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Working Hour Allocation Strategy in Lobster Grow-Out Farming in Lombok Island

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ABSTRACT

Indonesia has dramatically changed in respect to marine management and fisheries resources to create friendlier ecological business environment and boost economic expansion. Interpreting policies in action found difficulty to challenge due to needed to achieve dual goals of fishery production uplifting, while sustainable resource management has improved simultaneously. Lobster industry is one of the casualty bias policies when the government issued of minimum legal size of lobster regulation, wherein this regulation brought to an end the lobster grow-out activities. Those activities has proven that economic sustainability were in progress for family members in coastal communities since they did not need coast of production input for seeds, woof, and empowering families as workforce. The purpose of the study was to explain strategy used in lobster grow-out farming by empowering family to endorse family's economic sustainability. The study was conducted in Lombok Timur District, Province of Nusa Tenggara Barat by 97 respondents. Sampling technique used was non-probobility sampling method through snow ball sampling. The data collection instrument used questionnaires and they were analyzed by economic model and formulated using a simultaneous equation through two stages least square. The results concluded that the involvement of all family members in lobster grow-out farming has been unable to yield maximum result and most of them work far below their capacities.

Key words: working hour allocation strategy, lobsters grow out farming, Lombok Island.

INTRODUCTION

In 2014, Indonesia has dramatically changed in respect to marine management and fisheries resources to create friendlier ecological business environment and boost economic expansion. To get to the goals were arrange a plan strategy which consists of three pillars: sovereignty, sustainability, and prosperity as stipulated in the Strategic Plan 2015 – 2019 (Kementerian Kelautan dan Perikanan, 2015). This objective can't be achieved easily as previous policy caused marine resources are threatened and damaged by overfishing and coastal development. In addition, partially spatial management of coastal ecosystems have been exploited with limited concern for sustainability and they lead to loss in productivity and cascading effects on other parts of the ecosystems. Interpreting policies in action found difficulty to challenge due

to needed to achieve dual goals of fishery production uplifting, while sustainable resource management has improved simultaneously.

Lobster industry is one of the casualty bias policies. It has not been unregulated sector yet in Indonesia. This situation changed when Minister of Marine Affairs and Fisheries issued Minister Regulation No.1/2015 as amended by Minister Regulation No.56/2016. These regulations driven of minimum legal size stipulation harvested lobster. *Panulirus spp*. legally captured from nature with carapace length over 7 cm and the weight is more than 200 grams. Minimum legal size of lobster has hampered lobster industry sustainability, both captures and grow-out farming. This regulation is in-line with Gonzales & Taniguchi's (1995) research suggested that lobsters weight less than 100 grams should not be sold to any fishery market and should be released in their natural habitat. On the other hand, this regulation should accommodate fishery issues in term of economics as a primer tool and important use. Economics, however, will never be independent from politics and financial matters of short term urgency to transform mid- to long-term policies into immediate actions and legislation that caused damage, if not drawbacks, to fishery and fishing policies (Barreiros, 2016).

In the beginning of Minister Regulation No.1/2015 implemented on 7 January 2015, activities in lobster farming were proven has contributed for economic improvement and widely opened for people in coastal area, mainly located in Lombok Island. Unlimited demand endorsed lobster business as a profitable fishing enterprise. Increasing global demand, a high market value, and sustainability concern of wild stocks have created significant interest in spiny lobster aquaculture development (Radford & Marsden, 2005; Simon & James, 2007). Aquaculture and enhancement were come up as a commercially viable alternative to increase global supply of lobsters. Aquaculture offer tremendous economic growth opportunities to provide jobs and income for millions of coastal households and they have potential foreign revenue investments. The strong market for lobsters and farmers succeed to grow-out lobster indicated that lobster aquaculture will generate a profitable business opportunity in coastal communities where puerulus and juvenille lobsters can be found. Lobster farming was easily conducted by the relative poverty by practicing households with the subsistence nature activity and also reliance on predominantly family labor utility in various income sources and created family forming on capital.

Basically, Minister Regulation No.1/2015 is necessary. One of the reasons driven this necesscity by assumption among coastal communities that lobster were a common pool resource. In this case, earning a living was formed by the high level of uncertainty, giving rise to exploitative behavior that adversely affects to ecosystem, and promoting destructive fishing (Kusnadi 2009). Coastal management in Indonesia is being complex issue since in respect to socio-economy, environment, and technology mastery (Agunggunanto, 2011). Lobster grow-out farming is one of the solution to make economy better in coastal area because of large lands and huge of naturally puerulus. Utilized land for new coastal farming until 2014 is 413862 ha (4.95%) of the land, 8363501 (Kementerian Kelautan dan Perikanan Republik Indonesia 2015). Puerulus spreading area is consist of West Sumatera island, south of Java, Bali, and Nusa Tenggara, Sundaland, Strait of Malacca, east of Kalimantan, north of Sulawaesi, Maluku, and Papua (Kanna 2006). By this spreading, it can be ensured that there are many puerulus caused lobster fecundates growing linearly in line with carapace length (CL): *P. homarus* (CL 80–95 mm) 28000–96.000 eggs, *P. versicolor* (CL 85–100 mm) 16500–71000 eggs, *P. ornatus* (CL 85–100 mm) 47000–87000 eggs, *P. penicillatus* (CL 65–100 mm) 31000–152000 eggs, dan *P. longiceps* (CL 85–95 mm) 47000–140000 eggs. Puerulus has mortality rate of 0,01% (Junaidi, et al., 2010). By those comparative superiorities, it's better if the puerulus

