

Seaweed Micro-Business Enterprises' Support on Forming the Information Centre of Seaweed Farming

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Abstrak. Saat ini rumput laut mengalami penurunan dalam jumlah petani maupun produktivitas yang diakibatkan oleh banyak faktor yang mana. Pemicu utamanya adalah adanya asimetris informasi dalam rantai pasok budidaya rumput laut di Kabupaten Maluku Tenggara. Salah satu solusi yang dapat ditawarkan adalah pembukaan pusat informasi budidaya rumput laut. Hal ini mengingat kondisi geografis wilayah Kabupaten Maluku Tenggara yang berbentuk kepulauan dan akses jalan, internet serta jaringan telepon seluler yang terbatas. Tujuan penelitian adalah untuk mengestimasi persepsi pelaku usaha mikro rumput laut baik distributor, penjual bibit maupun petani pada gagasan dibentuknya pusat informasi budaya rumput laut. Proses pengumpulan data dilaksanakan pada bulan Januari hingga Mei 2018 menggunakan metode *purposive sampling* pada 13 desa di 6 kecamatan dengan jumlah sampel sebanyak 232 responden. Metode analisis data yang digunakan adalah deskriptif dan regresi logistic. Data-data yang digunakan diperoleh dengan menggunakan kuesioner dan *in-depth interview*. Hasil penelitian menunjukkan bahwa dari sisi sosial ekonomi semakin berumur dan semakin tinggi tingkat pendidikan maka tingkat dukungan pelaku usaha mikro rumput laut pada pusat informasi rumput laut semakin rendah. Khusus bagi pelaku usaha, distributor rumput laut di wilayah ini cenderung menolak adanya pusat informasi rumput laut, hal ini terkait kemampuan mereka dalam memanipulasi harga jual dan kualitas produk.

Kata Kunci: *Asimetris informasi, rumput laut, Kabupaten Maluku Tenggara, Logistic Regression*

Abstract. *Currently, seaweed has decreased in the number of farmers and productivity caused by many factors, the main trigger of which is the asymmetric information in the supply chain of seaweed cultivation in Southeast Maluku District. Thus, one of the solutions that can be offered is by the opening of the seaweed cultivation information center. The objective of the present research was to estimate the perception of micro seaweed business enterprises namely distributors, sellers of seeds and farmers on the idea of forming the seaweed farming information center in Southeast Maluku District. The data collection was conducted from January to May 2018, using purposive sampling on 13 villages spread over 6 districts with a total sample of 232 respondents. Data analysis methods used in this research was descriptive analysis and logistic regression. The Data was obtained by using questionnaires and in-depth interview. The results showed that from social economic factor, the older and higher education level, tend not to support seaweed information center. In addition, based on the role on seaweed, the distributors in this region tend to reject the idea of forming the information center of seaweed farming, because it will weaken their ability to manipulate the selling price and product quality.*

Keywords: *Asymmetric information, seaweed, Southeast Maluku District, Logistic Regression*

INTRODUCTION

Fisheries commodities included in the agricultural sector are one of the largest market in the world, however, in general the producers of products in this sector are Micro and Small Enterprises so that this is also the main weakness of the fisheries and agriculture sector. To be able to survive in the competition, micro and small entrepreneurs in the fisheries and agriculture sector can collaborate and build a good supply chain network (Marsden *et al.*, 2000; Brunetto & Farr-Wharton, 2007). With the geographical conditions of the archipelago with limited infrastructure, it caused difficulties in establishing relations between regions, thus affecting the flow of information in seaweed business in Southeast Maluku Regency.

The problem in price transmission in the seaweed supply chain in this region is also one source of problems in increasing the profit of micro seaweed entrepreneurs in the region. Price transmission is one of the supply chain risks in fishery products (Gordon & Hussain, 2015; Sapkota *et al.* 2015), this is due to the complexity of the actors and relationships in the supply chain in the fisheries sector (Matopoulos *et al.*, 2007) driven by business To utilize more information resources owned by one of the parties in the supply chain mostly in this case is the local seaweed distributor.

