies that support the findings of the study include Efendi (2004) found that the level of innovation adoption of Lowland Vegetable Crops (LVC) technology is influenced by one element of group dynamics, namely group effectiveness. Svenek (2001), Sutarno (2015), and Wicaksono, A.S., and Subekti, S. (2017) stated the same thing that the effectiveness of farmer groups consisting of cognitive, affective and psychomotor indicators jointly influenced the level of technology adoption. Prajawaiyudo et al., (2010) found the fact that farmer group effectiveness had a positive effect on the level of innovation adoption. Where effectiveness is measured based on indicators of performance, satisfaction and commitment. Farmer satisfaction affects the sustainability of the extension program and will have an impact on adoption improvement (Elias et al. 2015). Nuryanti and Swastika (2011) the role of farmer groups is not only as a medium for disseminating subsidies from the government, but more importantly as agents of application (adoption) of new technologies. Factors that influence the adoption of technological innovations in the Upsus Pajale (padi, jagung and kedelai / rice, corn and soybeans) activities include the role of information media and the role of farmer group communication (Adawiyah et al., 2017). The level of innovation adoption of Integrated Crop Management / of lowland rice one of them is the availability of information on Integrated Crop Management technology (Ismilaili et al., 2015). Farmer satisfaction affects the sustainability of the extension program and will have an impact on the adoption improvement (Elias et al. 2015). The impact of the adoption of agricultural technology innovations increases significantly over time (Ogunsari and Bolarinwa, 2018). Implementation of integrated crop management practices such as balanced fertilizer applications can increase yields and income by around 30% compared to conventional farming systems in Karnataka, India (Wani et al., 2017). The communication effectiveness in receiving messages results in high knowledge of farmer about modern farming methods, which has the effect of increasing farmers’ adoption (Rintjap, 2015). The role of farmer groups is not only as a medium for channeling government subsidies but also as an agent for implementing new technologies (Nuryanti and Swastika, 2011). While Djoni and Maulana (2009) get the fact that there is no relationship between group effectiveness with the adoption of technological innovation.

Table 13 – Results of the determination coefficient (R²)

<table>
<thead>
<tr>
<th>Y2</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.093</td>
</tr>
</tbody>
</table>

Source: Research data processed (2018).
Table 13 shows that the variable of the level of innovation adoption (Y2) is influenced by the variable of the effectiveness of the farmer group (Y1) with the value of the coefficient of determination (R square) equal to 0.093. This shows that the variable of the effectiveness of the farmer group (Y1) has an effect of 9.30% on the level of innovation adoption (Y2), while the remaining 90.70% is influenced or determined by other factors not included in the model. The results of this study indicate that the effectiveness of farmer groups influences the adoption of innovation. This means that if the farmer group is not effective it will result in a less optimal level of the adoption of innovation so that it will have an impact on production improvement and farming productivity.

CONCLUSION AND SUGGESTIONS

The average value of the innovation adoption level variable is in the very appropriate as the recommended category. While the average value of the variable of the effectiveness of farmer groups is in the good category. The variable of effectiveness of farmer groups (Y1) has a significant and positive effect on the level of innovation adoption (Y2) in the Integrated Crop Management / model with 2 (Two) technological components, namely basic technological components and selected technological components through Integrated Crop Management-implementation Movement. The value of coefficient of determination (R²) shows that the effectiveness of farmer groups gives a positive contribution on the level of innovation adoption. The path coefficient shows that there is a positive effect, meaning that the higher the effectiveness of the farmer group (Y1) will lead to higher influence on the level of innovation adoption (Y2). From the analysis of research results and conclusions it can be suggested that the level of innovation adoption category can be maintained, while the effectiveness of farmer groups from good categories can be increased to very good categories, by taking into account the indicators that are still lacking. Given that the effectiveness of farmer groups contributes positively to the level of adoption of innovation, then the variables need to be considered and improved.

APPENDIX

Appendix 1 – Statistics description of the effectiveness of farmer groups (X)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Item</th>
<th>VNG</th>
<th>NG</th>
<th>FG</th>
<th>G</th>
<th>VG</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>a. Performance</td>
<td>1</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
<td>25</td>
<td>19%</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
<td>41</td>
<td>30%</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0</td>
<td>0%</td>
<td>1%</td>
<td>44</td>
<td>33%</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0</td>
<td>1%</td>
<td>1%</td>
<td>43</td>
<td>32%</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
<td>39</td>
<td>29%</td>
<td>72</td>
</tr>
<tr>
<td>Mean Indicator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.014</td>
</tr>
<tr>
<td>b. Quality</td>
<td>1</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
<td>67</td>
<td>50%</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
<td>60</td>
<td>44%</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0</td>
<td>1%</td>
<td>1%</td>
<td>51</td>
<td>38%</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0</td>
<td>2%</td>
<td>1%</td>
<td>57</td>
<td>42%</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0</td>
<td>3%</td>
<td>2%</td>
<td>64</td>
<td>47%</td>
<td>53</td>
</tr>
<tr>
<td>Mean Indicator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.790</td>
</tr>
<tr>
<td>c. Satisfaction</td>
<td>1</td>
<td>0</td>
<td>0%</td>
<td>1%</td>
<td>63</td>
<td>47%</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
<td>59</td>
<td>44%</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0</td>
<td>3%</td>
<td>2%</td>
<td>40</td>
<td>30%</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>1</td>
<td>1%</td>
<td>6%</td>
<td>54</td>
<td>40%</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0</td>
<td>2%</td>
<td>3%</td>
<td>45</td>
<td>33%</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0</td>
<td>3%</td>
<td>2%</td>
<td>50</td>
<td>37%</td>
<td>65</td>
</tr>
<tr>
<td>Mean Indicator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.866</td>
</tr>
<tr>
<td>d. Commitment</td>
<td>1</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
<td>21</td>
<td>16%</td>
<td>102</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
<td>36</td>
<td>27%</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0</td>
<td>1%</td>
<td>1%</td>
<td>32</td>
<td>24%</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0</td>
<td>6%</td>
<td>4%</td>
<td>41</td>
<td>30%</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0</td>
<td>11%</td>
<td>8%</td>
<td>56</td>
<td>41%</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0</td>
<td>11%</td>
<td>8%</td>
<td>59</td>
<td>44%</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>0</td>
<td>23%</td>
<td>17%</td>
<td>61</td>
<td>45%</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>1</td>
<td>15%</td>
<td>11%</td>
<td>47</td>
<td>35%</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>0</td>
<td>6%</td>
<td>4%</td>
<td>34</td>
<td>25%</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>0</td>
<td>8%</td>
<td>6%</td>
<td>29</td>
<td>21%</td>
<td>77</td>
</tr>
<tr>
<td>Mean Indicator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.825</td>
</tr>
<tr>
<td>Mean Variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.874</td>
</tr>
</tbody>
</table>

Appendix 2 – Statistics description of the level of adoption of innovation (Y)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Item</th>
<th>VNA</th>
<th>NA</th>
<th>FA</th>
<th>A</th>
<th>VA</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Basic Technological Components</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Mean Indicator</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0.6</td>
</tr>
<tr>
<td>b. Selected Technological Components</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>0</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Mean Indicator</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>1.0</td>
</tr>
</tbody>
</table>


REFERENCES


PLANTING OF RAMIN (GONYSTYLUS BANCANUS KURZ) WILDING IN PEAT SWAMP THICKET OF CENTRAL KALIMANTAN

Rahmawati Reni, Lecturer
Department of Forestry, Faculty of Agriculture, University of Palangka Raya, Indonesia
E-mail: renirahmawati@for.upr.co.id

ABSTRACT
The purpose of this study was to determine the effect of planting row with different widths on the growth of Ramin seedlings planted in the area of peat swamp thicket. The research design used was Randomized Block Design (RBD) with 3 treatments, namely L0 = planting in a row without a clearance; L1 = planting in a row with a clearance of 1 m width; L3 = planting in a row with a clearance of 3 m width each of 3 plots (plot size 30 x 30 m) with a plant spacing of 5 x 5 m, so that the total number of seeds equal to 324 seeds. The variables measured and observed were the success / percentage of life of Ramin plants, percentage of bud growth and relative growth rate. Observations and measurements are carried out every 2 (two) weeks. The success of the plant life was 72,5%. The success of bud growth 34,9% and a relatively high growth rate of 11,1%. The bud growth and the relatively high growth rate of the Ramin plant in the peat swamp thicket for six months resulted in the highest growth in the treatment of Ramin planting in the row without clearance compared with planting in the row with the clearance of 1 and 3 meters width.

KEY WORDS
Peat swamp thicket, row, clearance.

Ramin trees thrive in peat swamp natural forests on Sumatra Island, Karimata Strait Islands, and Kalimantan. Ramin wood has high economic value and is categorized as beautiful wood. High selling prices and large market needs for this type make exploitation activities out of control in natural forests (Samojlik et al., 2019; Sen & Pattanaik, 2019; Nuță, 2019; Mcelwee, 2008; Lambin & Meyfroidt, 2011). The government's effort in conservation is to include Ramin in Appendix III of CITE (Convention International Trade Endangered Species of Wild Fauna and Flora) (CITES) Appendix II, in 1994 as an endangered tree. Ramin cultivation has problems, including the recalcitrant seeds, erratic fruiting season, the success rate of growing saplings is still very low and the regeneration process is slow (Bismark et al., 2006; Morrogh-Bernard et al., 2003; Supriana et al., 1978; Van der Meer et al., 2008; Yule, 2010; Smulders et al., 2008; Chua, 2008; Lescuyer et al., 2019; Ogoti, 2019).

Wahyuddiningsih & Rahmawati (2005), Rotinsulu et al. (2007), that various efforts have been made to increase the potential of ramin in peat swamp forests namely by maintaining existing ramin saplings and ramin cultivation which can grow as well as natural ramin growth in peat swamp forests. The information on the technique of ramin cultivation has been limited, especially for enrichment activities in regenerated empty spaces, how the proper plant techniques and maintenance so that they can spur the growth of seeds in nature. The general growth stimulation carried out in silviculture is maintenance with clearance.

