The development of cluster industry and product innovation based on seaweeds in the effort of expanding and piloting the sea shore area in the province of southeast sulawesi

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Abstract: - The research aimed at : (1) identifying potential location of seaweeds; (2) analyzing regional support in determining the cluster location industry; (3) analyzing social budget in developing cluster entrepreneurship in the region; (4) analyzing the relationship of seaweeds and another product. Findings in the research among others: (1) the region recommended as the development is located in Muna Island; (2) social budgeting is significant in pushing the development of cluster industry based on seaweeds in Muna Island; (3) meanwhile, some of innovation products of seaweeds operated in this cluster were: (a) pharmacy grade, (b) industrial grade, and (c) food grade.

Key-Words: cluster industry, seaweeds, innovation.

1 Introduction
Seaweeds is one revitalisation in fishery. The length of the seashore, the estimation of the potential of the land 1,1 million ha. And about 20% of the land cultivated. The prospect of the market is bright, as it is easy to be managed, and the needs of seaweeds are high. The global needs of seaweeds type Eucheuma is estimated 236.000 ton dried per year, and about 145.000 ton achieved, for type Gracilaria is the raw material of seaweeds is estimated 96.000 ton, and about 48.500 ton dried per year. Recently, the production on dried seaweeds in the world estimated 1,2 million ton.
About 50% is from Indonesia and 35% is from Philippines. Indonesian seaweeds is exported to Denmark, China, Philippines, Hongkong, Spain, Japan, and the US, as food, medicine, and cosmetic materials. The biggest export is dry seaweeds. The value of export reached 36% from the total export of fisheries with 30 million. Meanwhile, seaweeds type Euchena Catoni reached almost 90% of exporting in forms of chips and flour, so the value is reduced.

The developing of products based on seaweeds in the effort of improving the tax and farmers and fishermans’ values of the country, a good strategy should be improved from top to down. The real step taken by the government in developing the potential of seaweeds through bilateral coorporation between industrial ministry and marine and fishery ministry to open a wide range of improvement of national product of seaweeds, and to sustain the program, the ban on exporting the seaweeds started in 2014.

This plan, however, needs to be analyzed, as problems requiring the solutions. The efforts on developing the mainstream of the commodity should meet the prosperity of the community,..., the owner of the factory completed with modern technology and has an acces to the market, however, the difficulties on supply guarantee on raw materials either in quality and quantity. The problems faced by fishermen and farmers were the ability in accessing the market and eal with technology, but skillfull.

2 Problem Formulation

The problem solving of managing the seaweeds commodity between farmers and government, in Indonesia, especially in Southeast Sulawesi, a good strategy is the development of cluster industry and the innovation of products based on products. Cluster is assumed to avoid asymetris information between the needs of investor as the owner of technology and capital to develop the product of farmers/ fishermen to supply the aterials of seaweed.

The existence of cluster industry ensures the increasing of productivity and the value of seaweeds commodity. So, this condition had an impact on the increase of the income from this sector. From government sector, this cluster will generate the development of seaweeds management which refers to pillars of blue economy development which has an important role in the revenue, hiring the employment, and zero waste.

Therefore, innovative and creative are included in product diversification, product system, and the use of technology, financial engineering is the key of managing the seaweeds to be proceed as other materials. As a main material, seaweeds have more than 500 end products. This indicates that seaweeds as a raw materials seaweeds is needed by the industry both food and non-food.

Otherwise, the development of cluster industry and products innovation based on seaweeds is regarded not easy, there have been some challenges needed to be solved to develop the cluster. Referring to the concept of cluster, according to Porter (1998) there are some ways should be conducted in developing the cluster. Porter noted that it is important to creatue a cluster to achieve a competitive In resulting the prosperity in economy. There should be steps taken, to see the performance of economy of a region, and analyzing the economy composition, and noting the evolution of its economy, and find out the determination of its regional power support, and measuring the ability of the innovation. At the end, selecting the cluster.

2.1. Aim of the Reserach

The afforomentioned problems would be solved through the following: (1) identifying the location of potential seaweeds, in guaranting the availibility of materials suply in the location of cluster industry; (2) analyzing the supporting of the region in determining the center of cluster industry; (3) analyzing the capital of social community in developing cluster industry in the region; (4) analyzing the relationship between seaweeds and another products, as the effort of developing the innovation of products based on seaweeds.

