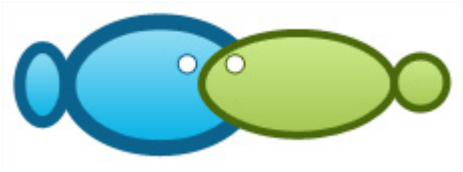

Agrobusiness of seaweeds in South Konawe (Indonesia)

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Abstract. This study aims to analyze the feasibility of seaweed farming, to analyze different agencies involved in the marketing of seaweed commodities, and to analyze the potential for developing agro-industry of seaweed in South Konawe regency. This research was conducted at the centers for seaweed production and marketing in the coastal areas of South Konawe, in the province of Southeast Sulawesi, Indonesia. The analytical methods used were the Feasibility Analysis, Analysis of Trading System Margin, Analysis of Marketing Margin, and Analysis of the potential for agro-industrial development. Results showed that it is feasible to run seaweed business in South Konawe given the profit gain of Rp.2.656.380/farm or Rp.6.194.916/ha, and an R/C ratio of 1.71. Institutions involved in the marketing of seaweed products in South Konawe are comprised of collecting traders and wholesalers, with two marketing channels including marketing channel I (farmers - collecting traders - wholesalers - exporter/manufacturer) and marketing channel II (farmers - wholesalers - exporters/factory). While both marketing channels are relatively efficient, the marketing channel II is better than the other one. A particular type of seaweed agro-industry which can potentially be developed in Konsel is that of semi-pure carrageenan in the form of Alkali Tread Cottonii (ATC) with small-scale production capacity (600kg/year) and medium-scale production capacity (300 tons/year).

Key words: agribusiness, seaweed, South Konawe.

Introduction. Seaweed is a commodity of aquaculture with excellent tolerance to the environment and can be easily cultivated by any groups, and since its market share is good enough, it has undergone quite rapid developments. Seaweed is also a commodity which has gained major economic interests in the world due to its protein, minerals, and fiber content, especially with the extraction of carrageenan (Arimisen & Postal 1995; Senthil et al 2011).

A rise in demand of seaweed products in the world market coupled with the rising price of seaweed have continued to boost the number and acreage of seaweed cultivation. Within the period 2008-2012, the development of Indonesia's seaweed exports showed a positive trend, amounting to 10.29%. In 2012, the export value of Indonesian seaweed amounted to US $134 million. In 2012, the largest export destination of Indonesian

seaweed is China by 67%, totaling US $90 million, followed by Philippines, Chile, Hong Kong and South Korea (Ministry of Trade 2013). In spite of these, it is stated that Indonesia is still importing 70% of raw materials for seaweed processing industries, which means that the seaweed processing industry in the country still needs to be developed (Ministry of Trade and Industry 2012).

South Konawe regency has about 9.368 km^2 of sea area and 388.5 km of coastline stretching along Hukaea coast in the sub-district of Tinanggea, Palangga, Laeya, Lainea, Kolono, Laonti, and Moramo, up to the border of Kendari city (DKP Konawe Selatan 2012). As can be seen from the region's vast potential for seaweed cultivation, the potential of developing this commodity in the regency is huge. In 2013, the areas used for cultivating seaweed in South Konawe reached 2.230 ha with a production of 105.072 tons, which ranked third after Muna, with 12518.60 hectares of land and 182,199.68 tons of production volume, and Kolaka with 4,129 hectares and a total production of 256.920 tons. The vast development of seaweed cultivation in South Konawe is also reflected by the growing volume of production and area of cultivation, which continues to increase from year to year. In 2005, the total area of cultivation was 3.8 ha, generating 6.9 tons of seaweed, while in 2013 this surface increased to 2.230 ha with a total production of 105.072 tons (DKP of Southeast Sulawesi Province 2014).

Despite the huge potential, the business of seaweed cultivation is still unable to improve the welfare of coastal communities due to the fact that the farming of seaweed has only been focused on the aspects of production, without any agribusiness orientation whatsoever. Another possible cause is because there are no agro-industrial activities in this area which specializes on the processing of seaweed into advanced products, particularly in the form of carrageenan, causing seaweed farmers to gain no added value. Generally, the process of post-harvest of seaweed by farmers today runs only up to a drying stage. Dried seaweed can actually be further processed with agro-industrial treatment so that its selling price and economic value can be increased (Lembaga Ilmu Pengetahuan Indonesia 2005; Soekartawi 2010; Kordi 2011).

Considering the above mentioned issues, this study was set out to analyze (a) the feasibility of seaweed cultivation, (b) seaweed marketing institution, and (c) the potential for the development of seaweed agro-industry in South Konawe.