maximized for economy. In fact, the implementation of minimum legal size of lobster created complicated problems to well establish production lobster center, particularly in Lombok Island, West Nusa Tenggara. The regulations inflicted frozen lobster industry entirely, both naturally catching and grow-out farming due to input factor of wild captured puerulus and juvenille lobsters that categorized as an illegal activities. Despite of continuing such activities, it has affected on inefficiency utilization resources due to a longer harvest period.

Steps to put out lobster farms would actually cause wider socio-economic problems, since family was a basic organizational unit in lobster grow-out farming. Lobster farm owners were poorly educated and they were in a subsistence condition, thus they were vulnerable to be poverty. This was one of the contributing factors caused all family members to be involved in lobster grow-out farming, include involving wives and children. The trap of impoverishment would be difficult to avoid due to fixity and rigidity of assets and those were being main reason why fishermen and farmers are trapped in poverty. Additionally, they would find difficulty in liquidating or converting their assets in the event of a change to their business condition (Smith, 1979). Changing their business model was not easy either for coastal communities in Indonesia. Generally, they prefer to wait and see new technologies effects that are introduced and their contribution on the household economy in order to minimize potential business failures, rather than seeking opportunities to generate maximum results. Business failure would threaten their families' existence. Through growing out lobster has been conducting in basic concept for intensive labor and it's not depend on technology use. So that, the purpose of this study to verify empirically weather labor sources were maximized effectively in order to assigning better strategy and having alternative family income sources.

LITERATURE REVIEW

Coastal community and lobster grow-out farming of farmer family

Fishery resource - common pool resources are inclined to be exploited by party who first in hand and they aside advantage for other party that provoked market failure potentially (Dharmawan & Daryanto, 2002). Lobster grow-out was identically satisfying daily needed for coastal community, especially fisherman and fishery farmer having own culture and unique characteristics. By this condition, it was needed to have comprehensively understanding of coastal community either as an idea, or cognitive system for way of life, social pattern reference, and medium to peruse every moment in surrounding (Keesing, 1989). Hishamunda et al. (2009) proposed that socio-economic in fishery sector activities can be scrutinized through input factors, such as: gender, workforce, income, nutrition, food safety, health, insurance, credit, human right, law, privatization, culture, global trade, policy, stakeholder, knowledge and behavior, ethic, market, and asset ownership.

Coastal communities in Indonesia are unique. Wahyudin (2003) defined coastal community as a pluralistic society who belongs to each other since they have combination characters either as urban society or rural communities affected by some reasons: environment, season, and market where they live in. living close to beach was chosen since give them easily access to do in daily activities. Kusnadi (2010) implied that coastal community in Indonesia has own construction in social culture that are affected significantly by social group existence and their sustainability in life depending on business utilization of marine resource and particular coastal. Those are formed through long evolution process affected by gender system, patron-client relationship, behavior patterns in exploiting fishery resource, and social leadership.

In coastal community, not only complemented trait of women (wives) in maintaining family life, but also it is stipulated by patron-client relationship which was a part of relation between two people mostly involving friendship instrumental in relationship construction. In one side,

patron was being a party has higher social-economy status using clout and resource to provide protection. On the other side, client was in lower status will return not only in material, but also in private service to patron as remuneration, endorsement, and assistance by asymmetry relationship (Scoot 1972).

Lobster grow-out farming in Lombok Island conducted by all family members, including children. Their involvement in growing out lobster is derived from '*ngayah'* culture, men and women farm together without paid. High collaboration of family member in lobster grow-out farming caused low rate workforce return in Lombok Island. This subsistence condition in growing out lobster was not assumed completely as an economy activity to seize an opportunity from investment, but also as an encouragement to create job vacancies for themselves. This is in line with neoclassical economy theory that workforce is as a deviced demand and induced supply workforce creation in informal sector.

Family members' involvement in lobster grow-out farming may absorb workforce, either men or women to ameliorate subsistence indirectly and distribute national income since they did not need to have formal educational requirement. Meanwhile, low educational level in Lombok Island was being hindrance input for productive age for workforce. Bappenas and JICA (2014) reported that household head whose work as fish farmers have education up to elementary school (SD) were 67,86% and junior high school were 15,31%.

