

# A model for developing seaweed agribusiness in South Konawe, Southeast Sulawesi, Indonesia

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**Abstract.** The aim of this study was to analyze the characteristics of seaweed agribusiness and to design a model for developing seaweed agribusiness in South Konawe, a district in the province of Southeast Sulawesi, Indonesia. The study was conducted at the coastal areas of the district. Data were analyzed descriptively and quantitatively using an exponential comparison method. Findings were: (1) the development of seaweed in South Konawe district was constrained by poor human resource due to seaweed farmers' old ages and low educational levels, and the fact that they run seaweed farming based on their experiences rather than informed understanding of the business; (2) to develop seaweed agro-business, it is necessary to strengthen the farmers' position by establishing agro-industry, shortening marketing chain to allow direct marketing to agro-industry via groups of seaweed farmers, providing access to capital through cooperative agencies and banks, cooperating with universities and governmental organizations to provide trainings and mentoring programs, and increasing business efficiency and productivity.

**Key Words:** agribusiness model, seaweed, South Konawe.

**Introduction.** The concept of agribusiness is introduced in various areas of business, such as agriculture, with a view that a well-managed agribusiness system, which comprises several subsystems, can be immensely profitable for those involved in the business. The subsystems include provision of raw materials, production processes, post-harvesting, processing, and marketing, as well as all supporting elements for the system. In an agribusiness system, the business should generate profits for every party involved in all subsystems; otherwise, a gap will appear and disrupt the business cycle and the sustainability of agribusiness process.

Soekartawi (1999, 2010) comments that a unit of business includes one or the whole components of production chains, product processing, and marketing associated with agriculture. In an agribusiness system, all subsystems are interrelated and interdependent on each other, so an issue with one subsystem can affect the others. A common problem in business development is a weak inter-subsystem connection.

Problems stemmed from a gap in the agribusiness system have been reported in the seaweed agribusiness in South Konawe, a city in Southeast Sulawesi, Indonesia. A study by Nuryadi et al (2017) showed that seaweed farmers in South Konawe were not in the position where they were empowered enough to determine the prices of their seaweed products. This has resulted in a relatively low profit the people could earn, which was only US\$ 458.71 per hectare in each production cycle. Since each production cycle takes two months to complete and each farmer has an average of 4,200 M<sup>2</sup> area, the average income is only US\$ 98.13 per farmer per month. This amount is still far below the 2016 minimum standard of regional wage in the province of Southeast Sulawesi, which was US\$ 148.34.

The condition described above should cause concerns since it indicates that, although the district of South Konawe has a highly potential for seaweed farming, seaweed business does not contribute significantly to the improvement of the welfare of those involved in the business. According to Nuryadi et al (2017), one reason why seaweed business in South Konawe is less developed is because the business focuses too much on the production aspect and fails to embrace a wider orientation of agribusiness. In addition, a lack of added values is stemmed from the absence of seaweed agribusiness management, which is a vital component of agricultural chains and has been proved to contribute around 20.7% of added value and absorb 89.9% of raw materials (Simatupang 1995; Austin 1981). According to Kordi (2011) and Muthalib et al (2017), during a harvesting period, farmers only dry up their seaweed without any further processing, and then export their dried-up products.

Based on the problems above, the current study was set out to analyze the characteristics of seaweed agribusiness and to design a model for seaweed agribusiness development in South Konawe, Southeast Sulawesi.

## **Material and Method**

**Research method.** The study was conducted at Tinanggea and Kolono, two sub-districts of South Konawe district in the province of Southeast Sulawesi, Indonesia. The sites were selected given their central role in seaweed business in the district. Data of the study were gathered from experts from the Office of Marine and Fishery of South Konawe, higher education institutions, and people running seaweed businesses. The study cited experts' opinions regarding strategies for increasing seaweed business profits, source of capital, marketing places, and how to foster seaweed cultivation. Experts provided their views based on five alternatives and criterion, including