The inequality of information between suppliers and buyers is one of the causes of the uninterrupted supply chain flow in an enterprise (Ozer & Ras, 2011; Wagner, 2015). More knowledge possessed by one of the parties, either by suppliers or distributors, will potentially harm the seaweed farmers, because of the possibility of moral hazard (Tumay, 2009). This is because seaweed cultivation is an inseparable entity from upstream to downstream (Figure 1) so that the benefits of one echelon will be determined by the knowledge possessed by the stage itself compared to other stages in a supply chain. Seaweed supply chains in Southeast Maluku District are not optimal, there is a need for supply chain connections that can optimize potential profits through asymmetric information mitigation (Teniwut *et al.*, 2017a). The information flow without distortion in producing an effective supply chain network has become very significant in its current business environment, although on the other hand, seaweed farmers, especially in the Southeast Maluku Regency, tend to only share information with their close relatives compared to fellow villagers (Teniwut *et al.*, 2017b). Gunasekaran *et al.* (2005) argued that businesses with a wide network of cooperation compared to traditional business models would have more opportunities to be able to compete and survive the competition.

Southeast Maluku District, geographically located in 5° to 6,5° south latitude and 131° to 133,5° east longitude, this region consists of two largest islands (larger island and smaller island) added with 25 small islands spread along the area as it shows in figure 2. This region covers more than $\pm 7.856,70$ km² where almost half of this region is water at $\pm 3.180,70$ km², and land area is $\pm 4.676,00$ km². This region located in average ± 100 m to 115m below sea level, as reported in 2016, the population of Southeast Maluku district was 98.684, where the population density of Southeast Maluku district in 2016 reached 95.64 people/km² (Statistic Indonesia, 2017).

As an archipelago, the local government established seaweed as a top commodity in 2012. However, since then the amount of seaweed production in this region has dropped dramatically due to various problems including price, production costs, level of demand and pests (Teniwut & Kabalmay, 2015). Most of the seaweed farmers are micro-entrepreneurs who do seaweed cultivation with family members or in groups with residents in one village. With the geographical conditions of Southeast Maluku District which tend to be far from buyers of seaweed products, making the ability to coordinate with parties in the supply chain on the downstream side becomes increasingly difficult.

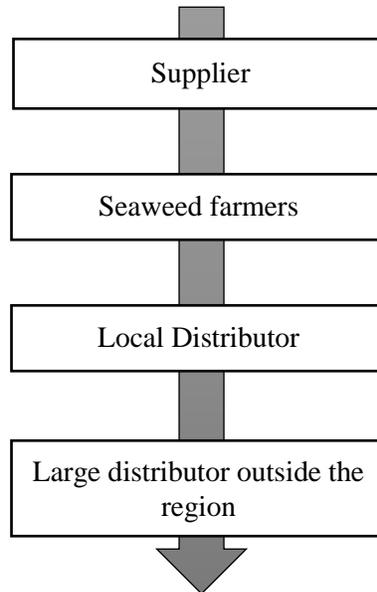


Figure 1. Seaweed Supply Chain in Southeast Maluku District
Source: Primary Data survey

In Figure 1, shows that the seaweed supply chain relationship in Southeast Maluku District, where seaweed from farmers, will be sold to a number of small distributors for later by the distributor is sold to large distributors outside the region. The problems that arise in the seaweed supply chain structure in this region are the limited number of local distributors and the weak role of local governments in price and production interventions makes farmers endure considerable pressure on price and demand changes. There is no end-use products wet or dry seaweed in this region, makes the ability of distributors to control the prices are even higher due to their ability to obtain more information on the number of demand for seaweed and access to buyers and end users outside the region. This factor has become one of the causes of significant price fluctuations in recent years.

In addition to the role of local distributors in price fluctuations, the lack of basic and applied knowledge from farmers in seaweed cultivation activities from seed selection process to the harvest process are also some of the factors causing price fluctuations. This condition makes the role of government to be very important, where according to Teniwut (2016) both central and regional governments play an essential role in improving the ability of cultivated farmers because for the aquaculture sector requires more in-depth knowledge (Diana et al. 2013).