Women (wife) position in lobster grow-out farming essentially may solve problems were caused by domestic function condition carried on. Timmer et. al. (1987) indicated that housewives who have children, mostly under five years old, spending their time to nurture their children and doing other housework, so, they had small time to deal both in market activities, and consumption and cost for their children. Through activating in this activities or family business allowed them to get out from poverty and assisted husband's low income to satisfy family needed which continuously increasing. Lobster grow out farming, moreover, had imbalance in total of real income which getting decrease. In this case, it was in line with fact that women' contribution to family income of low society was very high, yet they were still in poverty.

Children' contribution to lobster grow-out farming in Lombok Island can be classified as learning process in respect to skill sharing. The purpose of that was to equip new generation by practical competent needed for subsistence earning and facilitated children to integrate them into a community and transform them to be adult men or women. Activities in lobster grow out farming, however, were easy work and they related to applicable law. Indonesia has ratified ILO Convention No. 138 about minimum age limit allowing to work which has been ratified on Act No. 20 of 1999, ILO Convention No. 182 about prohibition and deletion as soon for worst profession forms for children has been ratified on Act No. 1 of 2000, so that, children participation in lobster grow-out farming practically have to accordance to children age, controlled by adult, not disrupt school hours, allow to have balance in order to play and socialize, and not dangerous for them.

Uncertainty of Fishery business theory

Theory for uncertainty in fishery business was developed by Charles (2001). He introduced that to create sustainability fishery system have to considered three key components: first, natural system is comprise of actor, (fisherman and farmer), processor, user, fishery community, social environment, economy and culture; Second, fishery management system is consist of planning, policy, development, and research in fishery.

Charles (2001), moreover, elaborated well of sustainability concept in fishery business as an obligation to have understanding in diversity and complex issues that correlate statically and dynamically among variables in fishery business creating diversity in fishery system and coming from many interests. It's very often the interest allowed conflict between interests. In addition, there were many species and among species interacted in tropical habitat, many fisherman groups and interacted among them, social structure and the effect to fishery, fishery information dynamics and dissemination, interaction dynamics between fish resource, uncertainty in each fishery component system.

Furthermore, he added that the key point to know fishery system is by understanding uncertainty of each fishery component. In this stance, it is needed because of uncertainty in fishery business, which comprise of three types, they are: random fluctuations analyzed quantitatively, uncertainty in estimation parameters and nature state analyzed quantitatively, structural uncertainty by lack of fundamental knowledge in respect to design fishery management in order to have robust result, adaptive, and precautionary.

Allocation time theory

Becker (1965) posed Time Allocation theory and laid down it as basic concept to analyze labor use in household production activities and time allocation. Household activities can be analyzed economically using the theory and it can elaborate two persons who are living in a house (having family) and each of them has utility and production function. In this case, household directly consumed commodity produced as a utility and output from household activities and produced by various input.

Furthermore, he elucidated that household are involved in production activities creating output such as food, nurturing children, and other domestic activities (Z) in a set of product and need time to do activities in household as single utility function model, which is commodity Z produced affordable goods or can be made by themselves. If Commodity Z is rendered as production factor used to create domestically, so, the activities are identical to time allocation in company labor use.

$$\text{Max } U(x, s)$$

Budgeting constraint: $I + wl = px$
Time constraint: $T = l + s$
Both constraints can be combined into income constraint:

$$FI = (I + wT) = ws + px,$$

Where *ws* is time needed to produce goods domestically, by assumption if individual are part of workforce will has payment as *W*, and *FI* and those are all of earned income by producing the goods.

MODEL CONCEPT OF RESEARCH

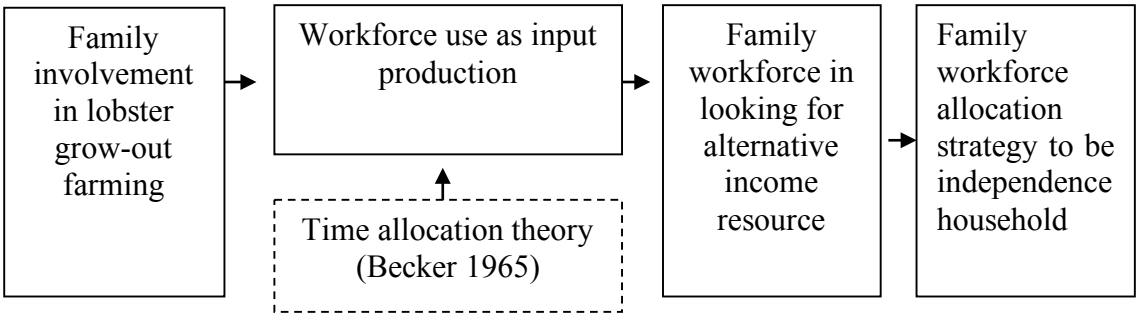

Figure 1: Model of research

RESEARCH METHODS

Population

The research population of lobster grow-out farmer was accordance to Petersen (2012) Approximately there were 1000 lobster grow-out farming businesses in Indonesia and the biggest one is located in Lombok Island. However, the total was not relevant anymore caused lobster legal minimum size has effected to lobster grow-out farming abandoned by. So that, this research was difficult to define number of samples that highlighting of observation unit characteristic. Based on the search, it was known that lobster grow-out farming still undertaken by people in Lombok Timur District, particularly in Jerowaru District, so, all population were taken in Jerowaru village and Pare Mas village.