Based on this, it is necessary to strive for planting ramin seedlings in secondary forests/peat swamp thicket area with the hope of increasing the productivity of peat swamp forests in order to meet the needs of ramin wood by making ramin plant forest.

METHODS OF RESEARCH

The study was conducted in the peat swamp thicket area of Taruna Village, Pulang Pisau Regency, Central Kalimantan Province, for 10 (ten) months, starting from June 2014 to March 2015.
The material used in the research is the seed of Ramin (Gonystylus bancanus Kurtz) derived from wilding which had been adapted in the nursery for 3 months as many as 400 seeds. The tools used among other sarlon, polybag, measuring ruler, plastic rope, compass, machete, label paper, hoes, carpentry tools, stationery, etc.

The experimental design used was a Randomized Block Design (RBD) with 3 treatments, each with 3 groups/plots (plot size 30 x 30 m) with a plant spacing of 5 x 5 m, so that the total number of seeds equal to 324 seeds.

The treatment of this study are:
- **L0** = planting in a row without clearance;
- **L1** = planting in a row with a clearance of 1 m width;
- **L3** = planting in a row with a clearance of 3 m width.

The variables measured and observed were the success/percentage of life of Ramin plants, percentage of bud growth and relative growth rate.

The procedure/stage of this research are:
- Preparation of Ramin Seeds. Ramin seeds come from wilding that has been adapted in nurseries for 3 months with criteria for the seedling height about 20 - 60 cm and have good growth.
- Making the Research Plot. The research plot was made in peat swamp thicket with the size 30 m x 30 m as many as 9 plots with a distance between plots of 2.5 m.
- Making the Planting Row. Make the planting row as wide as 1 m and 3 m with the direction of East-West. Planting row must be completely open so that light can enter optimally with a distance between the axes of the planting row equal to 5 m.
- Installation of Ajir and Planting Holes. Ajir is made of wood with a length of approximately 1 m and the tip is given a red mark. Ajir is installed in planting row with a distance of 5 m x 5 m. On the side of ajir, a planting hole is made and left for 1 week before planting activities are carried out.
- Planting. The planting trial was carried out on August 15th, 2014 - February 15th, 2015 (for 6 months). Observations and measurements are carried out every 2 weeks.
- Ramin Seedling Maintenance. Conduct weeding/clearance activities towards weed plants whose its shade canopy which carried out every 2 weeks.

**RESULTS AND DISCUSSION**

**Success of Life and Buds Growing of Ramin Plants.** Based on the results of measurements and observations of Ramin plants in peat swamp thicket for 6 (six) months, the success/percentage of life and growth of Ramin bud presented in Table 1 below.

<table>
<thead>
<tr>
<th>Clearance Width</th>
<th>Plot</th>
<th>Percentage</th>
<th>Average %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Life %</td>
<td>Bud %</td>
</tr>
<tr>
<td>0 meter</td>
<td>1</td>
<td>30</td>
<td>83,3</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>28</td>
<td>77,8</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>29</td>
<td>80,6</td>
</tr>
<tr>
<td>1 meter</td>
<td>1</td>
<td>25</td>
<td>69,4</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>27</td>
<td>75,0</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>26</td>
<td>72,2</td>
</tr>
<tr>
<td>3 meter</td>
<td>1</td>
<td>21</td>
<td>58,3</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>25</td>
<td>69,4</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>24</td>
<td>66,7</td>
</tr>
</tbody>
</table>

Based on Table 1 the percentage of Ramin plant life for 6 months is only 72.5%. The causes of death are thought to be related to environmental factors, planting techniques and seeds used. Some field conditions are inundated so that it can cause oxygen deficiency which can damage root development, namely the occurrence of decay in the roots causing death.
The percentage of the bud growth of Ramin plants in the thicket of peat swamps is decreasing with increasing width of the planting row in the thicket which is 1 meter high with an average seedling height of only 30 cm. With the increase in width of the row, the higher the intensity of the light received by the seed. High light intensity is good for root growth rather than bud growth. According to Soekotjo (1976), Totland (1999), Shah al. (2011), Vasseur et al. (2011), McDowell et al. (2008), Hatfield & Prueger (2015), Zandalinas et al. (2018), Jabran & Doğan (2018), high intensity causes an increase in leaf temperature which has a negative effect on plants, among others, the decline of photosynthesis, excessive transpiration so that the stem becomes shorter, leaves are thicker and smaller, and the occurrence of growth decreases.

Relative Growth Rate of Ramin Plants. Relative Growth Rate based on measurement results of height increment and the number of buds are presented in the following Tables 2 and 3.

Table 2 – The results of variance of relative high growth and the number of buds of Ramin plants in peat swamp thicket for 6 months

<table>
<thead>
<tr>
<th>Source of Variability</th>
<th>High Growth</th>
<th>Number of Bud</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planting without clearance</td>
<td>Very significant effect</td>
<td>No effect</td>
</tr>
<tr>
<td>Planting with 1 m clearance</td>
<td>No effect</td>
<td>No effect</td>
</tr>
<tr>
<td>Planting with 3 m clearance</td>
<td>No effect</td>
<td>No effect</td>
</tr>
</tbody>
</table>

Table 3 – Effect of Ramin planting on relative high increment in peat swamp thicket for 6 months

<table>
<thead>
<tr>
<th>Source of Variability</th>
<th>Relative High Increment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planting in a row without clearance</td>
<td>11.1 ^a</td>
</tr>
<tr>
<td>planting in a row with a clearance of 1 m</td>
<td>4.8 ^b</td>
</tr>
<tr>
<td>planting in a row with a clearance of 3 m width</td>
<td>4.7 ^b</td>
</tr>
</tbody>
</table>

Notes: Numbers followed by the same letter in the same column are not significantly different at 5% level of Duncan test.

Statistically there is a very significant effect from the treatment of planting in the row without clearance which given to the increment of Ramin plant height compared to planting in a clean row 1 and 3 meters width.

By planting in an open thicket (1 m thick height) where the light is directly on the Ramin plant, while the Ramin plant with an average height of only 30 cm still requires shade. This condition can increase the transpiration rate which exceeds the adsorption capacity and affect the activity of stomata cells and fixation of CO₂ from the air, for photosynthesis process become reduced, resulting in inhibition of growth.

According to Rajan et al. (1971), Walker et al. (1996), Poorter (1999), Ludwig et al. (2004), Monsi & Saeki (2005), Mårell et al. (2018) that light is the most important factor that determines the growth and development of vegetation, plant physiological processes such as photosynthesis, respiration and transpiration (Mirecki & Teramura, 1984; Darrall, 1989, Collatz et al., 1991; Bragina et al., 2004; Lambers et al., 2008). With the difference in light intensity will also cause differences in temperature, humidity and photosynthesis and transpiration in plants. Excessive light intensity can damage photosynthetic devices, causing an increase in temperature and which has a negative effect on plants, among others, can cause a decrease in photosynthesis.

CONCLUSION AND RECOMMENDATIONS

Based on the results of the study it can be concluded that the success of Ramin plants in the peat swamp thicket is included in the good criteria with a plant life percentage of 72.5%, The growth of buds and the relatively high growth rate of the Ramin plant in the peat swamp thicket for six months resulted in the highest growth in the treatment of Ramin planting in the row without clearance compared to planting in the row with a clearance of 1 and 3 meters width.
This research recommends the need for light shade on seeds and Ramin planting land to maintain moisture, because Ramin is very susceptible to high temperatures and land drought, need to be considered when planting should be conducted at the beginning of the rainy season as well as at the time of clearance should not be done in excess, because it can cause wilt/death of plants, in addition, further research needs to be done for a longer time, as information on silvicultural techniques in the field.

REFERENCES

THE EFFECT OF MAIN CANALS ON CO2 EMISSIONS IN PALM OIL PLANTATIONS AT PEATLAND, CENTRAL KALIMANTAN OF INDONESIA

Darung Untung\textsuperscript{1,2}, Soemarno\textsuperscript{3}, Dohong Salampak\textsuperscript{1}, Prayogo Cahyo\textsuperscript{3}
University of Palangka Raya &
Postgraduate Program, Faculty of Agriculture, University of Brawijaya
Faculty of Agriculture, University of Brawijaya, Malang, Indonesia

*E-mail: untdar@yahoo.com

ABSTRACT
The making of main canals in oil palm plantation areas, especially on peatlands, will affect changes in the physical, chemical and biological properties of peatlands, will affect the process of oxidation and reduction of peatland which affects the regulation of changes in gas emissions, especially the concentration of gases such as: carbon dioxide (CO\textsubscript{2}), nitrous oxide (N\textsubscript{2}O), methane (CH\textsubscript{4}). The research objective was to determine the effect of the making of main canals on the rate of CO\textsubscript{2} emissions from peat soil surface for each difference in the measurement distance from the drainage channel (25, 50 and 100) m in the block of oil palm plant age (3, 4, 5 and 6) years after planting. The average rate of emissions in Palm Oil Plants Age 3 Years after Planting at a distance of 25 m equal to 147.87 mg C m\textsuperscript{2} Hour\textsuperscript{1}, the distance of 50 m is 156.17 mg C m\textsuperscript{2} Hour\textsuperscript{1} and a distance of 100 m amounted to 148.01 mg C m\textsuperscript{2} Hour\textsuperscript{1}, Palm Oil Plants Age 4 Years after Planting at a distance of 25 m equal to 247.10 mg C m\textsuperscript{2} Hour\textsuperscript{1}, the distance of 50 m is 248.90 mg C m\textsuperscript{2} Hour\textsuperscript{1} and a distance of 100 m amounted to 257.10 mg C m\textsuperscript{2} Hour\textsuperscript{1}, Palm Oil Plants Age 5 Years after Planting at a distance of 25 m equal to 147, 87 mg C m\textsuperscript{2} Hour\textsuperscript{1}, the distance of 50 m is 156, 17 mg C m\textsuperscript{2} Hour\textsuperscript{1} and a distance of 100 m amounted to 148, 01mg C m\textsuperscript{2} Hour\textsuperscript{1}. Palm Oil Plants Age 6 Years after Planting at a distance of 25 m equal to 329, 95 mg C m\textsuperscript{2} Hour\textsuperscript{1}, the distance of 50 m is 335, 08 mg C m\textsuperscript{2} Hour\textsuperscript{1} and a distance of 100 m amounted to 347, 22 mg C m\textsuperscript{2} Hour\textsuperscript{1}. The effect of distance from canal main on CO\textsubscript{2} emissions does not significantly affect changes in CO\textsubscript{2} emissions in the block of oil palm plant age (3, 4, 5 and 6) years after planting, but the farther away from main canals, CO\textsubscript{2} emissions are increasing.

