

ON-GOING ASSESSMENT OF ISSUES IN THE SEAWEED FARMING INDUSTRY IN SABAH, MALAYSIA

Datu Razali Datu Eranza^{1*}
Arsiah Bahron¹
James Alin¹
Roslinah Mahmud¹
Siti Rahma Malusirang¹

¹Faculty of Business, Economics and Accountancy,
Universiti Malaysia Sabah, Kota Kinabalu, Sabah
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ABSTRACT

This paper provides an insight on the issues in seaweed farming and industry in Semporna, Sabah. The paper reviewed previous work and recent publications that related to the issues in seaweed farming. Eleven issues identified and re-assessed by the authors as follows: (1) unavailability of good quality 'seedlings', (2) pollution in production areas, (3) occurrence of 'ice-ice' and epiphytes, (4) shortage of raw materials, (5) lack of capital to venture into the industry, (6) prolonged processing time in borrowing from financing institutions, (7) poor crop management, and (8) lack of fund for R&D programmes, (9) seaweed farming among Malaysian islanders and immigrants, (10) seaweed farmers and middlemen, and (11) seaweed quality and pricing. The data collection was done through series of fieldwork and telephone interview. The research questions were asked based on open-ended question/interview checklist. The result indicated that not all the 11 issues are affecting the seaweed industry, and the NKEA EPP3 programme does provide a positive impact in commercializing the seaweed industry of Malaysia.

Keywords: seaweed farming, farmers, middlemen, pricing

INTRODUCTION

Seaweed is a commercial coastal production that farms as vary in size with large farms producing millions tones of seaweed per year (Flynn, 2014). Flynn described that not only availability of data and quality for seaweed farming are limited, information about the industry, trade, and regulation is also lacking in the public domain. Further described, most of the academic articles about seaweed farming, with most emphasized on the sustainable practice and effective industrial management.

*Corresponding author's e-mail: drde@ums.edu.my

Table 1 World seaweed production 2009

Rank/ Country	Producer	Red seaweeds	Brown seaweeds	Green seaweeds	Total seaweed production	World (%)
1	China	2,395,370	5,543,485	750	7,939,605	52.20
2	Indonesia	2,965,896			2,965,896	19.50
3	Philippines	1,736,548		3,881	1,740,429	11.40
4	South Korea	211,467	641,697	8,549	861,713	5.70
5	Japan	342,620	181,712		524,332	3.45
6	Chile	159,467	296,712	38	456,217	3.0
7	North Korea		444,300		444,300	2.92
8	Malaysia	138,857			138,857	0.91
9	Zanzibar	102,682			102,682	0.68
10	Vietnam	33,600			33,600	0.22
Top ten total		8,086,507	7,107,906	13,212	15,207,631	100%

* Data referred to annual production (metric tonnes and wet weight basis), obtained from Global Fisheries Production Statistics, FAO.

** For more details depicting 24 countries and sorted by region, refer to Siti Aishah Abdullah.

Source: Siti Aishah Abdullah

Flynn explained that the nature of seaweed farming, brings low concerns regarding potential impacts from effluents, feed, chemical use, disease, predator interactions and the use of wild populations for broodstock¹ or seed. Due to the high intensity of seaweed farming in some areas around the world, there can be impacts surrounding habitat. Despite the concerns, seaweed farming is shown to have minimal environmental impacts. In Malaysia, seaweed was highlighted as one of the most important aquaculture commodity especially on 3rd National Agricultural Policy (1998–2010) by Ministry of Agriculture Malaysia. Back in 1970s, it is part of the development programme introduced by the Government of Malaysia to alleviate poverty. Prime Minister YAB Dato’ Sri Mohd Najib Tun Abdul Razak (2009) mentioned in his 2010 Budget as follow: “Develop food farming industry such as fruits, vegetables, organic farming, herbs, seaweeds and swiftlet nets with an allocation of RM149 million” (p. 15) and “Although the 2010 Budget is the last budget for the 9th Malaysia Plan (9MP) it is the foundation for the development of the new economic model and a precursor to the 10th Malaysia Plan (10MP). We were successful in the past in transforming the economy from agriculture to industrial-based. We now have to shift to a new economic model based on innovation, creativity, and high value-added activities. Only then, we will be able to remain relevant in a competitive global economy” (PP. 2–3).