2.2. Method of Analisis

In determining a potential area of seaweeds commodity of superior and non- superior in a sub-district of a Regency in Southeast Sulawesi analysis of Location Quotient (LQ) is used. From the result of the analysis of LQ could be found out a commodity of superior or non- superior, was determined as the following: the commodities with LQ < 1 are not included into superior commodity. The analysis equipment used to measure the competitive and supporting of a region as the location of cluster developing scalogram analysis was used. According to Blakely (1994) scalogram analysis discussing the facilities of a city belonged to an area as an indicator that the area is functioned as a developing area. The facilities became supporting indicators of the development of the cluster that are: (1) facilities related to economic activity; and (2) facilities related to social activities.

Confirmatory Factor Analysis (CFA) used
to test the measured variables (indicators) of social capital to be able to affect the scale of ... based on seaweeds. CFA used to test and measured variables to describe the systematic and logic of the seaweeds.

The relationship between seaweeds commodity and another commodity was analyzed by using input-output analysis comprised of two parts: (1) relationship analysis, and (2) key sectors analysis.

1) relationship analysis
Counting the relationship by using Rasmussen method could be formulated as follow:

\[ FL_i^R = \sum_{j=1}^{n} m_{ij} \] .................................. (2.1)

\[ BL_j^R = \sum_{i=1}^{n} m_{ij} \] .................................. (2.2)

where BL_j^R dan FL_i^R showing the relationship of back and ward in Rasmussen method, while m_{ij} is the element in matriks invers Leontif, M = (I – A)^{-1}.

2) key sectors analysis

\[ \alpha_j = \frac{1}{n} \sum_{i=1}^{n} \frac{m_{ij}}{\sum_{j=1}^{n} m_{ij}} \] .......... (2.3)

\[ \beta_i = \frac{1}{n} \sum_{j=1}^{n} \frac{m_{ij}}{\sum_{j=1}^{n} m_{ij}} \] .......... (2.4)

where \( \alpha_j \) is the ability of power of dispersion, and \( \beta_i \) is sensitivity of dispersion with two indexes to compare the relationship ratio of intersector degree, which later be determinde by any of superior sectors, key sector or by leadership sector in economic development planning (Arief, 1993).

3 Problem Solution

3.1. Potential location of seaweeds
The province of southeast Sulawesi has 5 areas of seaweeds production; they are the Regency of Buton, North Buton, Kolaka, Muna and Wakatobi. Wakatobi Island has 9 districts as seaweeds growing as main commodity, they are: the districts of Lasalimu, Batauga, Gu, Sangia Wambulu, Lakudo, East Mawasangka, Central Mawasangka, Talaga Raya. From these 9 districts, Gu and Sangia Wambulu growing the seaweeds plantation the most. These two districts are potentially developing the cluster industry. Meanwhile, the Regency of North Buton only has one district to grow a superior seaweeds commodity that is in West Kulisusu District.

Kolaka Regency has 7 districts of superior commodity of seaweeds, they are in Watubangga, Tanggetada, Wundulako, Kolaka, Latambaga, Wolo, Samaturu. These 7 districts producing the average similarities amount of seaweeds, therefore it is likely difficult to determine the center of clustering of seaweeds. In Muna Regency has 9 district as the growing of superior commodity of seaweeds, they are in Kontukowuna, North Tiworo, Kusambi, Lohia, Duruka, Towea, South Wakorambu, Pasir Putih, Pasi Kolaga. From these nine districts, Kontukowuna is the most producing area of seaweeds; therefore, this area is considered as the most potential to grow the cluster industry based on seaweeds.

Wakatobi ha three district as the central of growing superior commodity of seaweeds and another sea plantation, Kaledupa, South Kaledupa, and South Wangi-Wangi. From these three districts, South Kaledupa producing the big amount of seaweeds. And kaledupa becomes the potential area as the center of cluster industry development based on seaweeds.