KEY WORDS
Peatlands, canals, CO\textsubscript{2} emissions, palm oil.

The current environmental problem that becomes the concern to the international community is the phenomenon of climate change, namely the changing physical conditions of the Earth's atmosphere among other temperature and rainfall distribution, which have a wide impact on various sectors of human life. Global climate change occurs because of an increase in gas concentration such as: carbon dioxide (CO\textsubscript{2}), nitrous oxide (N\textsubscript{2}O), methane (CH\textsubscript{4}) and hydrocarbons such as (CFCs) in the atmosphere of the earth, which is called the greenhouse effect or greenhouse gases (Batjes and Bridges, 1992).

Along with the issue of global climate change on earth caused by increasing concentrations of greenhouse gases, one of which occurs due to unwise use of forests and peatlands, causing organic matter in peat to decompose aerobically or anaerobically, so the three gases above potentially release into the atmosphere (Jauhiainen et al, 2005). Hooijer et al, (2010) say decomposition on damaged peatlands in Indonesia is estimated to emit CO\textsubscript{2} emissions of 632 Mton/year (range 355-874 Mton/year) and are likely to increase every year, unless peatland use practices change.

According to Page et al, (2008), tropical peat swamp forest ecosystem is the most efficient place to capture and store carbon (C) reserves, because in this ecosystem carbon is stored in the body of plants that are still alive (biomass) and on dead body parts of plants, whether they are still standing or fallen, including fallen branches and leaves.
The ecological function of tropical peatlands is as a storehouse of carbon, carbon balance, sediment retention, nutrient detention, and micro-climate stability (Maltby, 1997; Rieley et al, 2008). Peatlands are a place for carbon accumulation (carbon reservoir or carbon storage). The release of CO₂ into the air from reclaimed natural peatlands for agricultural activities is a process of oxidation and reduction of organic matter. In a reductive environment, the rate of decomposition of peat is very slow and many toxic organic acids and methane (CH₄) are produced, whereas in the oxidative state the release of C is increased more especially in the form of CO₂. The type of land use affects the ability of soil to store CO₂. This type of land use plays a very important role in controlling CO₂ flux in the atmosphere (Jauhiainen et al, 2005).

The opening of peat swamp land for agriculture and plantations is always followed by the making of deep and wide main (canals), which will cause damage to the hydrological system due to oxidation of organic matter and subsidence of the peat surface (Wosten et al, 1997, Furukawa et al, 2005), further in the area where the tropical peat area has been drained it will cause sudden and permanent changes to the carbon ecosystem balance (Page et al. 2002, Canadell et al, 2007, Hirano et al, 2007).

The making of main canals in oil palm plantation areas, especially on peatlands, will affect the high-low level of the groundwater. The high and low of groundwater level will affect the oxidation and reduction process on peat so it affects the regulation of CO₂ gas emissions.

The aim of the study was to determine the effect of the making of main canals on the rate of CO₂ emissions from peat soil surface for each difference in measurement distance from the drainage channel (25, 50 and 100) m.

**MATERIALS AND METHOD OF RESEARCH**

This research was carried out in oil palm plantation companies on peat land, Kota Besi sub-district, East Kotawaringin Regency, Central Kalimantan Province, Indonesia, which was held from November 2016 to October 2017. Field surveys at company sites on the plots of oil palm plants with 3 years of planting age (S:02° 26' 20.45", E:112° 54' 03.70" ), oil palm plants 4 years planting age (S:02° 24' 07.76", E:112° 59' 43.47"), oil palm plants with 5 years planting age (S:02° 26' 14.76", E:112° 54' 08.72"), and oil palm plants with 6 years planting age (S:02° 26' 22.11", E:112° 54' 05.23"). Measurement of CO₂ emissions for each oil palm plot from the main canals edge (25, 50 and 100) m, (Figure 1).

Figure 1 – Outline of CO₂ emission monitoring location at average distance in the block of oil palm plant age (3, 4, 5 and 6) years after planting

![Figure 2 – Method of Chamber oven and close (Toma and Hatano, 2007)](image)

Statistical analysis using a randomized block design with 3 replications, and 4 treatments namely the use of conservation forest land, grass land and oil palm plants with planting age (3, 4, 5 and 6 years). Analysis data was conducted using Genstat 18 Statistic program and Microsoft Office Excel program 2010.

**RESULTS OF STUDY**

The results of the effect of differences in the distance of measurement from the edge of the drainage channel to the average CO₂ emissions in the block of oil palm plant age (3, 4.5 and 6) years after planting, are shown in Figures below.

Figure 3 shows the average emission rate at a distance of 25 m equal to 147.87 mg C m⁻² Hour⁻¹, the distance of 50 m is 156.17 mg C m⁻² Hour⁻¹ and a distance of 100 m amounted to 148.01 mg C m⁻² Hour⁻¹ in Plots Location of Palm Oil Plant Age 3 Years after Planting.
Figure 3 – The pattern of CO$_2$ emissions at a distance of 25, 50 and 100 m in the Plots Location of Palm Oil Plant Age 3 years after planting

Figure 4 – The pattern of CO$_2$ emissions at a distance of 25, 50 and 100 m in the Plots Location of Palm Oil Plant Age 4 years after planting

Figure 4 shows the average emission rate at a distance of 25 m at 247.10 mg C m$^{-2}$ Hour$^{-1}$, the distance of 50 m is 248.90 mg C m$^{-2}$ Hour$^{-1}$ and a distance of 100 m amounted to 257.10 mg C m$^{-2}$ Hour$^{-1}$ in Plots Location of Palm Oil Plant Age 4 Years after Planting.

Figure 5 – The pattern of CO$_2$ emissions at a distance of 25, 50 and 100 m in the Plots Location of Palm Oil Plant Age 5 years after planting

Figure 5, Shows the average emission rate at a distance of 25 m equal to 147.87 mg C m$^{-2}$ Hour$^{-1}$, the distance of 50 m is 156.17 mg C m$^{-2}$ Hour$^{-1}$ and a distance of 100 m amounted to 148.01 mg C m$^{-2}$ Hour$^{-1}$ in Plots Location of Palm Oil Plant Age 5 Years after Planting.
Figure 6 – The pattern of CO₂ emissions at a distance of 25, 50 and 100 m in the Plots Location of Palm Oil Plant Age 6 years after planting

Figure 6 shows the average emission rate at a distance of 25 m equal to 329.95 mg C m⁻² Hour⁻¹, the distance of 50 m is 335.08 mg C m⁻² Hour⁻¹ and a distance of 100 m amounted to 347.22 mg C m⁻² Hour⁻¹ in Plots Location of Palm Oil Plant Age 6 Years after Planting. The results of the variance analysis showed that there was no interaction of treatment on the CO₂ emissions at the error level of 5% (P>0.05), but there is a major influence, namely, the age of oil palm plants is significantly different on the CO₂ emissions, but the effect of the distance of measurement from the drainage channel is not significantly different on the CO₂ emissions shown in Appendix Table 8. Effect of Palm Oil Plant Age and Distance on the Average of CO₂ Emissions can be seen in Table 1.

Table 1 – Effect of Palm Oil Plant Age and Distance on the Average of CO₂ Emissions

<table>
<thead>
<tr>
<th>Treatment</th>
<th>CO₂ (mg C m⁻² Hour⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 years palm oil plant</td>
<td>150.7 a</td>
</tr>
<tr>
<td>4 years palm oil plant</td>
<td>251.0 b</td>
</tr>
<tr>
<td>5 years palm oil plant</td>
<td>307.8 c</td>
</tr>
<tr>
<td>6 years palm oil plant</td>
<td>337.4 d</td>
</tr>
<tr>
<td>Distance from canal main</td>
<td></td>
</tr>
<tr>
<td>25 meter</td>
<td>259.7 a</td>
</tr>
<tr>
<td>50 meter</td>
<td>260.9 a</td>
</tr>
<tr>
<td>100 meter</td>
<td>264.7 a</td>
</tr>
</tbody>
</table>

Note: Numbers accompanied by the same letter on the same row and column are not significantly different from Duncan's test 5%.

Table 1, shows that the average of CO₂ emissions according to the age of oil palm plants and the distance of measurement from the edge of the drainage canal on the 6 years oil palm plants is higher and significantly different from the age of other oil palm plants with an average of CO₂ emission equal to 337.4 mg C m⁻² Hour⁻¹ while the lowest average of CO₂ was found in the age of 3 years of oil palm plants amounted to 150.7 mg C m⁻² Hour⁻¹.

The average of CO₂ emissions based on distance indicate a distance of 100 m with the higher average of CO₂ namely 264, 7 150, 7 mg C m⁻² Hour⁻¹ but not significantly different from the distance of 25 m and 50 m. Variations in the value of CO₂ emissions according to distance indicate that the farther away from the canal channel, the CO₂ increases.

DISCUSSION OF RESULTS

The difference in the average pattern of CO₂ emissions in the area of oil palm plantations is thought to be influenced by changes in environmental factors due to the conversion of peatlands into oil palm plantations. Some researchers say that the factors that affect the high and low average of CO₂ emissions that released to the atmosphere are environmental factors, especially groundwater, soil temperature and soil moisture. This is in accordance, that the average value of CO₂ emissions released by peatlands is influenced by environmental factors, including groundwater depth, air temperature, soil temperature, peat properties such as peat pH, CEC, C-organic content and microorganisms. Vegetation type (land cover / canopy) will affect the average temperature under the canopy which will automatically affect CO₂ emissions in different vegetation types.