Research Methods. This study was conducted in South Konawe at two representative sub-districts, Tinanggea and Kolono. The two areas were selected on the basis that they both have large areas of seaweed farming. Variables under examination included: (1) Capital, revenue, and expenses (2) The selling price of seaweed at farmer level, the buying price and the selling price set by collecting traders, the purchase price and the selling price set by wholesalers, as well as seaweed trading channels, and (3) The land area used for seaweed farming and the total production of seaweed in the regency.

To analyze obtained data related to the variables being investigated, the study employed some techniques of qualitative and quantitative descriptive analysis. Based on the formulation of the problem and research objectives, the following methods of data analysis were used: Feasibility Analysis, Analysis of Trading System Margin, Analysis of Marketing Margin, and analysis of the potential for agro-industrial development.

Results

Business Feasibility. The particular species of seaweed cultivated in South Konawe regency is *Eucheuma cottonii*. In terms of success rate, there are two seasons of seaweed cultivation in the regency, firstly, a high season which occurs during a rainy season and, secondly, a low season which takes place during a dry season when water temperature increases. Every year, seaweed cultivation undergoes three high seasons and two low

seasons. In low seasons, the cultivation of seaweed decreases by half of the high season, causing the selling price to fall from a normal price of Rp. 12.000/kg down to Rp.6.000,-/kg. The price is decreased due to the low quality of seaweed, forcing farmers to reduce their cultivation areas. According to Tasmin et al (2014) 50% of decrease in the growth of seaweed can be attributed to increased water temperature.

Seaweed cultivation involves fixed cost and variable cost. The average cost of seaweed cultivation is Rp. 1.549.389-/farm (4.288m^2) or Rp.3.613.314,-/Ha. Table 1 presents the result of analyzing the financial feasibility of seaweed cultivation.

Table 1

Feasibility of Seaweed Agribusiness in South Konawe

No.	Component	Per Cultivation (4.288 m^2)	Per Hectare
1.	Income		
	- Production (Kg)	467	1.090
	- Price (Rp/Kg)	9.000	9.000
	Total of Income (Rp)	4.205.769	9.808.230
2.	Cost		
	- Fixed Cost (Rp)	317.081	739.462
	- Variable Cost (Rp)	1.232.308	2.873.852
	Total of Cost (Rp)	1.549.389	3.613.314
3.	Profit (Rp)	2.656.380	6.194.916
4.	R-C Ratio	1,71	1,71

Institutional Trading System. The distribution of seaweed from a production center to end consumers involves traders and wholesalers. The trading of seaweed in South Konawe has created two marketing channels, as follows:

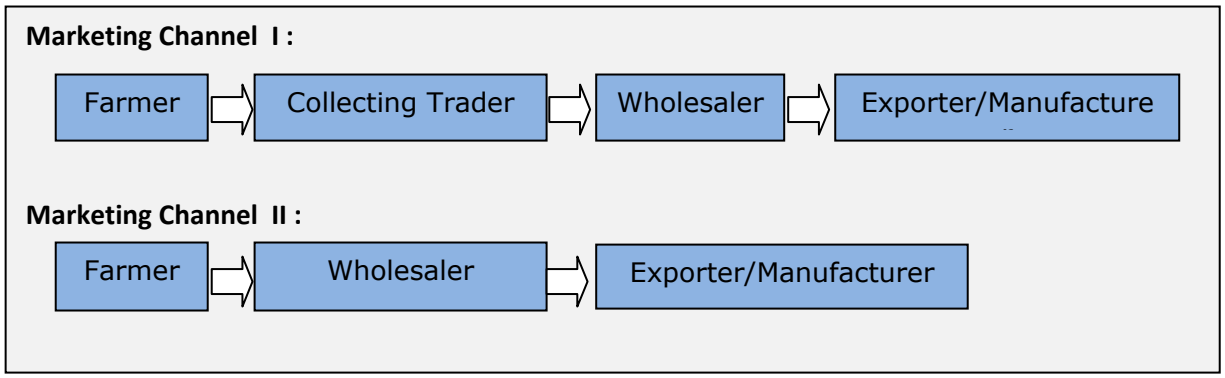

Figure 1. Seaweed Marketing Channels in South Konawe.

Tables 2 and 3 present the result of analyzing the Seaweed Marketing Margin through Marketing Channel I dan II in South Konawe.