Based on the previous research conducted by Teniwut et al. (2017a) suggest that to mitigate the presence of asymmetric information in the supply chain seaweed cultivation in the District of Southeast Maluku then, the best alternative is ideal for dealing with the problem is to establish an information centre for seaweed cultivation in this region . With the hope that the issue of incomplete information and knowledge in relation to selling price factors, market demand outside the region, the latest technology, especially in handling pest attacks and increasing productivity of seaweed until post-harvest knowledge and promotion can be minimized. The existence of this seaweed cultivation information centre is expected to reduce some of the obstacles that cause a decrease in the number of farmers and productivity of seaweed in Southeast Maluku District. Our objectives on this research are 1) identify the perceptions of coastal communities of seaweed farmers in Southeast Maluku Regency on the idea of establishing a seaweed cultivation information centre; 2) analyzes the tendencies of each party in the seaweed supply chain on the idea of forming seaweed

information centre in the region. The outcome of the study can served its purpose as an input to local government in their effort to revitalize the seaweed productivity in the region.

RESEARCH METHOD

Data Collection Procedure

In order to obtain an objective result accordingly to the purposed of the study, we identify villages that are actively conducting seaweed related production in the region. Data were collected in the span of five months from February to June 2018. Based on our identification, there are 13 villages were chosen spread in six sub-districts, with a total of 293 respondents consisting of seaweed farmers, seaweed seller, seaweed seed provider and distributors. There are two data collecting method approach taken on this study. First, all respondents filling out the questionnaires to measure the perception of the idea of seaweed information centre. Second, we conducting in-depth interview to explore the background of their reasoning, on the later, we conducted five FGD (focus group discussion) on clusters that based on sub-districts (Southwest Kei Besar, Kei Kecil, West Kei Kecil, Manyeuw and Hoat Sorbay) and each cluster consists of 5-8 respondents chosen from total 293 respondents used on the study that represent key member of seaweed micro-business in the region.

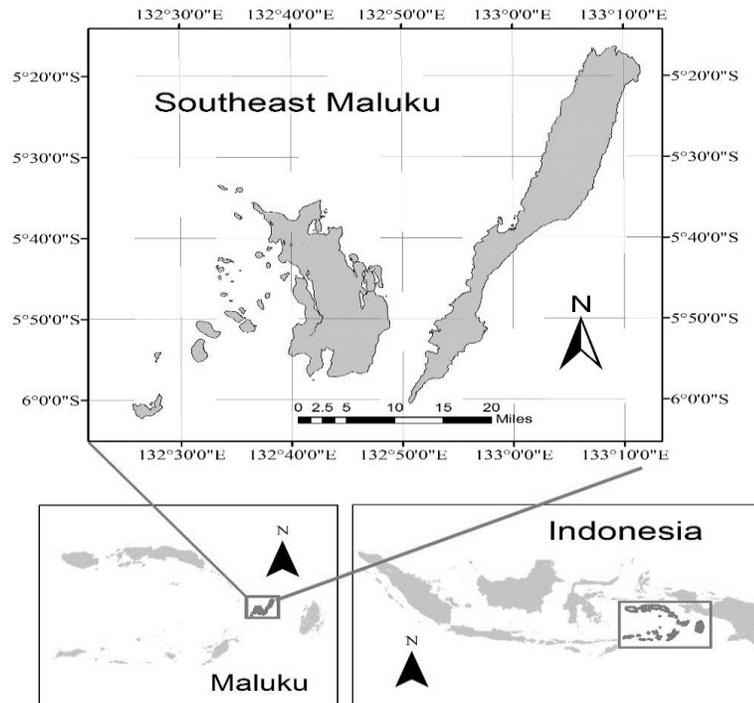


Figure 2. Study Location

Source: Data Processing

Data Analysis Method

As our main dependent variable is binary, we used logistic regression to analyze the tendentious of seaweed micro-businessmen to support the idea of forming seaweed information centre in Southeast Maluku District. Mathematically, logistic regression estimates multiple linear regression functions defined as (Sperandei, 2014):

$$= \log \left(\frac{\pi}{1 - \pi} \right) = \beta_0 + \beta_1 \cdot x_1 + \beta_2 \cdot x_2 + \dots + \beta_n \cdot x_n$$

π indicating probability
for $i = 1 \dots n$.

RESULTS AND DISCUSSIONS

Respondent Characteristic

The characteristics of our respondent were 87% are male and 13% female; over 65% are junior high graduate and 49% are 20-40 years old. This result was in line with our initial assessment that most of seaweed micro farmers, seller, seed provider and distributor were male dominant. Since seaweed much like fishing requires a better physical attributes in daily basis makes female tends to only play a role in part as seller. Based on education point of view, most of seaweed micro-business actors in the coastal area on developing countries used to have low socio-economic indicators where education is one of them. Coastal communities in Southeast Maluku District tend to married in early age and most of them did not even finish a junior high school level, which lead to high number of children they have and their ability in conducting seaweed farming. As aquaculture activity, seaweed farming included may have to require more complicated knowledge and the use of technology in order to thrive compare to the other fisheries activities. That is way the need of seaweed information centre in the region become very important to boost the productivity of seaweed commodity in the region.