3.2. Analysis of Regional Power Support
This analysis used to identify the role and the ability of a Regency/City to the community and economy service particularly to the activity of clustering development based on seaweeds. A good service given indicating that the Regency has a high level of service.

The service ability conducted in the Regency completed by the facilities belonged by the Regency/City. The more the facilities varied, showing that the Regency/City is able to conduct a good service to the community compared to another city/Regency. This condition, resulting the role of the regency/city as the ceter of cluster industry development based on seaweeds. The facilities that would be analyzed by scallogram in the research was classified into three categories, they are:

- The facilities that concern to health service
- Facilities that concern to education service
- Facilities that concern to economic activities.

The formulation and result of the counting would determine the rank of the city/regency of the province of Southeast Sulawesi. The following is the rank of the regency/city.

| Regencies/cities of the Province of Southeast Sulawesi |
|---|---|---|
| No | Regencies | Scores of facilities | Total |
| Rank |

Tabel 1. Analysis Result of Scallogram

Recent Advances on Finance Science and Management
The facilities of health

The facilities of education

The facilities of economy

<table>
<thead>
<tr>
<th>Region</th>
<th>Facilities of Health</th>
<th>Facilities of Education</th>
<th>Facilities of Economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buton</td>
<td>1.053</td>
<td>3.836</td>
<td>5.579</td>
</tr>
<tr>
<td>Muna</td>
<td>1.016</td>
<td>1.233</td>
<td>4.533</td>
</tr>
<tr>
<td>Konawe</td>
<td>1.074</td>
<td>1.143</td>
<td>5.346</td>
</tr>
<tr>
<td>Kolaka</td>
<td>935</td>
<td>1.195</td>
<td>3.162</td>
</tr>
<tr>
<td>Konawe Se.</td>
<td>1.011</td>
<td>1.111</td>
<td>5.169</td>
</tr>
<tr>
<td>Bombana</td>
<td>541</td>
<td>608</td>
<td>1.401</td>
</tr>
<tr>
<td>Wakatobi</td>
<td>395</td>
<td>726</td>
<td>2.88</td>
</tr>
<tr>
<td>Kolaka Ut.</td>
<td>410</td>
<td>715</td>
<td>4.581</td>
</tr>
<tr>
<td>Buton Ut.</td>
<td>346</td>
<td>487</td>
<td>9.09</td>
</tr>
<tr>
<td>Konawe Ut.</td>
<td>245</td>
<td>417</td>
<td>1.335</td>
</tr>
<tr>
<td>K. Kendari</td>
<td>536</td>
<td>603</td>
<td>5.754</td>
</tr>
<tr>
<td>K. Baubau</td>
<td>363</td>
<td>526</td>
<td>1.395</td>
</tr>
</tbody>
</table>

Source: Display Data

Result of analysis could also be shown in the following figure:

**Figure 1. Analysis Result of Scallogram of Regencies in the Province of Southeast Sulawesi**

Source: Researchers’ analysis

Based on the result, it is found that the potential regency to be the center of cluster industry development based on seaweeds in Southeast Sulawesi. Based on scallogram analysis, the Regency that completed with good and complete facilities is Muna Regency, and Muna is ranked in top regarding to the facilities provided and needed for the clustering industry and as the center of seaweeds cluster. And based on this result, Muna is recommended to be the center of clustering industry on seaweeds in Southeast Sulawesi. Kontukowuna is selected as the area of cluster development.

### 3.3. Analysis of social budget

Based on the result of Confirmatory Factor Analysis (CFA) continued to regression analysis, the effect of coefficient value of networking aspect ($X_1$), trust aspect ($X_2$), social cohesion aspect ($X_3$), and norm aspect ($X_4$) towards the scale of exertion ($Y$), in brief, could be seen in the following figure:

**Figure. Coefficient values of each variables of**

Notes:
- $X_{11}$ = the ease of money loan
- $X_{12}$ = problem solving
- $X_{13}$ = relationship
- $X_{21}$ = trust
- $X_{22}$ = loan expansion
- $X_{31}$ = the ratio of entrepreneur budget
- $X_{32}$ = Problems
- $X_{41}$ = rules faith
- $X_{42}$ = rules satisfaction

The aforementioned coefficient would be shown in the following model:

$$ Y = 0.635 + 0.512 X_1 + 0.254 X_2 - 0.309 X_3 + 0.131 X_4 $$

Notes:
- $Y$ = entrepreneur scale
- $X_1$ = Networking
- $X_2$ = trust
- $X_3$ = social cohesion
- $X_4$ = Norms

The value of $\beta_0$ shown that the constant value, the value of $\beta_0 = 0.635$ is entrepreneur scale ($Y$) with $0.635\%$ is networking ($X_1$), trust ($X_2$), social cohesion ($X_3$), and norms ($X_4$) equal to zero point and is constant.