1. Strategies for increasing business profits
  - a. Alternatives (expanding the cultivation area, increasing business efficiency, increasing productivity, searching for a better seedling, inventing a new cultivation method).
  - b. Criteria (capital, technology, human resource, water condition, availability of tools and infrastructure)
2. Source of capital
  - a. Alternatives (seaweed sellers, cooperative agencies, collateral-free bank loan, government aids, and self-owned capital).
  - b. Criteria (loan interest, flexibility of loan amount, flexibility of return, ease and accessibility of site).
3. Marketing place
  - a. Alternatives (marketing to retailers, whole saler, exporter, agroindustry and self-processed).
  - b. Criterion (selling price, flexibility of purchase amount, marketing continuity and insurance, ease of marketing process and added-value)
4. Farmers development
  - a. Alternatives (the government, higher education institution, trader, agroindustry and private parties and Non-Governmental Organizations NGO).
  - b. Criteria (human readiness, technological readiness, capital ownership, policy-making authority, relationship with farmers).

Data collected were analyzed descriptively and quantitatively by using exponential comparison method. This method is employed to determine ranks of alternative priority when dealing with multiple criteria. It is used to assist in the decision-making through a well-defined design of model produced in a process that generates alternative values (Marimin 2004). Analysis of exponential comparison has the advantage of reducing bias because it allows for a better, more realistic order of priority. Steps to decision-making using this method include (1) determining alternative decisions; (2) drafting criteria for decisions to be analysed; (3) determining relative level of importance of each decision criteria using a conversion scale favoured by decision maker; (4) determining relative level of importance of each alternative decision; and (5) ranking the alternative decisions based on score.

## Results and Discussion

**Characteristics of seaweed agri-business.** In constructing a seaweed agribusiness developmental model that emphasizes on the sustainability of agribusiness system, it is important to consider the socio-economic condition of seaweed farmers. In other words, the characteristics of seaweed cultivators are crucial to take into account. Figure 1.a shows that the cultivation of seaweed in South Konawe has been dominated by farmers with an average age of 35 years or above, indicating that young people were less attracted to the business. Abdullah et al (2009) mentions that a low profit earned from one type of business can lead people to turn to other more profitable business.

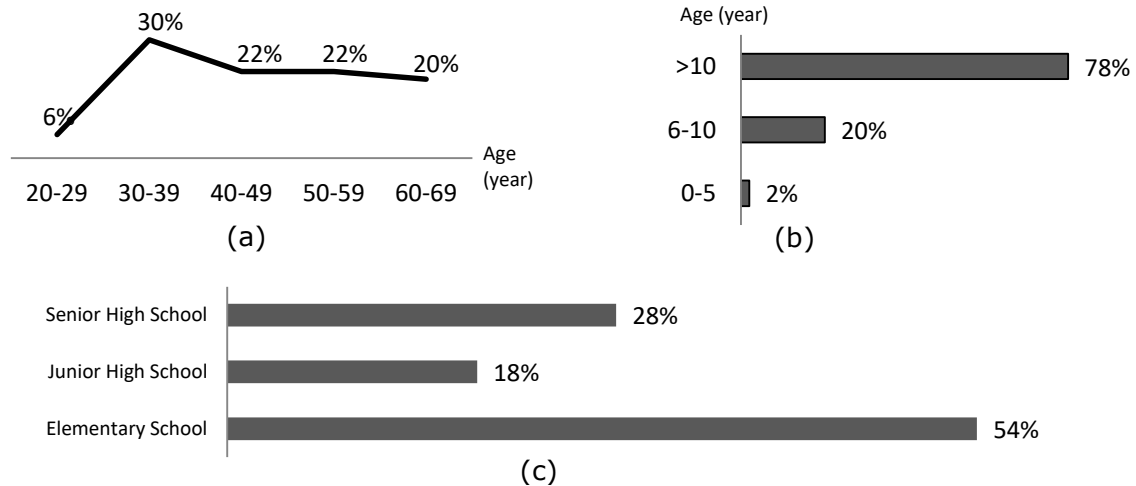


Figure 1. The characteristics of seaweed farmers in South Konawe (a) Age of seaweed farmers; (b) Experience in seaweed farming; (c) Educational background in seaweed farming.