Table 2

Analysis of Seaweed Marketing Margin in South Konawe through Marketing Channel I

No	Marketing Institution	Price (Rp/Kg)	Share (%)		
			Price	Ski	Sbi
1	Farmer				
	a. Selling price	9.000	64,285		
2	Collecting Trader				
	a. Buying Price	9.000			
	b. Transportation Cost	200			2,75
	c. Labor Cost	200			2,75
	d. Packing Cost	100			5,5
	e. Drying and Storing Cost	50			11
	f. Total of cost	550			22
	g. Selling Price	10.500			
	h. Profit	950		9,047	
3	Wholesaler				
	a. Buying Price	10.500			
	b. Transportation Cost	1.400			1,714
	c. Labor Cost	600			4
	d. Packing Cost	100			24
	e. Storing Cost	300			8
	f. Total of Cost	2.400			37,714
	g. Selling Price	14.000			
	h. Profit	1.100	7,857	7,857	
4	Manufacturer				
	a. Buying Price	14.000			
MP		5.000			
Total			13,4		59,714

Table 3

Analysis of Seaweed Marketing Margin in South Konawe through Marketing Channel II

No	Marketing Institution	Price (Rp/Kg)	Share (%)		
			Price	Ski	Sbi
1.	Farmer				
	a. Selling price	9.000	64,285		
	Collecting Trader				
2	a. Buying Price				
	b. Transportation Cost	9.000			
	c. Labor Cost	1.500			1,833
	d. Packing Cost	750			3,666
	e. Drying and Storing Cost	100			27,5
	f. Total of cost	400			6,875
	g. Selling Price	2.750			39,875
	h. Profit	14.000			
3	Wholesaler	2.250		16,071	
	a. Buying Price				
MP		14.000			
Total		5.000			

Discussion

Business Feasibility. The result of income analysis shows that seaweed cultivation in South Konawe can generate a total benefit of Rp.2.656.380,-/farm or 6.194.916,-/Ha, with a selling price of dried seaweed of Rp.9.000,-/Kg and a total production of 1.090 kg/Ha. The result of R/C ratio analysis is 1.71, which means that it is feasible to run seaweed agribusiness. This result is quite similar to the result of a study by Ngamel (2012), conducted at Panggang Island in East Nusa Tenggara, which indicated that the R/C value of seaweed cultivation at one production time was >1, which was 1.9. Soekartawi (2002) states that if the value of R-C Ratio >1, then farming is considered feasible and potentially profitable. This condition also suggests that seaweed business in the regency of South Konawe can generate quite handsome incomes so the business can become a main source of economy. Abdullah et al (2009) states that if labor income in a business is too low, it is highly likely that the labor will quit the business and join others with higher income.

Nevertheless, seaweed production costs need to be considered in order to enhance the competitiveness of seaweed business. Luhur et al (2012) and Fausayana (2014) argue that the competitiveness of seaweed business in South Konawe can be increased by implementing a policy that reduces the unit price of seeds and fuel, hired labor, and depreciation of production assets as a whole. In addition, government's intervention is needed in the provision of quality seeds and other variable costs.

Institutional trading system. The marketing of seaweed in South Konawe has formed two channels, i.e. marketing channel I, which involves two agencies, namely collecting traders and wholesalers, and marketing channel II, which involves wholesalers in addition to farmers/cultivators and manufacturers/exporters.

A scheme which links the various agencies involved in the seaweed agribusiness system in South Konaweis can be drawn schematically as follows.