The topten world seaweed production in 2009 depicted by Siti Aishah Abdullah is as shown in Table 1.

Seaweed Industry Association (2015) in their website where one of the seaweed farmer Mrs. Kabilah Hasan, a seaweed farmer from Kunak, Sabah was awarded the Transformational Power of Broadband Digital Icon 2013. The award was given to her as recognition for her success in transforming her conventional seaweed business into online business venture.

LITERATURE REVIEW

Flynn reported that Asian countries are the majority global seaweed producer, and the seaweed production methods are often similar between countries, and the production methods mentioned by Flynn has two distinct phases in seaweed farming: (1) the indoor hatchery phase, and (2) the sea-based grow out phase. Flynn cited on Redmond (2014) that both sea-and-land based methods have low environmental impacts, and can offer employment and independence for coastal communities. Flynn provides an overview of seaweed that sometimes referred as aquatic plants by organizations, and the production worldwide can be described by country, weight, value, or species. Most seaweed production is classified as brown, red, or green algae. Examples provided by Flynn are as shown in Table 2.

Table 2 General classification of seaweeds

Classification	Species
Red seaweeds	<i>Porphyra</i> spp., <i>Pyropua</i> spp., <i>Gracilaria</i> spp., <i>Kappaphycus</i> spp., <i>Euchema</i> spp.
Brown seaweeds	<i>Laminaria</i> spp., <i>Sacharrina</i> spp., <i>Undaria</i> spp., <i>Sargassum</i> spp.
Green seaweeds	<i>Monostroma</i> spp., <i>Ulva</i> spp.

In Malaysia, seaweed farming assistance programme is developed under EPP3: Mini Estate Farming for Seaweed that is driven by the Department of Fisheries aims to transform the seaweed farming industry into a high-yielding commercial-sale business by clustering farms under the seaweed mini-estate initiative. Through the initiative, total production of seaweed is expected to rise from 13,500 metric tonnes in 2010 to 150,000 metric tonnes in 2020. The expected gross national income (GNI) is RM1,410.6 (mil) and projected jobs by 2020 is about 12,700. The measures under this EPP place emphasis on improving downstream infrastructure and research and development (R&D) efforts to process dry seaweed into high-value products (semi- refined carrageenan and alkaline-treated chips), as well as exploring further uses of seaweed (Economic Transformation

Programme). Other efforts undertaken for this EPP include plans by the Sabah State Government to gazette another 3,000 ha of land for seaweed production. Recently, the ownership of this EPP has been transferred from Universiti Malaysia Sabah to Sabah Department of Fisheries to expedite process and overcome land matters. In 2014, the requirements for land titles and leasing periods were reduced to enable companies to join EPP, with companies possessing three-year temporary operating licences (TOL) from the State Government now allowed to join the programme. A cluster programme was introduced in 2014 to offset the production from mini estate companies and support existing smallholders. The average productivity of the mini-estate and cluster programme increased to 5.52 tonnes per hectare per year in 2014, from 5 tonnes in 2013 (Economic Transformation Programme). Based on the website feed, the several EPP Champions under the ETP EPP3 programme are Avanova Group, Perdana Seaweed Farm, Pertubuhan Peladang Kawasan Semporna, SALS Agriculture, NZH Goodwill Sdn Bhd, VC United Sdn Bhd, Madesjaya Sdn Bhd, Sebangkat Reef Eco-Plant, Ko-Nelayan Negeri Sabah, Kluster Look Butun, Kluster Gelam-Gelam, Kluster Koperasi Bajau Laut, Kluster Kuala Merotai, Permata Sekitar Sdn Bhd, and Department of Fisheries Sabah.