Figure 1.b. shows that in general seaweed farmers have more than 10-year experience in the business, which means that there are only very few people involved in the business, further indicating a lack of people's interests in it. Seaweed farmers also have a very low educational background, as most of them only obtained an elementary level of education (Figure 1 c). This fact does not only suggest that the farmers need further education and training to enable them to improve their business, but also that so far they have only been relying on their experience in running the business without formal knowledge. Azis (2011) notes that in general the problems with seaweed development in Indonesia stem from a low quality of human resources.

**A model for seaweed agribusiness development.** In this study, the model for seaweed agribusiness development places an emphasis on the protection of seaweed farmers in South Konawe, which today still remains under poverty due to limited business capital. This condition is illustrated by Nuryadi et al (2017) in the schematic interrelation of seaweed agribusiness system in South Konawe, as follows.

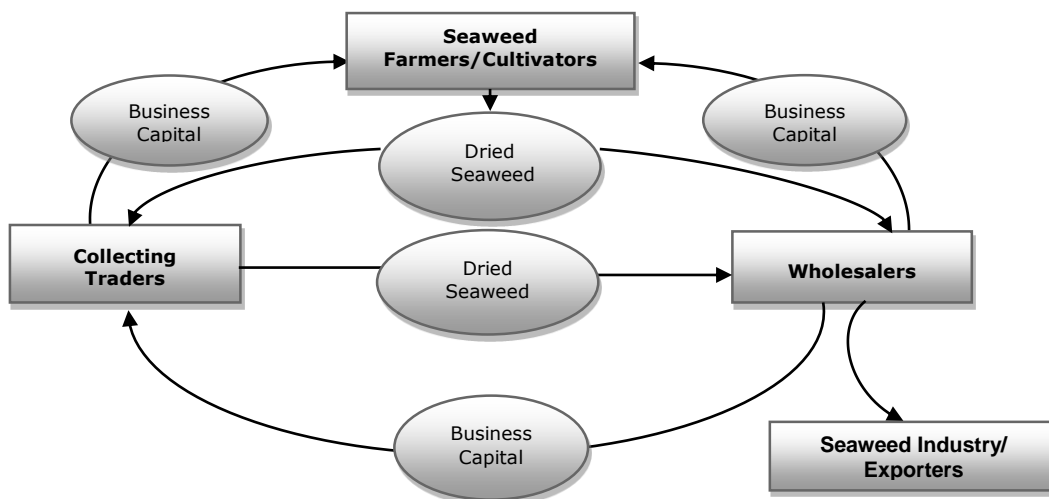


Figure 2. Seaweed agribusiness system in South Konawe. (Nuryadi et al 2017)

In figure 2 is shown that seaweed farmers have a very weak position in the business, and they are under the hegemony of big capital owners who take control over seaweed marketing network. In fact, the seaweed farmers' position is getting weaker since they are still highly dependent on capital providers who are also the buyers of their seaweed products. Besides, long marketing chains before reaching end-users, i.e., exporters or seaweed processing agro-industry, further exacerbate the farmers' condition since they are unable to directly market their commodities to consumers.

Based on these conditions, an analysis was conducted to determine a conceptual model that can help the system of seaweed agribusiness run better. The model was created based on experts' views on various solutions and possible actions. What follows is the result of analysis using exponential comparative method, through which aspect of interests are ranked in terms of priority, as the figure below displays.