Perception

It is necessary to measure the actual perceptions of the seaweed farmers in the region, where the perceptions of farmers, distributors, sellers, collectors and local governments on the idea of opening a seaweed cultivation information centre in the Southeast Maluku District. The results of a survey conducted with 293 respondents spread across 13 villages in the Southeast Maluku Regency region shows that 99% (Figure 3) of seaweed micro enterprises actors in this region agree with this idea. Some of the big reasons for their assessment are regarding the purpose of seaweed information centre to handle the latest information on handling pests and diseases of seaweed, where with the existence of this seaweed cultivation information centre, its faster and accurately to be quickly handled. Other factors that are taken into consideration are information on selling prices and seaweed buyers outside the area including seaweed shipping lines. These considerations are related to disrupted production and supply chain performance, as a result, the level of profit from seaweed farmers is decreasing which affects the productivity of seaweed from this region.



Figure 3. Seaweed micro-enterprises perception of the idea of forming seaweed information centre in Southeast Maluku District

Source: Data Processing

In more detail, some factors influence the perception of the support of seaweed farmers in their support for the opening of a seaweed cultivation information centre in the Southeast Maluku District showed on Table

1. Based on logistic regression result, for socio-economic indicators, age, sex and the number of a family member in liabilities had significant effect on the tendency to support seaweed information centre (<0.05), on the other hand, education did not have significant effect on the tendency to support seaweed information centre. In addition, based on the coefficient and odd ratio on table 1, age had a negative influence on the support on seaweed information centre (-0.558), whereas sex (0.225) and number of a family member in liabilities (0.274) has positive influence.

Based on the role on seaweed micro-enterprises in the region, the result showed that only distributor that had significant effect (<0.1) on the tendency to support seaweed information centre despite its a negative influence based on coefficient and odd ratio (-1.692), where the other indicators did not have a significant effect. In indicators for source of information on seaweed business activity, the findings showed that NGO (1.724) and fellow farmer (1.112) had a significant and positive effect on the tendency to support seaweed information centre (<0.01) and internet (-3.049) significantly negative effect on the tendency to support seaweed information centre. Frankly for scientist and higher education did not have a significant effect to influence seaweed micro-enterprises perception to support the seaweed information centre.

Table 1. Logistic Regression Results

Socio-economic				
Independent Variables	Coef	Odd Ratio	SE	Sig.
Education	-0.529	0.589	0.222	0.583
Age	-0.558	0.571	0.179	0.002***
Sex	0.225	1.384	0.592	0.017**
Number of a family member in liabilities	0.274	1.315	0.121	0.000***
Role of Seaweed micro-enterprises				
Independent Variables	Coef	Odd Ratio	SE	Sig.
Seed's Seller	-0.525	0.591	0.647	0.63
Seaweed Seller only	0.201	1.223	1.084	0.82
Distributor	-1.692	0.183	0.188	0.09*
Farmers	0.849	2.338	4.974	0.69
Source of information on seaweed business activity				
Independent Variables	Coef	Odd Ratio	SE	Sig.
NGO	1.112	3.042	1.361	0.01***
Fellow Farmer	1.724	5.607	2.714	0.00***
Scientist and Higher Education	-0.434	0.647	0.358	0.43
Book	0.382	1.466	1.215	0.64
Internet	-3.049	0.047	0.035	0.00***
			Pseudo R ²	0.234
			Prob > Chi ²	0.000
			Hosmer-Lemeshow Test	6.05
			Prob > Chi ²	0.6418
			Correctly Classification	82.47%

Source: Data Processing

Significance measure: ***<0.01; **0.05; *<0.1

The other statistic indicators showed the quality of the model, where Pseudo R² was 0.234 means that indicators of the model represented by 23.4%, this result caused by the large number of respondents (Crenshaw and Robison 2010) and type of the observant data which is 'people' and not an economic indicators. that make the low R² in this study was normal value in social studies than non-social studies (Eitle *et al* 2002), with Prob > Chi² resulted 0.000 (< 0.05). For Hosmer-Lemeshow Test showed that with

value of 6.05 and the Prob > Chi² value is 0.6418 (>0.05) means that the goodness of fits on the this model is sufficient. Based on this result, it's concluded that our model was statically good to be used.