Sampels and Sampling Techniques

Data collection in the research was conducted by case study method. Sample determination on this survey based on purposive sampling (judgmental sampling). To solve problem in sample determination number because of people abandoned the lobster grow-out farming, it used snowball sampling technique. This technique used sample which acquired through movement process from one respondent to the others to describe social pattern or a communication (sociometric) among people in a lobster grow-out community farming (Neuman 2003).

Additionally, snowball sampling technique was used in the data collection, as when the study commenced in September 2015 lobster grow-out business has started to be abandoned by the farmers as a result of the enactment of Minister Regulation No.1/2015. Data collection was conducted through two field research. The first field research was carried out on 11-13 October 2015 to identify lobster farming locations that are still in operation, through which 97 respondents were found. The second field research on 19-24 April 2016 acquired recall data from 96 people. The second research was aimed to determine whether the harvest in January 2016 was done in compliance with Minister Regulation No.1/2015, and whether June 2016 harvest was conducted in accordance with the regulation. The lack of respondent number on second field research was because of respondent being migrant workers to Malaysia.

Mathematical model

The basic problem of the study was to elucidate the following question: do labor source allocation implicated all family members in lobster grow-out farming has been used effectively in its production process? Based on the above mentioned, a set of mathematical model can be developed in the form of nihilism, and their theoretical basis. To assess the effectiveness of family member involvement in the grow-out lobster farming business, validation was first done to determine a sig value on the different levels of productivity that influenced by number

of family members involved in, including women' contribution in daily operation of lobster farming.

Determinants of female labor participation based on neoclassical economic theory suggests that a female's labor supply was a dual function of market wage offer (substitution effect) and her family welfare (income effect) which maximizes its welfare subject according to time and budget constraints. Since women dependent within the family, they must choose between work in the market, work at home and leisure to maximize a family's utility (Mincer, 1962; Backer, 1965; Gronau, 1980; Standing, 1978). Empirical studies often use a woman's market-wage offer (substitution effect), her husband's earnings and family non-earnings income (income effect), her schooling, work experience, number of children and other family background as variables to explain female labor supply.

Subsequently, by employing the theory of time allocation (Becker 1965), workforce use was analyzed with respect to household production activities and time allocation for household activities. Employing time allocation theory, household activities can be analyzed in economic terms and thus it can be explained role of the two people living in the house (family), where one has a utility function while the other undertakes a production function. In this regard, the household indirectly consume the commodity produced as a utility and output of the household, produced by various differing inputs.

Becker (1965) proved that the household is also involved in production activities and produced outputs, such as food, care for the children and other domestic undertakings within the home as a single household utility function model, where other commodities generated can be bought or manufactured by the household itself. If the other commodities are translated as production factors to support domestic productivity, such activities are taken as time allocation by workforce use for profit.

Such assumptions have evolved that time needed to manufacture goods domestically, individuals as workforce received wage, and their entire income derived from goods manufactured. Under such condition household will combine time with goods purchased at the market to produce a final commodity that can be immediately enjoyed by incorporating them into a utility function. Profit was not derived in form of utility, but in form of final goods and in production required particular technology. Thus, the household was addressed to have a particular production function represented by new commodity.

If goods produced and bought at the market, time used are used to produce a number of commodities and maximize utility function within budgetary limits bound by availability of resources possessed as a differentiator under consumption theory that will produce direct utility by consuming particular goods or services. Such conditions were occurred due to Becker (1965) view that household activities should be seen as an economic unit that concurrently undertaken two things, production and consumption. Such conditions created time decreased issues to produce goods that will reduce the time for consumption. By combining the three impediments household income accordance to time availability within household and they assessed on the basis of the applicable wage level as additional income was not derived from work.

Full income concept as developed using model thought by Sing (1986) who stated that operational income (Π) is included as a component of full income by taking into account all cost of manpower used in household business and the coasts derived from family members or outside of applicable wage level. This condition was an outcome assumption for price receiver

behavior among labor at the market, where family workforces and hired workers have perfect substitutive character. By using household income function level through selecting consumption commodity and demand for workforce input in the production and it would conform to applicable market wage. Such equation contain an endogen variable - workforce, thereby earning full income as impediment when lobster grow-out farm owners maximized its production profit function by manipulating workforce input.