Kaur and Ang (2009) in their seminal talk on ‘Developing the Seaweed Aquaculture Sector in Malaysia’ stated that 42 countries in the world involved in commercial seaweed activity, and top 10 countries contributed 95% of the world’s commercial seaweed volumes (2 million tonnes). Seaweed industry annual production value is at US\$6 billion, China, Japan, Korea, Philippines, and Indonesia produce the bulk valued at US\$250 million mainly for phycocolloid production while Denmark, France, Norway, and USA dominated the manufacturing industry (Kaur & Ang, 2009). Based on one million tonnes cultivated seaweed, Malaysia was contributing 0.4%, with China as the main producer 61.4%, Japan 9.8%, Phillipines 8.3%, North Korea 6.4%, South Korea 6.0%, Indonesia 4.3%, Chile 3.1%, Tanzania 0.5%. However, it was not stated that the type of seaweed being produced by the countries mentioned by Kaur and Ang (2009). Kaur and Ang (2009) stated Sabah was the only state in Malaysia that is producing seaweed commercially, in four districts: Semporna, Lahad Datu, Kudat, and Kunak, and has two seaweed processing mills in Malaysia located in Sabah. They further mentioned that seaweed farming has positive impacts on poverty alleviation among coastal populations. In 2008, the aquaculture production in Sabah as seaweed weighted 31% out of 354,314 tonnes of productions. It is noted that the farm was as large as 960 ha in 205, expanding to 7730 ha in 2008. The families involved also ranged from 583 in 2005 to 950 in 2008. They listed the stakeholders of seaweed farming are Department of Fisheries, Malaysian Fisheries Development Authority, District Office, local universities, Malaysian Agricultural Research and Development Institute, SIRIM Berhad, financial institutions, manufacturing companies and farmers. Kaur and Ang (2009), shortlisted few issues and challenges in the seaweed farming industry, they are: (1) unavailability of good quality ‘seedlings’, (2) pollution in production areas, (3) occurrence of ‘ice-ice’ and epiphytes, (4) shortage of raw materials, (5) lack of capital to venture into the industry, (6) prolonged processing time in borrowing from financing

institutions, (7) poor crop management, and (8) lack of fund for R&D programmes. In spite of the issues and problems facing the seaweed industry in Malaysia, Kaur and Ang (2009) stated that the strengths of seaweed farming in Sabah is the availability of seaweed areas in Sabah, established culture techniques for seaweed farming, low operation cost, and government support and policies with the huge economic potential. Other strengths or opportunity would be capacity and capability building in research and development, application of modern biotechnology in high quality seedling production, exploration of seaweed new cultivation methods, expanding seaweed varieties for production and discovery of seaweed utilization and its products, and development of human resource at technical and non-technical levels through seaweed training, special forum, and seminar on business opportunities.

Sade, Ali and Ariff (2006) mentioned that seaweed is one of the prioritized fisheries commodities under the development of aquaculture industry in Malaysia, particularly in Sabah. On the source, Sade et al. (2006) stated that to the date, seaweed is at negative side, indicated that Malaysia has been importing more seaweed compared to its export value. According to them on that time, the most urgent projects are developing suitable sites for seaweed cultivation, promoting and strengthening existing sites, developing collection and drying centres and also build up seaweed processing plant. At that time, a zoning mechanism was employed as to developing and managing the development of Aquaculture Industrial Zone (AIZ). Apart from that, there are also five major programmes in place, and must be addressed which are logistic and infrastructure, labour and manpower, product quality, transfer of technology, industrial supports, and marketing strategy.

Sade et al. at the time proposed that certain strategic action must be taken place in ensuring product quality such as Code of Practice for Responsible Seaweed Farming and the Standard Operating Procedure. The transfer of technology has been practised in certain identified critical area of either cultivation site or processing plant. Industrial support also needs to be addressed in order to achieve the strategic goals. However, development of human resource technical and non-technical has to be further enhanced through training, special forum, and seminar on business opportunity. For AIZ, the establishment of Aquaculture Industrial Zone (AIZ) is to promote healthy environment, and also to ensure the sustainable development.

Three issues related to seaweed farming in Semporna, Sabah were discussed by Datu Razali, Arsiah and James (2015). The three issues are: (1) seaweed farming among Malaysian islanders and immigrants, (2) seaweed farmers and middlemen, and (3) seaweed quality and pricing.

Issue (1): *Seaweed farming contestation among Malaysian islanders and immigrants.* According to Datu Razali et al. (2015), of their record in 2004, more than half of the 2,061 individuals are involved in seaweed farming inside Tun Sakaran Marine Park

area. Whereby, 90% of the 3,095 metric tonnes Sabah dried seaweed are produced by the seaweed farmers there. It was observed on that time the Park was occupied by illegal immigrants, resulted from civil war, and economically deprived fishermen from Mindanao, Basilan, Sulu, Tawi-Tawi and Sibutu of the Philippines. It has happened that there was a contestation among the newly arrived illegal immigrants, and Malaysian islanders at that time. Claims on land have been overlapping, limited farming area, that resorted the local islanders and new illegals to engage in fish bombing activity.