Darung et al. (2018), Changing of the land use conversion of tropical peat land for oil palm plantation activities plays a very important role in the pattern of changes in the rate of emissions from the surface of peatlands, controlling the rate of CO₂ emissions in the atmosphere, means controlling global warming. Changes in peat land use in oil palm plantations, the findings obtained the rate of CO₂ emissions vary widely depending on changes in vegetation types.

Based on the results of the analysis of variance, there is a major influence, namely, the age of oil palm plants is significantly different on the CO₂ emissions, but the influence of the
measurement distance from the drainage channel is not significantly different on the CO$_2$ emissions. The average of CO$_2$ emissions according to the age of oil palm plants and the measurement distance from the edge of the drainage canal in 6 years oil palm plants is higher and significantly different from the age of other oil palm plants. The average of CO$_2$ emission in 6 years palm oil plants is 337.4 m C m$^{-2}$ Hour$^{-1}$ then a 5 years oil palm plant equal to 307.8 mg C m$^{-2}$ Hour$^{-1}$, 4 years oil palm plantations amounting to 251.0 mg C m$^{-2}$ Hour$^{-1}$. The lowest oil palm plants found at the age of 3 years for oil palm plants equal to 150, 7 mg C m$^{-2}$ Hour$^{-1}$, while the average of CO$_2$ emissions based on distance show a distance of 100 m with the higher average CO$_2$ namely 264, 7 150, 7 mg C m$^{-2}$ Hour$^{-1}$ but not significantly different from the distance of 25 m and 50 m. Variation in the value of CO$_2$ emissions according to the distance measurement of CO$_2$ emissions shows that the farther away from the canal channel then CO$_2$ increases to a distance of 100 m from the drainage channel.

The results of measurements on CO$_2$ emissions released in the area of oil palm plantations on peatlands show that there are differences where the older the plant ages, the greater the CO$_2$ emissions released into the atmosphere. According to Melling et al.(2005), that the differences in the age of oil palm plants have an important role in the value of CO$_2$ emissions on peatlands. Mature oil palm plants have more plant roots (rhizosphere) compared to young plants and simultaneously that the microbial community of the rhizosphere region is higher than non rhizosphere so that in addition to plant root respiration, microbial activity is possible to contribute a number of emissions around plant roots so that the CO$_2$ emissions produced are also higher.

The part of the plant that has the most role in the respiration of plant roots is the root area. The root area as the rhizosphere is a place where concentrated root hairs which play a role in plant root respiration. In oil palm plants with the age of 6 years have more rhizosphere compared to the age of 3 years. The process of root respiration of oil palm plants is the second largest emitter after the process of decomposition by microbes on peatlands (Melling et al.2005).

This is in line with the opinion from Ekberg et al.(2007), that the process of respiration produced by plants is one of the contributors to carbon emissions in oil palm agroecosystem land. Soil respiration is a joint process between autotrophic respiration (root respiration) and heterotrophic respiration (peat decomposition), root respiration activity; is one component that plays an important role in determining the value of CO$_2$ emissions released into the atmosphere (Tian et al. 2010).

Main canals in oil palm agroecosystems are one of the important factors in the process of carbon emissions. The research results showed variations in the value of CO$_2$ emissions according to the distance of measurements from the drainage channel. At a distance of 25 m from the drainage channel the CO$_2$ emissions equal to 259.7 mg C m$^{-2}$ Hour$^{-1}$ at groundwater level of 33.24 cm, measurement distance of 50 m from the drainage channel the CO$_2$ emissions equal to 260.9 mg C m$^{-2}$ Hour$^{-1}$ at groundwater level of 34.58 cm, and the measurement distance of 100 m from drainage channel the CO2 emission equal to 264.7 mg C m$^{-2}$ Hour$^{-1}$ at groundwater level of 35.42 cm, this shows that the farther away from the canal channel, then the average of CO2 emission increases, as well as the groundwater level, gets deeper to 100 m distance.

This is thought that the further away from the drainage channel there is a decrease in groundwater level causing changes in anaerobic conditions to be aerobic in the layer above the groundwater level thereby increasing O$_2$ availability and can accelerate the process of reforming organic matter further, it will further spur C-organic mineralization to produce CO$_2$ gas, so that CO$_2$ emissions increase the further from the edge of the drainage channel.

According to Hooijer et al. (2009 and 2012), fluctuations in the depth of peat soil water have a positive relationship to changes in the value of CO$_2$ emissions in the rhizosphere and non rhizosphere, n line with the findings of Hirano et al. (2014) that there is a significant relationship between groundwater level and soil CO$_2$ emissions on tropical peatland in Palangkaraya, Central Kalimantan.

Jauhiainen et al. (2012) said that if groundwater is close to the surface for a long time then heterotrophic carbon emissions will occur so rapidly along with changes in groundwater
depth, at this time there will also be a non-linear relationship between groundwater and humidity. Hirano et al. (2012) also said that the increase in carbon flow or decomposition of oxidative peat in low groundwater conditions was due to thickening of the unsaturated soil zone and the result of increased aeration.

Research by Hirano et al. (2012) suggests that the relationship of groundwater and carbon flow is a linear relationship. Jauhiainen, et al., (2012) also said, when measuring the relationship between CO$_2$ emissions and the depth of groundwater, it must be remembered that the depth of groundwater does not control the oxidation of peat. Conversely, it is used to measure moisture from peatland above groundwater, which has a direct effect on peat oxidation by affecting the availability of oxygen in porous space. Also added that on peatlands which have high groundwater depth and no good drainage control, had a strong relationship with soil moisture.

CONCLUSION

Effect of distance from canal main on CO$_2$ emissions does not significantly affect changes in CO$_2$ emissions in the blocks of oil palm plant age (3, 4, 5 and 6) years after planting, but the farther away from canal main CO$_2$ emissions are increasing.

ACKNOWLEDGEMENTS

Thank you to Professor Ryusuke Hatano (Hokkudai-Japan University), and Mr. Teguh Patriawan as President Director of the Palm Oil Plantation Company PT.Nusantara Sawit Perdana and also colleagues staff at Center for International Cooperation in Sustainable Management of Tropical Peatland (CIMTROP) Palangka Raya University for cooperation and assistance during research activities on CO$_2$ emissions from changes in conversion land use in oil palm plantations running well.

REFERENCES

THE QUALITY OF LANDRACE PIG SPERMATOZOA DURING THE COLD STORAGE PROCESS USING BTS AND CEP-3 DILUENTS ADDED 10% EGG YOLK AT TEMPERATURES OF 2-5°C

Feka Wolfhardus Vinansius, Postgraduate Student
Isnaini Nurul, Susilawati Trinil, Lecturers
Faculty of Animal Husbandry, University of Brawijaya, Malang, Indonesia
*E-mail: wolfhardusfeka@gmail.com

ABSTRACT
In East Nusa Tenggara many Landrace pigs are used to fulfill the protein needs of the community and Artificial Insemination has been used to improve the genetic quality of pigs. The objective of this study was to find out the period of cold storage on the quality of the Landrace pig spermatozoa using BTS and CEP-3 diluents and added 10% egg yolk. This research was conducted at the Laboratory of the Faculty of Agriculture of Timor University using Landrace pig spermatozoa. The research method is a laboratory experiment using 2 treatments with 10 replications, namely T1 (BTS) and T2 (CEP-3 + 10% egg yolk) which stored at refrigerator temperature of 2-5°C. The variables observed were individual motility and membrane integrity of spermatozoa. Data were analyzed using Randomized Block Design (RBD). Motility percentage using Pearson's ChiSquare with an expected value of 40 million motile sperm/ml. The results showed that the percentage of individual motility at storage period of the 3rd hour type of diluent had no significant effect (P>0.05) whereas at the storage time/period of the 6th, 9th, 24th, 48th, and 72nd hours percentage of individual motility T1 with the value of 66.5%, 61.5%, 52.5%, 42.5%, 32% significantly different (P<0.05) towards and T2 by 63%, 57.5%, 42.5%, 31.5%, 17%. The percentage of membrane integrity in this study shows that the storage period of the 3rd hours the diluent type has no effect (P>0.05) on the membrane integrity of Landrace pig spermatozoa. Meanwhile at 6th, 9th, 24th, 48th, and 72nd hours showed that the treatment of T1 with a value of 77.68%, 73.59%, 64.61%, 52.71%, and 42.18% respectively gave a significant effect (P <0.05) on T2 with a value of 75.86%, 67.73%, 57.95%, 47.09 % and 33.71% respectively. The conclusion of this study namely diluent that has a higher advantage in maintaining the quality of spermatozoa of Landrace pigs at a temperature of 2-5°C is BTS diluent which has the highest percentage of motility compared to CEP-3 diluent + 10% egg yolk. The results showed that BTS diluent can be stored for 48 hours while CEP-3 diluent +10% egg yolk can be stored for 24 hours with a minimum percentage of spermatozoa motility of 40%.

KEY WORDS
Spermatozoa, Landrace pigs, individual motility, membrane integrity, Beltsville thawing solution, CEP-3.

Pig is one of the meat producing commodities that has great potential to be developed, this is because pigs have favorable properties and capabilities among others rapid growth, high litter size and good ration efficiency (75-80%) as well as a high carcass percentage (65-80%) with the cutbacks conducted at the age of 12 months (Aberle et al. 2001).

Increased productivity of livestock in Indonesia has been carried out by applying livestock reproduction biotechnology through Artificial Insemination (AI) techniques to improve the genetic quality (Susilawati, 2013). The use of frozen Semen for certain areas experiencing problems of the limited liquid nitrogen. One alternative to overcome this obstacle is by AI using liquid Semen. Liquid Semen has many advantages such as easier manufacturing techniques and cheaper costs (Zaenuri et al., 2014). The making of liquid Semen also requires diluents that have easy and inexpensive conditions and are able to provide nutrients as an energy source for spermatozoa (Susilawati, 2011).
BTS diluent is currently the most widely used by farmers who conduct AI because of its affordable price and good results. The results of the study of Kadirvel et al. (2005) showed BTS can be used as a diluent of Semen pig with storability for 4 days in a temperature of 17°C, with motility at the 4th day observation reaching 64.43%. Another study by Kommisrud et al. (2002) stated that using BTS diluent for 6 hours of storage at a temperature of 16-18 °C showed a percentage of spermatozoa motility 79.8%.