In such households, income was influenced by home production activities. When factors changed, it has affected to production and can be ascertained that has affected to full income. Consequently, they might change consumption behavior in terms of demand or goods consumption, as well spare time they have. On the other hand, such conditions might change consumption behavior and it was determined by production behavior through income, while production behavior was not determined by consumption habits. It means that production decisions with regard to use of input were different from consumption decisions and those decisions related to offers of manpower. The condition would employ formulated model by Sadoulet & Janvry (1995) stated that the decision maker within household farming would concurrent combine decisions on production, consumption and manpower. Those decision types were merged into a single household problem. In this household economy model among lobster grow-out farmers, a limitation was imposed by assumption that household used one production variable only, manpower and they may produce one type of product only. The assumption came up because of lobster feed input was procured internally among lobster farmers through trash fish. To analyze working hour allocation in lobster grow-out farmers, an economic model formulated using a simultaneous equation with two stages least square (2SLS) and processed with SAS computer program through an economic developed model to analyze household working hour for lobster farmers that were divided when lobsters rose. Completely the economic developed model to analyze the household working hour allocation in lobster farming can be described as follows:

1. Model for *P. Homarus* grow out

Model for man working hours in *P. Homarus* grow-out:

$APLPi=a_0 + a_1AWLPi + a_2AALPi + a_3PTRT + a_4JKLP + a_5JBLP + \mu_1$

Model for woman working hours in *P. Homarus* grow-out:

$AWLPi = b_0 + b_1PTRT + b_2JKLP + b_3JBLP + b_4JABT + \mu_2$

Model for children working hours in *P. Homarus* grow-out:

$AALPi = c_0 + c_1PTRT + c_2JKLP + c_3JBLP + \mu_3$

Model for total working hours *P. Homarus grow-out*:

$JAKPi = APLPi + AWLPi + AALPi$

where:

APLP = Man working hours allocation in *P. Homarus* grow-out
PTRT = Total family expenditure
JKLP = Number of sea cages *P. homarus*
JBLP = Number of peureulus P. Homarus
AWLP = Woman working hours allocation in *P. Homarus* grow-out
JABT = Number of infants under 5 years old
AALP = Children working hours allocation in *P. Homarus* grow-out
JAKP = Total working hours *P. Homarus* grow-out

Model of production cost in *P. Homarus* grow-out
BPLPi = BVLPi + BTLPi

where:
BPLP = Production cost *P. Homarus* grow-out
BVLP = Variable cost on peureulus of *P. Homarus* grow-out
BTLP = Fix cost *P. Homarus* grow-out

Model of production *P. Homarus* grow out
$JPLPi = d_0 + d_1JAKPi + d_2JPKLP + d_3JKLP + d_4JBLP + \mu_4$

where:
JPLP = Total production of *P. Homarus* grow out
JAKP = Total allocation working hours of *P. Homarus* grow out
JMLP = Total feeding of *P. Homarus* grow out
JKLP = Total sea cages of *P. Homarus* grow out
JBLP = Total peureulus of *P. Homarus* grow out

Model of productivity *P. Homarus* grow out
$PULPi = e_0 + e_1JPLPi + e_2JKLP + e_3JBLP + e_4\ JAKPi + \mu_5$

where:
PULP = Productivity of *P. Homarus* grow out

2. Model for *P. Ormarus* grow out.
Model for man working hours in *P. Ornatus* grow-out:
$APLMi = e_0 + e_1PTRT + e_2JKLM + e_3JBLM + \mu_6$

Model for woman working hours in *P. Ornatus* grow-out:
$AWLMi = f_0 + f_1PTRT + f_2JKLM + f_3JBLM + f_4JABT + \mu_7$

Model for children working hours in *P. Ornarus* grow-out:
$AALMi = g_0 + g_1PTRT + g_2JKLM + g_3JBLM + \mu_8$

Model for total working hours *P. Ornatus grow-out*:
JAKMi = APLMi + AWLMi + AALMi

where:
APLM = Man working hours allocation in *P. Ornatus* grow-out
PTRT = Total family expenditure
JKLM = Number of sea cages *P. ornatus*
JBLM = Number of peureulus *P. ornatus*
AWLM = Woman working hours allocation in *P. Ornatus* grow-out
JABT = Number of infants under 5 years old
AALM = Children working hours allocation in *P. Ornatus* grow-out
JAKM = Total working hours *P. Ornatus* grow-out

Model of production cost in *P. Ornatus* grow-out
BPLMi = BVLMi + BTLMi

where:

BPLM = Production cost of *P. Ornatus* grow-out
BVLM = Variable cost of peureulus *P. ornatus* grow-out
BTLM = Fix cost of *P. Ornatus* grow-out

Model of production *P. Ornatus* grow-out
$JPLMi = h_0 + h_1JAKMi + h_2JPLM + h_3JKLM + h_4JBLM + \mu_9$

where:
JPLM = Total production of *P. ornatus*
JAKM = Total allocation working hours *P. ornatus*
JPLM = Total feed of *P. ornatus*
JKLM = Total sea cages of *P. ornatus*
JBLM = Total peureulus of *P. ornatus*