Issue (2): *Seaweed farmers and middlemen*. The matter is mentioned by Datu Razali et al. (2015) where middlemen are perceived as exploiting the hardcore poor seaweed farmers. Some of the farmers are artisanal fishermen too. Past research entailed that fishing industry has strong bias against middlemen, and middlemen exploiting poor fishermen (Firth, 1996; Eliston, 1967). There is also claim that the Malay fishermen are helpless struggling with the exploitation by the (mainly Chinese) middlemen. Various agencies were set up in order to assist the fishermen/farmers since the past as suggested by Firth (1966), Eliston (1967), and Yap (1978). Trono (1989) and (1990) attributed that the ex-farm gate price fluctuation is due to speculative bubble and bust involving farmers. Rosnah Ismail (2004) concluded that the success of any governmental assistance programme is depending on the attitude and awareness of the target group. It is also noted from the write-up of Rosnah, that any form of governmental or non-governmental assistance is an appreciation and worthiness. View by Sade, Ali and Ariff (2006) is similar to Monzales (2006), the successfulness of seaweed farming is due to the household enterprise element. Interestingly, James Alin (2013) found out that informal credit market are removed from perfect competition and smooth functioning, resulting a symbiotic bilateral relationship between seaweed farmers (fishermen) and middlemen (intermediary) to evolve. He stressed up that seaweed farmers might be poor but that does not necessarily meaning they are lacking of the ability to bargain for fair trade.

Issue (3): *Seaweed quality and pricing*. Datu Razali et al. (2015) reported that the quality of dried seaweed is highly affecting the seaweed price. Some seaweed farmers have mistaken that semi-refinery companies are manipulating the price. As stated by Datu Razali et al. (2015), in good time back in 2008 and 2009, the price fetched up until RM7.00 per kg, compared to RM2.50 to RM2.70 per kg from time to time. Post harvesting process (like cutting off the tie, clearing, drying and packing) would be an influential factor to the seaweed pricing upon reaching the company's compound in Tawau, Sabah. Hence, it takes more than 10 years for the farmers to personally meet up the factory owners. Most of the works for clearing seaweeds, drying it, and transportation are done by the middlemen. It is observed here that middlemen are actually positively contributing to the industrial transactions, proving that the middlemen exploiting farmers could be bias and falsely claimed and perceived.

RESEARCH METHODOLOGY

Based on the several issues mentioned, the authors have conducted a re-assessment on the issues within April – August 2015. Five middlemen and seven representative farmers from several islands area were contacted for data collection.

Research Questions

The research questions are developed based on (1) unavailability of good quality ‘seedlings’, (2) pollution in production areas, (3) occurrence of ‘ice-ice’ and epiphytes, (4) shortage of raw materials, (5) lack of capital to venture into the industry, (6) prolonged processing time in borrowing from financing institutions, (7) poor crop management, and (8) lack of fund for R&D programmes as mentioned by Kaur and Ang (2009) along with the recent issues mentioned by Datu Razali et al. (2015), (9) seaweed farming among malaysian islanders and immigrants, (10) seaweed farmers and middlemen, and lastly (11) seaweed quality and pricing.

Research Instrument

An 11-item question checklist was developed and enquired to the middlemen and farmers on the current status as of 2015. The questions are all open-ended, suggesting that this is a qualitative research. Sampling framed to five persons each for middlemen and farmers category. The sampling technique is by snowball sampling technique with the purpose of confirmatory data accuracy from Person (middleman/farmer) No.1 to No. 5.

Data Collection and Analysis

Data was collected via face-to-face interview, and followed up by telephone call when there is incongruence or confirmatory need to be done. Respondents were called few days earlier before the meet up in Semporna, Tawau, and Kota Kinabalu of Sabah. The data analysis is done qualitatively, as the data is expected to derive from the 11 questions list (open-ended) developed by the authors.

RESEARCH FINDINGS

Based on the data collection and analysis, below are the findings on each of the issues mentioned in the literature review.