Caudal Epididymis Plasma (CEP) is a type of diluent that is widely used in liquid semen. The ion composition and osmolarity contained in the CEP are almost the same as the composition of the seminal fluid in cauda epididymis, so that it can support the life of the spermatozoon. Indriani, Susilawati, Wahyuningsih (2013) stated that CEP-2 diluents with a mixture of 10% egg yolk were able to maintain the quality of spermatozoa to remain good, minimize damage to cell membranes and maintain motility of spermatozoa. CEP-3 diluent is a modified diluent from CEP-2 which has been carried out by Sholikah et al (2016) with the use of 0.4% albumin to replace BSA and the addition of 10% egg yolk. The use of 0.4% egg white was able to replace BSA in CEP-2 diluent for liquid Semen which stored at 3-5°C reviewed from the percentage of motility, viability and abnormalities of spermatozoa.

Based on the background and thoughts mentioned above, then this study was conducted to test individual motility and total of liquid Semen motile spermatozoa of the pig using BTS and CEP-3 diluents + 10% egg yolk that stored at temperatures of 2-5°C to find out the storage period of Landarce pig liquid Semen and can be used in the process of artificial insemination (AI).

MATERIALS AND METHODS OF RESEARCH

This research was conducted at the Laboratory of the Faculty of Agriculture, University of Timor, Subdistrict of Kota Kefamenanu, Regency of Timor Tengah Utara, East Nusa Tenggara Province from September to October 2018. The material used in this study is Semen from storage result of 3 (three) Landrace pig studs with an age of 3 years and 270 kg pig weight using dummy. Semen used in this study had mass motility criteria ++ and individual motility ≥ 70%. Egg yolks derived from the egg of fresh laying hens (egg age less than 3 days).

Semen from the storage results is tested macroscopically and microscopically. Macroscopic tests include volume, color, consistency and pH. Microscopic tests include concentration, motility, viability, abnormalities and membrane integrity of the spermatozoon.

This research method is a laboratory experiment with experimental design in this study using the Randomized Block Design (RBD) method with 2 treatments with 10 replications as a group. The treatment conducted is BTS and CEP-3 diluents + 10% egg yolk stored in a refrigerator with a temperature of 2-5°C. Observations were made after storing the 3rd, 6th, 9th, 24th, 48th and 72nd hours.

The basic diluent material used is a diluent ready to use BTS®. The making of diluents begins with weighing 5 g of BTS powder and inserted into an Erlenmeyer glass, add aquabides 100 ml then homogenize the mixture for several minutes until homogeneous, and stored at water bath at the temperature of 37°C used after the Semen has been stored.

Mixing of materials as follows: NaCl 0.887g, KCl 0.522 g, CaCl2(H2O)2 0.441 g, MgCl2(H2O)6 0.813 g, NaHCO3 0.999 g, NaH2PO4 1.104 g, KH2PO4 2.722 g, Fructose 9.91 g, Sorbitol 1 g, Tris 16.196 g, gentamicin-S 0.05 g/L, and added citric acid 8.198 g and 1.000 ml aquabidest. The finished diluent is placed in a test tube until it reaches pH 6.6. 10% egg yolk, 0.4% albumin added after the Semen is ready to be diluted.

The variables observed in this study were the quality of sperm from diluted landrace pig Semen, including:

Individual motility. Assessment of individual motility was observed by taking one drop of Semen using an ose placed on top of a glass object and closed using a glass cover then examined under a light microscope with a magnification of 400 times. Calculation is done by determining the percentage of spermatozoa that moves progressively forward in one field of view (Susilawati, 2011).
Spermatozoa Membrane Integrity. Testing of spermatozoa cell membrane integrity to see membrane status using the Hypo Osmotic Swelling (HOS) test according to Susilawati method (2011). The test was carried out by adding 0.1 ml of the Semen sample into 1 ml of the hypoosmotic solution 150 mOsmol in an eppendorf tube then incubated at 37°C for 30 minutes. After incubation, one drop is taken and placed on a glass object and then covered with a glass cover and observed using a 400 times magnification microscope. Observations were made on typical changes that occur, namely the presence of a circular swelling or tail end that identifies the integrity of the membrane plasma (Indriani et al., 2013). Calculations were performed on 200 observed spermatozoa.

Data from the results of the study were analyzed using variance analysis in Randomized Block Design (RBD) which grouped by replication (shelter/storage time). If there is a significant difference, continue with the Multiple Range Test (Duncan). Individual motility was tested by Pearson's Chi Square with an expected value of 40% to ensure that Semen was still suitable to be used for AI purposes according to Indonesian National Standard/SNI.

RESULTS AND DISCUSSION

The average value of Semen evaluation from this study can be seen in Table 1.

| Table 1 – Semen Examination Results |
| Color | Yellowish white |
| Smell | Typical |
| Consistency | Liquid |
| pH | 7.0 ± 0.0 |
| Volume (ml) | 221 ± 25.14 |
| Concentration (10^6/ml) | 188 ± 53.01 |
| Mass motility | ++ |
| Individual Motility (%) | 74 ± 2.10 |

In Table 1 shows that the results of the macroscopic examination of the average value of Landrace pig Semen volume produced by the study are 221 ± 25.14 ml per ejaculate in the range of 190-260 ml. The volume of Landrace pig Semen produced in the study shows the normal range. In line with Sumardani et al., (2008) stated that the volume of fresh Semen of pigs ranges from 150-250 ml per ejaculation. Pig Semen volume measurement is done by looking at the scale on the tubes used.

Observation of the color and smell of fresh pig Semen is carried out during the shelter/storage. The color and smell of the Landrace pig Semen from the result of the study showed that the fresh Semen of Landrace pig was yellowish white (creamy) and has typical smell. The color and smell of fresh Semen produced shows that the condition of Semen is included in the good category, not contaminated with blood, pus, urine or other contaminating substances. The degree of acidity or pH of Landrace pig Semen during the study of ten constant shelters/storage, ie an average of 7.0 ± 0.0 with liquid consistency. Fresh Semen has a pH of 7 can be said to be normal because this result is consistent with what has been said by Bearden et al (2004), Garner and Hafez (2008) that the average pH of normal Semen is 6.8-7.8.

Observation data in the study obtained the value of mass motility (mass movement) is ++. Mass motility of spermatozoa categorized into three groups namely the mass movement of spermatozoa resemble the thick clouds and fast moving (+++), spermatozoa mass movements resemble thick clouds and move rather slowly (+++) and the movement of the spermatozoa resembles thin clouds and moves slowly (+) (Richard et al., 2016). The average value of mass motility from the results of the study shows the level of activity of the movement of the spermatozoa is classified as moderate.

The microscopic test results on the quality of Landrace Pig liquid semen obtained by individual motility averages 74 ± 2.10%. The individual motility presentations of the study results were classified as normal spermatozoa motility namely 50-80% (Garner and Hafez 2008). Factors that can affect the motility of spermatozoa in pigs are age, genetics, cattle
breed, environment and feed. The percentage of motility in this study is relatively high, this is meant so that the spermatozoa used are more able to survive during the storage process. The average concentration of fresh spermatozoa obtained was 188 ± 53.01 (10^6 / ml). This result is the same as Sumardani (2008); Johnson et al. (2000); Gadea (2003); Robert (2006) namely 191.65 ± 71.1 (106/ml).

Table 2 – The percentage of Landrace pigs spermatozoa motility at the temperature of 2-5°C

<table>
<thead>
<tr>
<th>Hour</th>
<th>Treatment</th>
<th>Individual Motility (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>T1</td>
<td>69 ± 2.11</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>69 ± 2.11</td>
</tr>
<tr>
<td>6</td>
<td>T1</td>
<td>66.5 ± 3.37(^b)</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>63 ± 2.58(^a)</td>
</tr>
<tr>
<td>9</td>
<td>T1</td>
<td>61.5 ± 3.37(^b)</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>57.5 ± 2.64(^a)</td>
</tr>
<tr>
<td>24</td>
<td>T1</td>
<td>52.5 ± 2.64(^b)</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>42.5 ± 2.64(^a)</td>
</tr>
<tr>
<td>48</td>
<td>T1</td>
<td>42.5 ± 2.64(^b)</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>31.5 ± 2.42(^a)</td>
</tr>
<tr>
<td>72</td>
<td>T1</td>
<td>32 ± 3.5(^b)</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>17 ± 2.58(^a)</td>
</tr>
</tbody>
</table>

Note: 1. T1 (BTS) and T2 (CEP-3 + KT 10%); 2. Different notations in the same column show significantly different (P<0.05).

The results of the variance analysis showed that the storage period of the 3rd hours of the diluent type had no significant effect (P> 0.05) on spermatozoa motility of Landrace pigs. This is presumably because at the 3rd hour the diluent still provides the same protection towards the motility of the spermatozoa whereas at the storage time/period of the 6th, 9th, 24th, 48th and 72nd hours the percentage of individual motility T1 with the value of 66.5%, 61.5%, 52.5%, 42.5%, 32% significantly different (P<0.05) towards and T2 by 63%, 57.5%, 42.5%, 31.5%, 17%. T1 diluent (BTS) produces the highest motility of individual spermatozoa at the cold storing period at the 3rd, 9th, 24th, 48th and 72nd hours. This is because BTS diluent is more suitable in maintaining quality (individual motility, viability, normal shape and membrane integrity) of pig spermatozoa during cold storage.

The results of variance analysis show that the longer the storage time/period the percentage of motility decreases. Membrane damage can cause ATP production to stop and the spermatozoa cannot move. The decrease in the percentage of spermatozoa motility during storage is due to the reduced energy reserves of the spermatozoa to move (Nugroho et al., 2014). According to the Indonesian National Standard (SNI) No. 8034 in 2014 about pig liquid Semen, preserved pig liquid Semen must show spermatozoa motility at least 40% and movement of individual spermatozoa with a minimum score of 2 (two). Based on Table 2 above the average percentage of spermatozoa motility during the study of the use of BTS diluent during cold storage at a refrigerator temperature of 2-5°C until the 48th hour, it still has motility in the SNI standard so that it can be used for artificial insemination (> 40%). While the diluent of Tris Aminomethane + egg yolk 20% the average motility above 40% only found at the 24th hours after storage treatment.