Model of productivity *P. Ornatus* grow-out
$PULMi = i_0 + i_1JPLMi + i_2JKLMi + i_3JBLMi + i_4\ JAKMi + \mu_{10}$

where:
PULM = productivity *P. Ornatus* grow-out

RESEARCH RESULT AND DISCUSSION

Description of Respondents

Respondents from Desa Jerowaru are 46 people and they are distributed into 36 men and 10 women. In addition, respondents from Desa Paremas are 50 people and they are comprised of 49 men and 1 woman. By group age distributions are youngest respondent was 19 years old while the oldest was 70 years old, and the averages age are 43 and 45 years old. Furthermore, lengths of experience in lobster grow-out farming were 1 year for the shortest and 25 years for the longest and the average experience of 5.6 years with value mode was 6 years. The maximum numbers of family member of the respondents were 8 people and the minimum number was one person, with the average number of family members were 3 people.

Lobster grow-out farmers that had low education level were 20 respondents and they had never attended formal education. 6 respondents did not complete primary school and 47 respondents completed primary school. Respondents with secondary education were 23 people by only 1 female respondent was graduated from junior high school and 6 male respondents were graduated from high school. The numbers of *keramba* (floating fish cage) in Desa Jerowaru and Paremas were 514 plots (13,878 m3). Even though transformation in lobster feed and introduction of technology had not immediately yielded the maximum result yet, it constituted a necessity to achieve business efficiency. Under such conditions, it can be ascertained that in order to lobsters meet legal minimum size better feed were needed to allow lobster grow-out farming business to be economically viable to support household needed.

Table 1. FCR, weight of lobster, and harvest time

Data	FCR		Weight of lobster (grams)		Harvest time (days)	
	P. homarus	P. ornatus	P. homarus	P. ornatus	P. homarus	P. ornatus
Minimal	1:16	1:11	150	150	104	99
Maximal	1:41	1:23	290	245	328	214
Average	1:28	1:18	185	197	210	159
Modus	1:27	1:18	160	175	104	175

Lobster grow-out farming in Lombok Island

The lobster farming unit usually consists of far extended family members or sometimes closed extended family member. An ancient labor division used in lobster grow-out was recognized in three jobs or roles: looking for lobster feed, feeding, and securing sea cage. The head of business process was a father. He had dual responsibilities in looking for lobster food and looking after lobster farming security. The other family members, spouse, and children had contribution to feed lobsters and secured sea cages when their father was looking for lobster feed. Wives and children involved in lobster grow-out farming business as workers and they were inseparable in production process. During busy periods, however, lobster farmers may ask assistance from patrons, neighbors, or other acquaintances had fields adjacent to his, on a reciprocal basis, or he may hire additional labor.

Lobster grow-out farming families were lived in terrible condition. A household farmer in fishery sector had average between 4 to 5 family members and household head usually only had elementary school education. As a result, any increased income in fish farming household used to buy basic needed and average spending increased per capita of 32.85%, which only results in proportion reduction coast for fish feed by 0.1% of 65% in 2007 to 64.9% in 2010 (Bappenas dan JICA 2014). The condition contradicted to Engel's Law, stipulated that the higher income, the lower expenditure proportion was for feed.

In Lombok Island, there were two species of lobster cultivated – *P. homarus* and *P. ornatus*. A lobster owner would usually disperse lobster larvae of two above species with ratio of 3:1. They then rose in submerged cages made of synthetic fish nets with size mesh of 15 mm. The cages were cube shaped has capacity 27 m^3 (3 x 3 x 3m), moored to a floating frame kept afloat by plastic or metal drums. The cages held 20 lobsters per cubic meters. When the lobsters weight more than 200 grams, maximum density of lobsters kept in the cages were 10 lobsters per cubic meter. The lobsters were fed by trash fish and the trash fish were caught by farmers itself. The trash fish was minced into large pieces and given it after farmer sorted to the lobsters every morning. Usually trash fish was mostly consisting of small species with a small number mollusks and crustaceans. These kinds of feed were less than idea as they adversely affected for growth rate and skin color when the lobster harvested. The price of *P. ornatus* had sharply decreased and lower than when they fetched due to their small sizes (<500 gram). Meanwhile, harvested *P.homarus* usually has weight 200 to 300 grams.

The Result of 2SLS Working Hours Allocation in *P. Homarus* Grow-out Farming

1. Man working hours allocation in P. Homarus grow-out (APLP)

APLP had positive correlated to AWLP, AALP, and PTRT. APLP was significantly affected by AWLP and PTRT. It means that AWLP and PTRT was booster of APLP. The result of parameter estimation APLP was stated in Table 16 that AWLP had significant effect to APLP was on level of 5%, AWLP had coefficient effect was 0.0072, means every AWLP increment of 1%, it would increase APLP of 0.072%. Regression coefficient sign of AWLP was in line with expectation –

positive and it indicated that aligned relationship between APLP and AWLP. PTRT had significant correlation to APLP was on level of 1% with coefficient of 0.74%. As result, every PTRT increment of 1% would work up APLP of 0.74% by ceteris paribus assumption.