Table 1

Ranking of prioritized alternative aspects of interest in the development of seaweed agribusiness in South Konawe

Farmers' source of capital			Increase of Farmers' Income		
Alternative	Score	Priority	Alternative	Score	Priority
Cooperative agencies	5.8000	1	Increasing productivity	6.5556	1
Collateral-free bank loan	5.2727	2	Increasing business efficiency	4.5385	2
Seaweed sellers	3.6250	3	Inventing a new cultivation method	3.6875	3
Self-owned capital	3.2222	4	Searching for a better seedling	3.2778	4
Government aids	2.7619	5	Expanding the cultivation area	3.1053	5

Venue for marketing seaweed products			Farmers' Developmental Programs		
Alternative	Score	Priority	Alternative	Score	Priority
Agro-industry	9.0000	1	Higher education	6.7500	1
Wholesaler	4.5000	2	Agro-industry	4.9091	2
Retailer	3.3750	3	The government	4.5000	3
Exsporter	2.7000	4	Private parties and NGO	2.5714	4
Self-processes	2.5714	5	Trader	2.3478	5

Based on the result of analysis using exponential comparative method above, a diagram has been created to illustrate the interrelationship of each element in seaweed agribusiness system, which is then used to design a model for developing seaweed agribusiness.

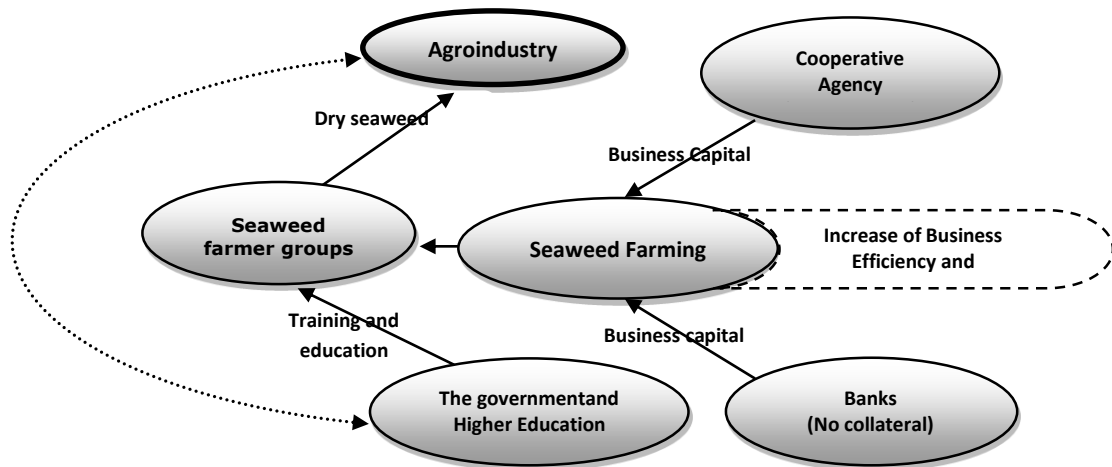


Figure 3. Design of the model for developing seaweed agribusiness.

Figure 3 illustrates the interconnection among elements that are involved in the development of seaweed agro-business in South Konawe. The model shows that banks, cooperation agencies, the government, higher education institutions, agro-industry, farmers and groups of farmers are all involved. The model is consonant with the Indonesian Ministry of Marine and Fishery's Directorate of Fishery (2016) that states that several institutions must be involved and provide supports for sustainable, competitive seaweed farming, including (1) farmer groups; (2) collectors/cooperative agencies; (3) financial institution; (4) capital agencies, and (5) other institutions that help to develop seaweed farming.

To achieve the goal of developing seaweed agro-business, all elements showed in Figure 3 must work synergistically towards the same goal, that is, to build and develop seaweed agro-business by playing each role in terms of providing raw materials, production and processing, as a form of guarantee for marketing aspect and improving competitiveness so as to form an agro-industry organization. Waits (2000), Porter (1998) and World Bank (2002) state that an agro-industry organization can help to meet globalization challenges, technological development, decentralization demands, as well as to facilitate the formation of production and distribution network and increase the ability to compete in the global markets.

Seaweed aquaculture needs to emphasize on the aspects of efficiency and productivity in order that the business can render a significant difference between production cost and profit, thus generating higher incomes. Capital needed for seaweed business can be obtained from cooperative agencies and banks without collateral since most seaweed farmers in South Konawe possess no properties, such as land, that can be used to secure a bank loan. So long as farmers still obtain capital from the parties which require the farmers to sell their products to the capital providers, it will always be difficult for the farmers to increase their profits.