Pearson’s Chi Square test results with an expected value of the percentage of motility equal to 40% at the 48th hours the T1 diluent was not significantly different (P> 0.05) this shows that the T1 diluent stored at the temperature of 2-5°C can still be used for AI until the 48 hours storage period. Whereas for the 24th hour storage period the T2 diluent is not significantly different (P>0.05) which stored at temperatures of 2-5°C can be used for AI until the 24th-hour storage time because the total of motile spermatozoa was not significantly different from the expected value of 40 million spermatozoa/ml.

The integrity of the plasma membrane is important for maintaining the viability of spermatozoa (Shukla, 2011). Hypo-osmotic Swelling (HOS) Test is a relatively easy method for evaluating the functional integrity of the spermatozoa membrane. Spermatozoa that have
good integrity are characterized by tails that are circular or bulging, while damaged spermatozoa are marked by a straight tail.

The average and SD values of spermatozoa membrane integrity in this study during storage at the temperature of 2-5°C can be seen in Table 3.

Table 3 – Percentage of Integrity of Landrace Pig Spermatozoa Membrane at temperatures of 2-5°C

<table>
<thead>
<tr>
<th>Hour</th>
<th>Treatment</th>
<th>Spermatozoa Membrane Integrity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>T1</td>
<td>83.58 ± 1.71</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>83.26 ± 1.71</td>
</tr>
<tr>
<td>6</td>
<td>T1</td>
<td>77.68 ± 2.09</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>75.84 ± 2.09</td>
</tr>
<tr>
<td>9</td>
<td>T1</td>
<td>73.59 ± 2.09</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>66.5 ± 2.09</td>
</tr>
<tr>
<td>24</td>
<td>T1</td>
<td>64.61 ± 2.24</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>53.85 ± 2.24</td>
</tr>
<tr>
<td>48</td>
<td>T1</td>
<td>52.71 ± 2.35</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>41.78 ± 2.35</td>
</tr>
<tr>
<td>72</td>
<td>T1</td>
<td>42.18 ± 1.79</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>30.07 ± 1.79</td>
</tr>
</tbody>
</table>

Note: 1. T1 (BTS) and T2 (CEP-3 + KT 10%); 2. Different notations in the same column show significantly different (P <0.05).

The results of the variance analysis showed that the storage period of the 3rd hours the diluent type had no effect (P> 0.05) on the membrane integrity of the Landrace pig spermatozoa. While the Duncan Test results show that the percentage of membrane integrity values of spermatozoa at the 6th, 9th, 24th, 48th, and 72nd hours shows that treatment T1 with a value of 77.68%, 73.59%, 64.61%, 52.71%, and 42.18% respectively gave a significant effect (P <0.05) on T2 with a value of 75.86%, 67.73%, 57.95%, 47.09% and 33.71% respectively. These results indicate that at storage period of the 3rd, 6th, 9th, 24th, 48th and 72nd the T1 diluent has a higher percentage value than T2 diluent.

Addition of egg yolk as extracellular cryoprotectant containing lecithin and lipoprotein can also protect the membrane of spermatozoa to prevent cold shock during cold storage (Nugroho et al., 2014).

Data analysis in the table above shows that liquid Semen will experience the decrease in the membrane integrity of spermatozoa if stored for long periods of time either in cold temperatures and room temperature. This is in accordance with the results of the study of Hiwasa et al., (2009) reported that post-thawing spermatozoa membrane integrity of the whale stored at different temperatures and different diluents will also decrease. If the plasma membrane of spermatozoa cells can be maintained its integrity, it will have a good effect on motility, life force and integrity of the spermatozoa acrosome hood.

CONCLUSION AND SUGGESTIONS

Diluents that has a higher advantage in maintaining the quality of Landrace pig liquid Semen at a temperature of 2-50°C is BTS diluent which has the highest percentage of motility compared to CEP-3 diluent + 10% egg yolk. From the results of the study show that BTS diluent can be stored for 48 hours with a higher percentage of membrane integrity whereas CEP-3 diluent + 10% egg yolk can be stored for 24 hours with a minimum percentage of spermatozoa motility of 40%. It is recommended that the use of Pig Landrace Semen for AI purposes using BTS diluent should be stored for 48 hours while the CEP-3 diluent + 10% egg yolk should be stored for 24 hours.

ACKNOWLEDGMENTS

We thank you to the management of the Laboratory of the Faculty of Agriculture, the University of Timor for supporting researchers during the research by providing research locations and materials.
REFERENCES


DOI 10.18551/rjoas.2019-04.29

ANIMAL FOOD DEMAND IN JAKARTA, INDONESIA: USING QUADRATIC ALMOST IDEAL DEMAND SYSTEM

Khoiriyah Nikmatul*
Doctoral Program of Agricultural Science, University of Brawijaya & Department of Agribusiness, University of Islam Malang, Malang, Indonesia

Anindita Ratya, Hanani Nuhfiil, Muhaimin Abdul Wahib
Faculty of Agriculture, University of Brawijaya, Malang, Indonesia

*E-mail: nikmatul@unisma.ac.id

ABSTRACT
All of the households in Jakarta are urban households, but when viewed from the income elasticity of animal food, all animal food is still a luxury item except eggs. This study aims to analyze the influence of socio-demographic variables, price, and income on animal food demand in Jakarta. The estimation of demand system using Quadratic Almost Ideal Demand System model with the application of Iterated Non-Linear Seemingly Unrelated Regression. Research data using Susenas 2016 is 4,298 households. The results showed that a 1% increase in income would increase demand for eggs, chicken, beef, fish and milk by 0.38%, 1.07%, 2.19%, 1.44%, and 1.84%. Eggs are normal goods while chicken, beef, fish, and milk are luxury items. Beef is most sensitive to income changes. Beef is a substitute for eggs and chicken. The increase in household members of 1 person decreased the consumption of beef by 0.07%. Households in Jakarta are very sensitive to changes in the price of chicken, beef, and fish. To meet protein consumption according to national standards, the stability of beef prices needs to be maintained. In Jakarta, pricing policies are more effective than income policies.

KEY WORDS
Animal food, protein, demand system, urban household.

Three provinces with the lowest share of food expenditure is Yogjakarta (43.00%), Bali (42.73%) and Jakarta (39.94%) (BPS, 2016). Monthly expenditure per Capita in Jakarta by Rp. 1,997,446,-. Percentage of Monthly average expenditure per capita in the food and non-food by Jakarta by 39.94 and 60.06%. The monthly share of food expenditure per capita in Jakarta in March 2017 by 39.94%, East Java and Bali is 50.79 and 42.73% (Suhariyanto, 2017). Monthly average expenditure per capita of food items in Jakarta for fresh fish and shrimp by 1.48 kg (Rp. 45,638), beef by 0.12 kg (Rp. 12,317), broiler and local chicken meat by 0.76 kg (Rp. 23,158), chicken eggs by 10.57 unit (Rp. 13,511), duck eggs by 0.01 unit (Rp. 23), infant formula by 0.1 kg (Rp. 8,805). Along with increasing income and public awareness of nutrition and food quality, there has been a change in consumption patterns including increased consumption of animal foods (Bharumshah & Mohamed, 1993). Furthermore, Fabiosa (2005) said that income growth would shift the consumption of high-carbohydrate staple foods into more expensive foods such as meat and milk.

The increase in income will increase the demand for animal food (Bharumshah & Mohamed, 1993, Wood, Nelson, & Nogueira, 2012). Increasing demand for Indonesian animal food in the future requires adequate, quality and safe supply readiness. It is consistent with the goal of self-sufficiency, self-reliance, sovereignty, and resilience in food development. Indonesia was targeting self-sufficiency for animal food in 2010, but until now domestic animal food availability has not been sufficient, so imports are still being carried out, except for fish whose needs are met by domestic production. Weber (2015) also explained that if only relying on domestic production, it would be difficult for Indonesia to be self-sufficient in meat. Meat imports in 2010 amounted to 28% and in 2015 imports were still
quite high at 37%. During this time the highest imports occurred in 2014, amounting to 246,509 tons. Domestic supply instability and import dependence often result in very volatile market prices.

Research on the demand for animal food using the QUAIDS approach has previously been carried out in various cities in various countries, both developed and developing countries (Elijah Obayelu, Okoruwa, & Ajani, 2009) in Nigeria, (Mittal, 2010) in India, and (Korir, Rizov, & Ruto, 2018) in Kenya. However, similar research is still rarely found especially in Jakarta. Therefore, this study wants to analyze the impact of price changes on demand for animal food in urban areas in Jakarta. Through this research we will obtain price elasticity and animal food income, whether animal food is normal or luxury goods, whether animal food is a substitute or complementary. This illustrates the consumption behavior and purchasing power of households for animal foods so that these results can be used to develop a protein fulfillment policy in Jakarta.

METHODS OF RESEARCH

Quadratic Almost Ideal Demand System. Estimating demand impact of rising food prices requires reliable price and income elasticities that could be commonly derived from utility-based demand models. The (Okrent & Alston, 2011), Linear Expenditure System (LES) and Theil (1965) Rotterdam model are among the first attempts to derive utility-based demand models. The AIDS model has been the most commonly used specification in applied demand analysis for more than two decades as it satisfies a number of desirable demand properties. Moreover, it allows a linear approximation at estimation stage and has budget shares as dependent variables and logarithm of prices and real expenditure/income as regressors. (Banks, Blundell, & Lewbel, 1997), however, observed the existence of non-linearity in the budget shares for some, if not all, commodities and subsequently introduced an extension to permit non-linear Engel Curves. They proposed a generalized Quadratic Almost Ideal System (QUAIDS) model which has budget shares that are quadratic in log total expenditure.