Table 2. The result of APLP in Equation Parameter Estimation

Explanatory variables	Estimation Parameter	Standard Error	t Value	Pr > |t|
Intercept	-4.891650	0.798701	-6.12	<.0001
AWLP	0.071868	0.030717	2.34	0.0227
APLP	0.007733	0.024885	0.31	0.7571
PTRT	0.743580	0.058017	12.82	<.0001
F Value: 294.89		Pr > F: <,0001		
R-Square: 0.93748		Durbin-Watson: 1.761969		

2. Woman working hours allocation in P. Homarus grow-out (AWLP)

AWLP had positive correlation to PTRT and JABT. On the other hand, JBLP had negative effect to AWLP. Based on the result of AWLP data processing that AWLP was significantly affected by PTRT with p-value < 0.05, means that PTRT had significant effect to AWLP was on level of 5%. The result of parameter estimation of AWLP was stated in Table 17. The large coefficient effect of PTRT was 2.83, means that every PTRT increment of 1%, AWLP would increase of 2.83% by paribus ceteris assumption. Meanwhile, the other two variables were JBLP and JABT had not significantly effected to *P. Homarus* grow-out business. JBLP had negative correlation to AWLP.

Tabel 3. The result of AWLP in Equation Parameter Estimation

Explanatory variables	Estimation Parameter	Standard Error	t Value	Pr > |t|
Intercept	-34.083000	15.48952	-2.20	0.0317
PTRT	2.839806	1.359083	2.09	0.0410
JPLP	-0.71491	1.044504	-0.68	0.4964
JABT	0.833529	0.868529	0.96	0.3411
F Value: 6.38		Pr > F: 0.0008		
R-Square: 0.24489		Durbin-Watson: 1.198278		

3.Children working hours allocation in P. Homarus grow-out (AALP)

AALP had positive correlation to AWLP and JBLP. Based on the result of AALP data processing indicated that AWLP had significant effect to AALP was on level of 10%. The large coefficient effect of AALP was 2.48, means that every AALP increment of 1%, AALP would increase of 2.48% by paribus ceteris assumption. The result of AALP estimation parameter was stated on Table 4.

Table 4. The result of AALP in Equation Parameter Estimation

Explanatory variables	Estimation Parameter	Standard Error	t Value	Pr > |t|
Intercept	-13.5698	5.382690	-2.52	0.0144
AWLP	2.489083	1.310246	1.90	0.0623
JPLP	0.190546	0.934987	0.20	0.8392
F Value: 8.20		Pr > F: 0.0007		
R-Square: 0.21465		Durbin-Watson: 1.582315		

4. Number of P. Homarus production (JPLP)

Table 5 pointed out that JPLP was significantly affected by JAKP and JPKLP due to had p-value < 0.01, means that JAKP and JPKLP had significant effect to JPLP was on level 1%. The large coefficient of JAKP was 0.064. It means that every JAKP increment of 1%, JPLP would increase 0.064% by paribus ceteris assumption. Additionally, JPKLP had significant correlation as well to JPLP was 0.767. It indicated that every JPLKP increment of 1%, JPLP would increase of 0.767%.

Table 5. The result of JPLP in Equation Parameter Estimation

Explanatory variables	Estimation Parameter	Standard Error	t Value	Pr > |t|
Intercept	-2.70371	0.364054	-7.43	<.0001
JAKP	0.064861	0.013352	4.86	<.0001
JPKLP	0.767968	0.061757	12.44	<.0001
F Value: 220.71		Pr > F: <.0001		
R-Square: 0.88034		Durbin-Watson: 1.36758		

5. Productivity of P. Homarus grow out (PULP)

JAKP had positive correlation to PULP. Table 20 indicated that JAKP had significant effect to PULP was on real level of 10%. The large coefficient effect of JAKP was 0.009 and it indicated that every JAKP increment of 1%, PULP would increase of 0.009% by paribus ceteris assumption.

Table 6. The result of PULP in Equation Parameter Estimation

Explanatory variables	Estimation Parameter	Standard Error	t Value	Pr > |t|
Intercept	5.043077	0.084691	59.55	<.0001
JAKP	0.008969	0.004519	1.98	0.0517
F Value: 3.94		Pr > F: 0.0517		
R-Square: 0,06066		Durbin-Watson: 2,079393		

The Result of 2SLS Working Hours Allocation Grow-out *P. Ornatus*

1. Man working hour allocation in P. Ornatus grow-out (APLM)

Table 7 indicated that PTRT had significant effect to APLM was on real level 1%. The large coefficient effect was 0.635. It indicated that every PTRT increment of 1%, APLM would increase of 0.635%. Meanwhile, AWLM and AALM had not significant effect to APLM. PTRT had significant effect to APLM was on level 1% and it had coefficient effect of 0.635. It means that every PTRT increment 0f 1%, APLM would increase of 0.635.