Based on socio-economic criteria, it appears that the higher the age of seaweed entrepreneurs, the more likely they are to support the idea of establishing an information centre for seaweed cultivation in the region. This is because for the older people, in addition to the lack of their ability and desires to learn tend to decrease, with the geographical condition within the region makes the movement of people between one area to another more difficult so that elderly seaweed cultivators tend to want officers to come to their site. Thus, the role of seaweed information centre in Southeast Maluku become an advantage to older farmers since information centre brings information and knowledge and information closer to them, this due to latest and applicable knowledge on the use of technology that available on seaweed information centre can be easily transferred to them right on their area. Also, business actors in this region are located in coastal areas that have not been touched by technology so they tend to be resistant to something new (Oreg, 2006).

Furthermore, these results indicate that male seaweed entrepreneurs tend to agree more to this seaweed cultivation information centre because more than 85% of seaweed cultivators in this region are men so the idea of this seaweed cultivation information centre will be welcomed. On the other hand, seaweed cultivators who have a lot of family members in liabilities will tend to agree with the existence of this seaweed cultivation information centre because it will increase the productivity of seaweed and the profits obtained that will improve their ability to support their families.

Based on the role criteria in seaweed business, found results that confirm the leading cause of asymmetric information in seaweed cultivation supply chains, distributors tend to reject the idea of establishing a seaweed information centre in the region. This is because distributors are worried that the power will be reduced in controlling prices, due to market information and demand for seaweed outside the area to be more accessible to seaweed farmers. Distributors who have access to information are more likely to refuse to share information they have, reluctance from those who have more information to share with other parties in a supply chain related to the costs they have incurred to obtain the information (Lutze and Ozer, 2008); Kaya and Ozer, 2009). Nonetheless, the inability of farmers to deliver seaweed products outside the region makes the role of local distributors still entirely necessary, this is due to their ability to control and obtain information (Taylor and Xiao, 2010). However, with the existence of an information centre for seaweed cultivation, their ability to control the amount and price has decreased, and this condition will benefit the seaweed farmers more.

The results of logistic regression also show that seaweed farmers who are accustomed to using the internet to supply information and knowledge independently will tend to have a high level of resistance to the opening of seaweed cultivation information centre in this region. However, because the number of seaweed cultivators who are proficient in using information communication technology (ICT) is still minimal, so the seaweed information centre is still very much needed. Furthermore, seaweed entrepreneurs who are accustomed and dependent on information from other seaweed farmers and through NGOs will tend to support the existence of this seaweed cultivation information centre.

CONCLUSION

From the results of the research that has been done, seaweed entrepreneurs agree with the idea of establishing an information centre for seaweed cultivation in the region. Furthermore, from the results of the study, it is also known that distributors have a high level of resistance to this idea because the ability of bargaining power on prices and demand will decrease due to the forming of seaweed information centre. As the empirical finding showed that there are only 3 actively seaweed distributor in the region, therefore they have a very significant power to control seaweed' prices in the region compare to seaweed farmers, this happen due to their advantage on the information possess by them. Seaweed information centre in the region

eventually decrease one of their biggest advantage that's why they tend to resist the idea to form seaweed information centre in the region. The geographical condition of Maluku Regency which is an archipelago is one of the causes of asymmetric information in addition to the socio-economic conditions of coastal communities. The role of the central and regional governments related to infrastructure is becoming increasingly significant, especially in the border region such as in Southeast Maluku District. The results of this study are expected to be an input for the Regional Government of Southeast Maluku District in the framework of their efforts to revitalize seaweed cultivation in this region. This study also carried an inevitable limitation, from the indicators that being used, aside of socio-economic, role and sources of information, there are many factors that have to be taken into consideration such as socio-cultural and environment. Thus future study may have to consider adding these factors, in addition, the result of the study might applied in coastal region with same socio-economic characteristic such as age, education, sex, number of liabilities but in region where the condition of socio-economic is differ then the result might only being act as comparison study.

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