The AIDS as well as QUAIDS models are derived from indirect utility function (V) of the consumer given by:

$$1nV = \left(\left\{\frac{1nx - 1na(p)}{b(p)}\right\}^{-1} + \lambda(p)\right)^{-1}$$

(1)

Where x is total food expenditure, p is a vector a prices, a(p) is a function that is homogenous of degree one in prices, and b(p) and λ(p) are function that are homogenous of degree zero in prices; ln a(p) and ln b(p) are specified as translog and Cobb-Douglas equations as originally specified in Deaton and Muellbauer’s AIDS model. Note also that λ(p) is set to zero in Deaton and Muellbauer’s AIDS model.

$$1na(p) = a_0 + \sum_{i=1}^{n} a_1 1np_i + \frac{1}{2} \sum_{i=1}^{n} \sum_{j=1}^{n} \gamma_{ij} 1np_i 1np_j$$

(2)

$$b(p) = \prod_{i=1}^{n} p_i^{\beta_i}$$

(3)

$$\lambda(p) = \sum_{i=1}^{n} \lambda_i 1np_i$$

(4)

Where = 1, ..., n represent commodities.

After application of the Roy’s identity to equation [1], the QUAIDS expressed in budget shares form is given by (Banks, et al., 1997):

$$w_i = a_1 + \sum_{j=1}^{n} \gamma_{ij} 1np_j + \beta_i 1n \left(\frac{x}{a(p)}\right) + \lambda_i \left[1n \left(\frac{x}{a(p)}\right)\right]^2 + \epsilon_i, \ i = 1, ..., n$$

(5)

Where $w_i$ is budget share for good i, $a_1$, $\gamma_{ij}$ and $\beta_i$ are the parameters to be estimated, $\epsilon_i$ is error term.
The demand theory requires that the above system to be estimated under restrictions of adding up, homogeneity and symmetry.

The adding up is satisfied if \(\sum w = 1\) for all \(x\) and \(p\) which requires.

\[
\begin{align*}
\sum_{i=1}^{n} \alpha_i &= 1, \sum_{i=1}^{n} \beta_i = 0, \sum_{i=1}^{n} \gamma_{ij} = 0, \sum_{i=1}^{n} \lambda_i = 0 \quad \text{(Adding-up)} \\
\sum_{j=1}^{p} \beta_j &= 0 \quad \text{(Homogeneity)} \\
\gamma_{ij} &= \gamma_{ij} \quad \text{(Slutsky symmetry)}
\end{align*}
\]

(6)

(7)

(8)

These conditions are satisfied by dropping one of the \(n\) demand equations from the system and recovering parameters of the omitted equations from the estimated equations. Household demand for animal food consumption depends not only on their income and product prices but also on household preferences as well as socio-demographic characteristics (Banks, et al., 1997, Poi, 2012). Household demographic factors can be incorporated (in the demand model) using demographic transition method (Pollak and Wales, 1981). The QUAIDS can then be modeled after specifying the constant terms, \(x\), \(\alpha_1\), as follows:

\[
\alpha_i = \delta_i + \sum_{j=1}^{k} \delta_{ij} D_j, \& \sum_{j=1}^{k} \delta_{ij} = 0 \quad i = 1, ..., n
\]

(9)

Where \(\delta_i\) and \(\delta_{ij}\)'s are parameters to be estimated and \(D_j\) are demographic attributes including household size. In the letter approaches, zero consumption is modeled in the following system of demand equation with limited dependent variables.

\[
w_i = f(x_i, u_i) + u_i d_i = z_i \theta_i + v_i,
\]

(10)

Where is budget share of good \(i\) (as specified above) and \(d_i\) is a binary outcomes that take one if household consumes food item of the considers aggregate, and zero otherwise, and \(w_i\) and \(d_i\) are the corresponding unobserved (latent) variables, \(x_i\) are household expenditure (income) and prices and \(z_i\) are household demographic and related variables; \(u_i\) and \(\theta_i\) vectors of parameters to be estimated \(u_i\) and \(v_i\) are the random errors.

Assuming error terms \((u_i\) and \(v_i)\) have bivariate normal distribution with \(\text{cov}(u_i, v_i) = 0\), for each commodity, Shonkwiller and Yen (1999) correct for inconsistency in the demand system by defining the second-stage regression as;

\[
w_i = \phi(z_i \theta_i) f(x_i, u_i) + \delta_i \phi(z_i \theta_i) + e_i
\]

(11)

Where \(\phi(z_i \theta_i)\) and \(\phi(z_i \theta_i)\) are the probability density function (PDF) and the cumulative distribution function, respectively, which are obtained, in theory, from a probit model using equation (10) in the first step for each of food commodity.

The QUAIDS model for animal food demand with household demographic in the second-step in then modified as (Poi, 2012):

\[
w_i = \alpha_i \phi(z_i \theta_i) + \sum_{j=1}^{k} \gamma_{ij} 1 \!\! n p_j \phi(z_i \theta_i) + \sum_{j=1}^{k} \gamma_{ij} 1 \!\! n (\frac{x}{a(p)}) + \sum_{j=1}^{k} \gamma_{ij} 1 \!\! n (\frac{x}{a(p)}) \phi(z_i \theta_i)\left[1 + n (\frac{x}{a(p)})\right]^2
\]

(12)

In order to derive conditional expenditure on food prices elaticities, equation (12) is differentiated with respect to ln\(m\) and ln\(p\), such that:

\[
\psi_i = \frac{\partial w_i}{\partial \ln x} = \phi(z_i \theta_i)\left(\beta_i + \frac{2 \lambda_i}{b(p)}\left[1 + n (\frac{x}{a(p)})\right]\right)
\]

(13)

\[
\psi_i = \frac{\partial w_i}{\partial \ln p_j} = \phi(z_i \theta_i)\left(\gamma_{ij} - \psi_i (\alpha_j + \sum_{k=1}^{k} \gamma_{jk} 1 \!\! n p_k) - \frac{2 \lambda_i}{b(p)}\left[\gamma_{ij} + n (\frac{x}{a(p)})\right]^2\right)
\]

(14)
Where $p$ is a price index calculated as the arithmetic mean of prices for all $k$ animal food groups in the system. The conditional expenditure elasticities are then obtained by $e_i = (\psi_i / \psi^*_i) + 1$.

Marshallian (uncompensated) price elasticities are derived as $e_i^{ij} = (\psi_i / \psi^*_i) - \partial_{ij}$, where \( \partial_{ij} \) is the Kronecker delta equating one when $i=j$, and zero otherwise. Using the Slutsky equation, the conditional, Hicksian (compensated) price elasticities are given by $e_i^{ij} = (\psi_i / \psi^*_i) + \partial_{ij}$. Estimating system using Brain P Poi 2008 "demand-system estimation: update, Iterated Non-linear Seemingly Unrelated Regression (Inlsur) model" (Poi, 2012), written in STATA 14. We based on Poi's Inlsur and developed a program that has taken into account the two-stage probit model for zero consumption expenditure and household demographic.

The data used in this research is secondary data in the form of Central Bureau of Statistics of the Republic of Indonesia, March 2016. The data analyzed include socio-demographic data, household residence status, number of household member, household income, household consumption, price and total expenditure. The animal foods in this study include eggs (chicken eggs, local chicken eggs, and duck eggs), chicken (local chicken meat and chicken meat), beef, fish (fresh fish and shrimp including fish, shrimp, squid, and shellfish) as well as milk (milk powder and infant milk). The sample size is 4,298 households. Data processing proved challenging because many households do not consume animal foods, so many zero observations.

**RESULTS AND DISCUSSION**

*Parameter estimates.* Almost all parameters in the animal food demand system in Jakarta are significant at alpha 1 to 5%. The parameters of income and square of income are very significant, as well as the parameters of the number of household members are also very significant. This parameter will be used to calculate the income elasticity, its own-price elasticity, and the Marshallian and Hicksian cross price prices. Table 1 shows the parameter estimates of factors affecting animal food demand in Jakarta.

<table>
<thead>
<tr>
<th>Parameter (Coefficient and SEM)</th>
<th>Eggs (1)</th>
<th>Chicken (2)</th>
<th>Beef (3)</th>
<th>Fish (4)</th>
<th>Milk (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Constant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\alpha$</td>
<td>1.611414</td>
<td>-2.640143</td>
<td>1.453717</td>
<td>0.027303</td>
<td>0.547709</td>
</tr>
<tr>
<td></td>
<td>(0.080396)</td>
<td>(0.110112)</td>
<td>(0.096427)</td>
<td>(0.080502)</td>
<td>(0.093668)</td>
</tr>
<tr>
<td><strong>Expenditure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\beta$</td>
<td>0.192306</td>
<td>-0.543867</td>
<td>0.260958</td>
<td>-0.006042</td>
<td>0.096646</td>
</tr>
<tr>
<td></td>
<td>(0.012357)</td>
<td>(0.017106)</td>
<td>(0.016601)</td>
<td>(0.014685)</td>
<td>(0.017742)</td>
</tr>
<tr>
<td><strong>Price</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\gamma_1$</td>
<td>0.496095</td>
<td>-0.500526</td>
<td>0.135477</td>
<td>-0.043424</td>
<td>-0.087622</td>
</tr>
<tr>
<td></td>
<td>(0.016039)</td>
<td>(0.031534)</td>
<td>(0.020627)</td>
<td>(0.014526)</td>
<td>(0.017905)</td>
</tr>
<tr>
<td>$\gamma_2$</td>
<td>-0.500526</td>
<td>1.131309</td>
<td>-0.536707</td>
<td>0.114023</td>
<td>-0.208099</td>
</tr>
<tr>
<td></td>
<td>(0.031534)</td>
<td>(0.089040)</td>
<td>(0.056729)</td>
<td>(0.036292)</td>
<td>(0.046279)</td>
</tr>
<tr>
<td>$\gamma_3$</td>
<td>0.135477</td>
<td>-0.536707</td>
<td>0.233135</td>
<td>-0.009269</td>
<td>0.177364</td>
</tr>
<tr>
<td></td>
<td>(0.020627)</td>
<td>(0.056729)</td>
<td>(0.045186)</td>
<td>(0.018845)</td>
<td>(0.020366)</td>
</tr>
<tr>
<td>$\gamma_4$</td>
<td>-0.043424</td>
<td>0.114023</td>
<td>-0.009269</td>
<td>0.016307</td>
<td>0.102051</td>
</tr>
<tr>
<td></td>
<td>(0.014526)</td>
<td>(0.036292)</td>
<td>(0.018845)</td>
<td>(0.009272)</td>
<td>(0.021122)</td>
</tr>
<tr>
<td>$\gamma_5$</td>
<td>-0.087622</td>
<td>-0.208099</td>
<td>0.177364</td>
<td>0.102051</td>
<td>0.102051</td>
</tr>
<tr>
<td></td>
<td>(0.017905)</td>
<td>(0.046279)</td>
<td>(0.020366)</td>
<td>(0.021122)</td>
<td>(0.021122)</td>
</tr>
<tr>
<td><strong>Square expenditure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\lambda$</td>
<td>0.021583</td>
<td>-0.027715</td>
<td>0.009273</td>
<td>-0.001496</td>
<td>-0.001645</td>
</tr>
<tr>
<td></td>
<td>(0.000422)</td>
<td>(0.000949)</td>
<td>(0.000838)</td>
<td>(0.000678)</td>
<td>(0.000817)</td>
</tr>
<tr>
<td><strong>Demography</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\eta_{hhm_tot}$</td>
<td>0.001392</td>
<td>-0.002057</td>
<td>0.000654</td>
<td>-0.000118</td>
<td>0.000130</td>
</tr>
<tr>
<td></td>
<td>(0.000910)</td>
<td>(0.000906)</td>
<td>(0.000270)</td>
<td>(0.000168)</td>
<td>(0.000319)</td>
</tr>
<tr>
<td>$\rho_{hhm_tot}$</td>
<td>0.161776</td>
<td>0.161776</td>
<td>0.161776</td>
<td>0.161776</td>
<td>0.161776</td>
</tr>
<tr>
<td></td>
<td>(0.026703)</td>
<td>(0.026703)</td>
<td>(0.026703)</td>
<td>(0.026703)</td>
<td>(0.026703)</td>
</tr>
</tbody>
</table>