Table 7. The result of APLM in Equation Parameter Estimation

Explanatory variables	Estimation Parameter	Standard Error	t Value	Pr > |t|
Intercept	-3.88329	3.440599	-1.13	0.2731
AWLM	0.196310	0.175745	1.12	0.2779
AALM	-0.03024	0.042091	-0.72	0.4812
PTRT	0.635294	0.207980	3.05	0.0065
F Value: 4.58		Pr > F: 0.0141		
R-Square: 0.41970		Durbin-Watson: 2.047882		

2. Woman working hour allocation in P. Ornatus grow-out (AWLM)

Table 8 indicated that PTRT, JBLM and JABTM had not significant effect to AWLM since it had

p-value > 0.20. It means that working hour allocation of woman in *P. Ornatus* grow-out had not been effected by family expenditure, seed total, and baby under five years number. In *P. Ornatus* grow-out business, baby under five years had elastic trait in working hour allocation. It implied that the more much baby less than five years old, the more much for woman in working hour allocation.

Table 8. The result of AWLM in Equation Parameter Estimation

Explanatory variables	Estimation Parameter	Standard Error	t Value	Pr > |t|
Intercept	-20.71580	31.50742	-0.66	0.5188
PTRT	2.104677	2.473762	0.85	0.4055
JBLM	-0.98710	1.293932	-0.76	0.4549
JABT	0.666143	0.785417	0.85	0.4069
F Value: 0.41		Pr > F: 0.7464		
R-Square: 0.06105		Durbin-Watson: 2.099825		

3. Children working hour allocation in P. Ornatus grow-out (AALM)

Table 9 pointed out that PULM had significant effect to AALM was on level 10%, 26.76, It means that every increment of PULM of 1%, AALM would increase of 26.76%. AALM and PULM had elastic trait to AALM and it indicated that there was a relationship substitution.

Table 9. The result of AALM in Equation Parameter Estimation

Explanatory variables	Estimation Parameter	Standard Error	t Value	Pr > |t|
Intercept	-147.262	68.06263	-2.16	0.0428
AWLM	1.821509	2.131148	0.85	0.4028
PULM	26.76301	13.32859	2.01	0.0583
F Value: 2.97		Pr > F: 0.0744		
R-Square: 0.22878		Durbin-Watson: 2.35866		

4. Total production of P. ornatus (JPLM)

Table 10 signified that JBLM had significant effect to JPLM, was on level of 1% or 0.79. It means that every JBLM increment of 1%, JPLM would increase of 0.79%. Meanwhile, JPKLM had significant effect was on level of 5% or 0.25. It means that every JPKLM increment of 1%, JPLM would increase of 0.25%.

Table 10. The result of JPLM in Equation Parameter Estimation

Explanatory variables	Estimation Parameter	Standard Error	t Value	Pr > |t|
Intercept	-2.25466	0.185515	-12.15	<.0001
JAKM	0.798710	0.110915	7.20	<.0001
JPKLM	0.254962	0.107765	2.37	0.0282
F Value: 1010.53		Pr > F: <.0001		
R-Square: 0.99020		Durbin-Watson: 2.113354		

5. Productivity in P. Ornatus grow-out (PULM)

Table 11 highlighted that JAKM had significant effect to PULM, was on real level of 10%. The large coefficient effect of JAKM was 0.01. It means that every JAKM increment of 1%, PULM would increase of 0.015 by paribus ceteris assumption. The effect of JAKM to lobster grow-out

business indicated that number of family member involved within the business had low contribution to productivity of *P. Ornatus* grow-out.

Table 11. The result of PULM in Equation Parameter Estimation

Explanatory variables	Estimation Parameter	Standard Error	t Value	Pr > |t|
Intercept	4.796813	0.122609	39.12	<.0001
JAKM	0.015949	0.008011	1.99	0.0603
PULM	0.042019	0.027505	1.53	0.1423
F Value: 7.41		Pr > F: 0.0039		
R-Square: 0.42572		Durbin-Watson: 2.340185		

CONCLUSION

All family member involvements have allowed yielding maximum result and most of them worked far below their capacities. The result of the study on Panulirus Ornatus and Panulirus Homarus lobster grow-out farming found that extended working hour allocation has been able to increase output, although the extent of such increments assessed by productivity has not demonstrated any significant value. Added productivity was followed by high working hour which yielded low value and it had elastic trait. Productivity would be higher if working hour allocation was concurrently with procurement of quality feed, as they had positive correlation and elastic. Given this findings, feed would have a greater role in increasing productivity than merely increasing working hour allocation in lobster grow-out farming. As such in lobster grow-out farming businesses, all family member involvements had implication on total working hours that should be discarded. Wives and children should be restored as their previous roles. The impediments in lobster grow-out farming in Indonesia can be solved by maximizing new technology to shorten harvest period. Eventually, feed have to be conformed to lobsters' life cycle and not solely rely on trash fish during growth period.

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