In general, seaweed farming industries in Indonesia experience capital constraints, a problem also faced in South Konawe, Southeast Sulawesi, Indonesia. In fact, 60-70% of seaweed farmers have a binding relationship with traders who provide ease of access to capital that farmers can use to purchase seaweed seeds and production tools, as well as to finance their children education and health care (Azis 2011; Neish 2007). It is also very difficult to get rid of seaweed sellers when seaweed markets are only available outside of the region, as with is the case in the region. Therefore, developing seaweed agro-industry in the region is a crucial step to shorten seaweed marketing chains. In this way, all seaweed products is recommended to be marketed directly by farmer groups to agro-industry.

In order that the farmers' seaweed products can be purchased by agro-industry at good prices, and that the quantity and quality of seaweed produced meet the agro-industry need, farmer groups need to work with the agro-industry. This is important to ensure the sustainability of each subsystem of seaweed agribusiness. It is also necessary for agro-industry of fishery commodities to work together with other parties because this type of collaboration with agro-industry is seasonal in nature and therefore the sustainability of the business relies heavily on the extent to which supplies of raw materials are available (Defra 2006; Setthasakko 2007). Each business has a place in every layer of network and involves in a minimum of one chain of supply so that a parallel process is possible at one point of time (Vorst 2004). Having a fixed price and market guarantee, seaweed farmers will be well-protected.

This model considers the government, higher educational institutions, and agro-industry management as crucial elements in the improvement of human resource quality in seaweed farming. Since seaweed farmers are generally low-educated (Figure 1c) they should be educated through trainings and mentoring programs. To have effective and efficient trainings, farmers need to establish farmer groups. Pandakaki (2012) mentions three recommended strategies for developing seaweed farming, including the increasing level of effectiveness of government's roles or related institutions in human resource development, expanding access to business capital, and creating a marketing partnership.

Developing human resource capacity of cultivating seaweed through agroindustry is an integral part of an agrobusiness process and is the consequence of high demands for seaweed as well as a step to anticipating global competition and high mobility of labors across business sectors. These circumstances demand for increased quality of human resource, especially in terms of cultivating skills and post-harvesting processes, in order to promote productivity and business efficiency. Skills and expertise are the main capital of workers and they become the basis upon which work achievement and appreciation are built (Bhattacharya & Gibson 2005; Brink & Woerd 2004). According to Ashton et al (2008), Defra (2006), and Andrew (1999), labor skills are important social indicators and they can significantly influence the performance of a business. Soekartawi (2001) also points out the quality of human resource as a critical factor that affects agroindustrial success or its failure.

The government also has the responsibility to supervise agro-industry, particularly as far as workforce is concerned, since the absorption of workforce is an indicative of social benefits that an industry offers to people in the surrounding environment (Brink & Woerd 2004; Krajnc & Glavic 2003). In addition, it is the government's responsibility to ensure that the existence of agro-industry and its industrial waste do not cause pollution that can degrade the quality of the environment. Statyukha et al (2009), Adams & Ghaly (2007), Halog & Chain (2006) commented that to maintain environmental sustainability, land and water resources must be used wisely and efficiently so that there is no shortage of the resources in the future. The higher the volume of industrial waste, the bigger is the potential of environmental pollution (Glavic & Lukman 2007; Ardebili & Boussabaine 2007; Halog & Chain 2006; Krajnc & Glavic 2003).

**Conclusions.** Seaweed farming in South Konawe district has a number of constraints in terms of the quality of human resource, due to the old age of seaweed farmers, their low educational background, and their reliance on experiences in running the business; Seaweed agro-business can be developed by strengthening the position of seaweed farmers. This can be achieved by establishing an agro-industry, shortening marketing chains so that seaweed products can be directly marketed from farmers to the agro-industry, providing better access to business capital through cooperative agencies and banks, educating farmers via training and mentoring programs that are facilitated by higher educational institutions and the government, and increasing seaweed business efficiency and productivity.

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