*Source: Authors’ computation from Susenas, 2016.*
Income and own-price elasticity. Table 2 present the income elasticities, uncompensated own-price elasticities, and compensated own-price elasticities. All animal foods have positive income elasticity. It is consistent with the economic theory that when income increases, households will increase consumption of animal food as a source of protein (Akaichi & Revoredo-Giha, 2014). A 1% increase in household income will increase the demand for eggs, chicken, beef, fish and milk by 0.38, 1.07, 2.19, 1.44 and 1.84% respectively. Eggs are normal items. It is indicated by the value of income elasticity of less than 1. Beef and milk are luxury items. It is indicated by the value of the elasticity of income of more than 1. Chicken meat and fish are luxury items but tend to be normal items. It is indicated by the value of income elasticity closed to 1 (Cupák, Pokrivčák, & Rizov, 2015, Bilgic & Yen, 2013).

Table 2 – Income elasticity, Marshallian and Hicksian Own-price elasticity

<table>
<thead>
<tr>
<th>Animal food groups</th>
<th>Income elasticity</th>
<th>Price elasticities</th>
<th>Number of household member</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Marshallian</td>
<td>Hicksian</td>
</tr>
<tr>
<td>Eggs</td>
<td>0.38180</td>
<td>-0.63816</td>
<td>-0.48355</td>
</tr>
<tr>
<td>(0.00812)</td>
<td>(0.03787)</td>
<td>(-0.03719)</td>
<td>(0.000910)</td>
</tr>
<tr>
<td>Chicken</td>
<td>1.07257</td>
<td>-1.64344</td>
<td>-1.29633</td>
</tr>
<tr>
<td>(0.01282)</td>
<td>(0.05539)</td>
<td>(-0.05521)</td>
<td>(0.000906)</td>
</tr>
<tr>
<td>Beef</td>
<td>2.19585</td>
<td>-2.60731</td>
<td>-2.47695</td>
</tr>
<tr>
<td>(0.04045)</td>
<td>(0.24623)</td>
<td>(-0.24644)</td>
<td>(0.000270)</td>
</tr>
<tr>
<td>Fish</td>
<td>1.44415</td>
<td>-2.48026</td>
<td>-2.40039</td>
</tr>
<tr>
<td>(0.03900)</td>
<td>(0.15617)</td>
<td>(-0.15624)</td>
<td>(0.000168)</td>
</tr>
<tr>
<td>Milk</td>
<td>1.83761</td>
<td>-1.22798</td>
<td>-0.93993</td>
</tr>
<tr>
<td>(0.02409)</td>
<td>(0.06618)</td>
<td>(-0.06641)</td>
<td>(0.000319)</td>
</tr>
</tbody>
</table>

Source: Authors’ computation from Susenas, 2016.

All animal foods have negative price elasticity both Marshallian and Hicksian. It is also in accordance with the economic theory that when there is an increase in prices, households will reduce consumption of a bundle of commodities (Matsuda, 2006). Beef is most sensitive to prices, followed by fish, chicken, fish, and milk (Table 2). Marshallian price elasticity has a greater value (in absolute terms) compared to Hicksian elasticity. It is because the Marshallian price elasticity contains the effect of changes in prices and income, while the elasticity of Hicksian prices only contains the effect of price changes (Demeke & Rashid, 2012, (Weber, 2015).

Demographic effects. The household member includes each of the persons who form household regardless of whether he or she is present or temporarily absent at the date of enumeration. However, a household member who on a journey for six months or longer, or less than six months but intended to move away, is not regarded as a household member (Bellemare, Barrett, & Just, 2013). The number of household members (HH size) influences the demand for household animal food in Jakarta statistically high significance at the 1% level. HH size has a positive relationship with the animal food demand for eggs, beef, and milk, but a negative relationship with chicken and fish. The increase in the number of household members one person will reduce the consumption of chicken and milk meat by 0.09% and 0.017% (Table 2).

Cross-price elasticity. Table 3 shows cross-price elasticity between household animal foods in Jakarta. If the relationship between animal food is positive means, there is a substitution relationship, and if it is negative, then there is a complementary relationship (Matsuda, 2006)(Mittal, 2010), Korir, Rizov, & Ruto, 2018). Marshallian cross-price elasticity for egg groups is negative with all animal food, chicken, beef, fish and milk. It means that among all animal foods complement each other. In other words, households in Jakarta consume animal food simultaneously. If there is an increase in animal food prices, households in Jakarta will reduce consumption of eggs, chicken meat, and milk. Conversely, if there is a decline in animal food prices, households in Jakarta will increase consumption of eggs, chicken, and milk together. The increase in income followed by the decline in milk
prices will increase the demand for eggs, chicken and beef by 5.98%, 16.91%, and 0.49% respectively.

Table 3 – Cross-price elasticity of animal food demand

<table>
<thead>
<tr>
<th>Animal food groups</th>
<th>Eggs</th>
<th>Chicken</th>
<th>Beef</th>
<th>Fish</th>
<th>Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eggs</td>
<td>-0.63816</td>
<td>0.22027</td>
<td>-0.00373</td>
<td>0.00830</td>
<td>0.03152</td>
</tr>
<tr>
<td>(0.03787)</td>
<td>(0.03276)</td>
<td>(0.02416)</td>
<td>(0.01968)</td>
<td>(0.02054)</td>
<td></td>
</tr>
<tr>
<td>Chicken</td>
<td>-0.02341</td>
<td>-1.64344</td>
<td>0.27591</td>
<td>0.29199</td>
<td>0.02639</td>
</tr>
<tr>
<td>(0.04191)</td>
<td>(0.05539)</td>
<td>(0.03132)</td>
<td>(0.02569)</td>
<td>(0.03093)</td>
<td></td>
</tr>
<tr>
<td>Beef</td>
<td>-0.69261</td>
<td>1.10445</td>
<td>-2.60731</td>
<td>-0.22684</td>
<td>0.22647</td>
</tr>
<tr>
<td>(0.16866)</td>
<td>(0.17106)</td>
<td>(0.24623)</td>
<td>(0.14089)</td>
<td>(0.11884)</td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td>-0.36622</td>
<td>1.57711</td>
<td>-0.19269</td>
<td>-2.48026</td>
<td>0.01790</td>
</tr>
<tr>
<td>(0.14726)</td>
<td>(0.15083)</td>
<td>(0.15121)</td>
<td>(0.15617)</td>
<td>(0.10333)</td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>-0.49490</td>
<td>-0.21526</td>
<td>0.11668</td>
<td>-0.01615</td>
<td>-1.22798</td>
</tr>
<tr>
<td>(0.05496)</td>
<td>(0.06459)</td>
<td>(0.04550)</td>
<td>(0.03666)</td>
<td>(0.06618)</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ computation from Susenas, 2016.

CONCLUSION

This study uses the QUAIIDS model approach to see the impact of price changes on animal food demand in urban Jakarta. The number of samples is 4,298 households. The results of the study show that all animal food income elasticity in Jakarta is positive. All price elasticities are either Marshallian or Hicksian were negative. Eggs are normal goods, while chicken, beef, fish, and milk are luxury items. Eggs are substitute with chicken, beef and milk. Households in Jakarta consume animal food simultaneously because it is seen from the cross elasticity of prices that are mostly negative. If there is an increase in animal food prices, households in Jakarta will reduce consumption of eggs, chicken meat, and milk. Conversely, if there is a decline in animal food prices, households in Jakarta will increase consumption of eggs, chicken, and milk together. The increase in income followed by a decrease in milk prices will increase the demand for eggs, chicken, and beef.

ACKNOWLEDGMENTS

Acknowledgments are submitted to the Central Bureau of Statistics of the Republic of Indonesia which has served the process of the data purchasing and to the Ministry Research and Technology and Higher Education for the funds through the Doctoral Program of Doctoral Dissertation 2018.

REFERENCES

Find us on Facebook:
They didn’t have it in their time...

...imagine what you could achieve with it now

UK PubMed Central
A unique, free, information resource for biomedical and health researchers

ukpmc.ac.uk