The value of $\beta_1$ is networking variable of regression coefficient ($X_1$) the ratio was 0.512 indicating that there is positive between networking and entrepreneur scale with 0.512%. If networking($X_1$) increased with 1% so the scale of entrepreneur ($Y$) would increase with 0.512%. Otherwise, if networking ($X_1$) decreased with 1% so
the scale of entrepreneurship (Y) would decrease with 0.512%.

While the value of $\beta_2$ is the regression coefficient of trust variable (X2) the ratio was 0.254 indicating that there is a positive between trust and and the scale of entrepreneur with 0.254%. If trust variable increased with (X2) 1% so the scale of entrepreneur will increase with 0.254%. If the variable of trust decreased with (X2) 1% so the scale of entrepreneur decreased with (Y) 0.254%.

The value of $\beta_3$ is regression coefficient of social cohesion variable (X3) the ratio was -0.309 indicating that there is a negative effect between social cohesion and the scale of entrepreneurship with the ratio -0.309%. If social cohesion X3) increased with 1% so the scale of entrepreneur (Y) decreased with 0.309%. If social cohesion (X3) decreased with 1% so the scale of entrepreneur decreased with (Y) 0.309%

From the result of regression it can be concluded that networking (X1), trust (X2), and norms (X4) has a positive effect towards the variable of scale of entrepreneur. While the variable of social cohesion (X3) has a negative effect.

### 3.4. Analysis of top production of seaweeds based

The growth of seaweeds management in southeast Sulawesi concerns to the empowerment of the availability potential natural resource management in. By concerning to the potential of the resource of the ocean and the geographic site of southeast sulawesi, as the consequence, the opportunity of the investro is widely opened concerning to seaweeds. This condition will bring the chance for the investors to widely extend the management for seaweeds to produce it into goods products. By the opening of seaweeds industry the chance for another goods and services regarding to seaweeds industry would bring another opportunity to other sectors, both private and government. The chance of seaweeds industry in southeast sulawesi would be directed into local market or export-import. The industry for seaweeds could be managed through micro or macro entrepreneurship. The following is the condition of seaweeds production in cluster industry.

#### Figure. The structure of seaweeds industry type of *Eucheuma Cottonii*

### 4. Conclusion

The potential of seaweeds in southeast Sulawesi is spreaded in five regions of the province, they are in the regency of Buton, North Buton, Muna, kolaka and Wakatobi. From these five regions, based on the analysis of region power support Muna Island is recommended as the center for seaweeds cluster industry.

Result of analysis on social characteristic shown that social budget modal social is significantly in generating the development of cluster industry based on seaweeds

Some innovation products that could be operated with the clusters are among others: (1) pharmacy grade, comprised of: imitation teeth, shampoo, tooth paste, soap, pharmacy, and others. (2) Industrial grade, comprised of: fish feed, printing textile, papers, porcelain, etc; (3) food grade, comprised of: ice cream, soft drink, milk, bread, jamu, and others.

The strategic policies is required in advancing to the development of cluster industry based on seaweeds, and the policies are:(1) organizational aspects, comprised of: (a) board authority formation in cluster industry development based on seaweeds ; (b) the availability of information service “supply demand” related to the product of seaweeds;(c) access, capital, technology, and the marketing of the products. (2) infrastructure aspects, comprised of: (a) infrastructure priority, transportation in cluster location; (b) the understanding between the leader of the regency/city and the stakeholders involved in providing the infrastructure in the regency/city ; (c) the understanding between the government and the local government of the regency/city concerning to superior variety of the investor of raw materials in the industry based on seaweeds.
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