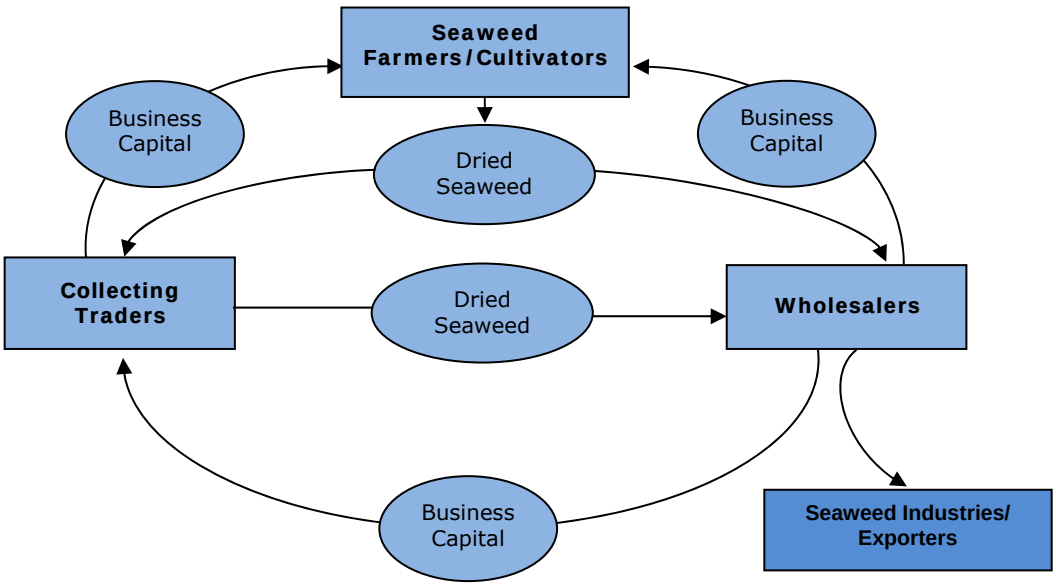

Figure 1. Seaweed Agribusiness System in South Konawe.

Margin of Trading System. Result of the study indicates that the prices received by producers (i.e. seaweed farmers) through either marketing channels I or II are efficiently at the same rate, which is Rp. 9,000 /kg, with a share price of 64.285% and the marketing efficiency (EP) value of 21.07% for the marketing channels I and 19.64% for the marketing channel II. Soekartawi (1991) states that if the value of EP≤50, the marketing channel is considered efficient. However, the EP value of marketing channel II appears to be lower, which means that marketing channel II is more efficient than marketing channel I.

Based on the analysis above, it is clear that the marketing margin that occurs between farmers and the end consumers/manufacturers is 5,000, - /kg. The existence of two marketing channels in seaweed business in Konsel does not affect the seaweed farmers since the buying price offered by the farmers is relatively similar in both marketing channels. This condition is also evident from the pattern of partnership between wholesalers and farmers, between traders and farmers, and between wholesalers and traders in terms of capital and marketing. Besides, both traders and wholesalers buy seaweed directly from the farmers so that farmers do not bear shipping costs in either marketing channels I or II. Having said that, the results revealed that marketing channel II is more profitable for wholesalers than marketing channel I, with a difference of Rp.1.150, -/kg.

The potential for Development of Seaweed Agro-industry. Since the seaweed cultivated in Konsel is of *Eucheuma cottonii* species, the type of carrageenan produced is kappa carrageenan, which is a polysaccharide galactan sulfate (Distantina et al 2013). Thus, a most feasible seaweed agroindustry in Konsel which cultivates *Eucheuma cottonii* species is an agroindustry of semi-pure carrageenan in the form of Alkali Tread Cottonii (ATC). Hendrawati (2014) states that an establishment of Alkali Treated Cottonii (ATC) industry can avoid a surplus of raw material production that might cause a drastic drop in prices of dried seaweed on the market.

The production capacity of seaweed agroindustry refers to an agro industrial ability to produce within a certain time with a certain capacity and technology. According to Mustam (2005), a small-scale seaweed agro-industry has a production capacity of 50 kg per month or 600 kg per year, a medium scale agro-industry 25-62 tons per month or 300-744 tons per year, whereas a large-scale agro-industry 120 tons per month or 1,440 tons per year. A seaweed processing factory which produces carrageenan in the sub-district of Kei Kecil in Southeast Maluku uses 90 tons of raw materials every year (Ngamel 2012). Considering the potential of seaweed production in South Konawe in 2014, which amounted to 100.710 tons (BPS Sulawesi Tenggara 2015), it is possible to establish small-scale and medium-scale seaweed agro-industries in the region. If we assume that a medium-scale agroindustry has a production capacity of 300 tons per year, then the volume of raw materials in the form of dried seaweed that must be available to meet the industrial demands is 9.450 tons/year. With a production capacity of 100.710 tons of seaweed per year, the regency of South Konawe will be able to meet this need for raw materials.

Conclusion. Seaweed farming is feasible in South Konawe regency because it generates a total profit of Rp.2.656.380 / farm or Rp.6.194.916 / ha, and its R/C ratio is 1.71. The marketing of seaweed in Konsel involves collecting traders and wholesalers and two marketing channels, i.e., (1) farmers/cultivators – collecting traders – wholesalers - exporters/manufacturer and (2) farmers/cultivators – wholesalers – exporter/ manufacturer. Results of analysis showed that marketing channel II is more efficient than the other one, although they are both relatively efficient. A type of seaweed agroindustry that has the potential for development in South Konawe is semi-pure carrageenan in the

form of Alkali Tread Cottonii (ATC) with small-scale (600kg/year) and medium scale (300 tons/year) production capacity.

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