(1) Unavailability of Good Quality ‘Seedlings’

Based on the fieldwork visit and interview, it is observed and confirmed by the farmers that seedlings are taken from the matured, harvested seaweed. All of the seedlings used for nurturing and farming are not using any type of wild stock seedlings. All of the seedlings are selected by the farmers and assisted by family members (for household farmers). There is no issue of quality of seedlings observed in field visit. As far as it concerns, size of the seaweed may depend on various factors (like current, methods) that not solely restricted for being factored by seedlings.

(2) Pollution in Production Areas

Due to constant inspection by government authorities of Malaysia, pollution is unlikely to happen. The major issue on previous time was only fish bombing. Due to the restriction and considerable as an act of crime, fish bombing is rarely seen. The pollution concern here most probably is the usage of water bottle as the floater of tying the seaweed. Introduction of new floaters are considerably expensive and financially constrained to obtain. Hence, some of the farming sites are still using the water bottle floaters. Observation made by the researchers shown that farming companies’ workers are aware of pollution concern, and proper bin is used for discarding the trash. One of the influential factors of being eco-friendly is some of the farming sites nearby are used for raring fish. Another factor to consider would be the mindset of getting the place clean in order to obtain (avoid?) being inspected and assessed by enforcement officers from various agencies.

(3) Occurrence of ‘Ice-ice’ and Epiphytes

Occurrence of ice-ice is mostly reported in Omadal Island area and nearby. Apart from there, most of the areas are suitable for seaweed farming and have less problems with ice-ice.

(4) Shortage of Raw Materials

Shortage of raw materials has always been a misplaced issue among the farmers. It happens when there is special aid to the farmers and fishermen. Previously without funding, some farmers are self-sustain. The successfulness of farming seaweed can be relied on the material supply by government or agencies, or even without it. The authors hereby are not to contest the benefit given by the Government, by all means the idea is to project and increase a higher income and alternative livelihood for the locals. Since 1990s up until 2000s, the Government has special aid to the farmers, which is granted under National Key Economic Area EPP3. Upstream and downstream technologies are

developed to increase the farming capacity and to induce the entrepreneurial activities among the household members who are farming seaweed. The boom of the entrepreneurial motivation generates various types of end product in the late 2000s–2013. For the researcher, it would be fair to mention that motivation and morale other than supply of raw materials are considerable factors for the successfulness of farming seaweed.

(5) Lack of Capital to Venture into the Industry

Farming seaweed requires intensive labour few sessions per day as for tying up new seedling, farming, harvesting, cleaning, and packing before selling it to middlemen or factory. The game play is different when it comes to processing products (semi-refinery items) and finishing products for end users to consume. Semi-refinery technology requires huge capital that is considerably not cheap to purchase, yet it requires expertise, science knowledge and officers, etc. However, it is not profoundly to say that the expertise, knowledge and skills are not learnable, but it uses a large sum of money to pay off the operating cost. The only venture that considerable to access in would be developing end products like juices, soaps, foods and others that consumable. What would be lacking is the intellectual capital of know-how. Capital here as agreed by the authors is not financial capital but rather the investment into their knowledge, training to be provided, seminar, hands-on workshop for the locals to enable them to come up with ideas of products. Capital of know-how to transform ideas into actual products would be the main challenge to locals or household members that wish to penetrate the industry and becoming entrepreneurs.

(6) Prolonged Processing Time in Borrowing from Financing Institutions

The issue is well discussed by Alin et al. The middlemen is a great factor in resolving or easing the financial difficulties of the farmers. In another way to say, the middlemen carry a greater risk of not receiving the dried seaweed as promised by the farmers. Various compromising factors would be natural causes such as fish consumption on seaweed, unsettling weathers, safety concern (kidnap, terrorists?), and most importantly farmers' attitude. The attitude of the farmers is often influenced by the political activities such as developmental projects, and fishing boat assistance from the government. The offset of farming seaweed is always generated by other un-planned income. Financial institutions would give a high impact to the farmers to develop their farming site and drying platform but the major concern that seem to be forgotten by a lot of venturing (often failed) companies since the past is the profit calculation of seaweed farming is targeted based on the size of land applied/occupied, and not based on the labour that can be provided by the labourers. Datu Razali dan Alin have written papers regarding on the matter. It is the issue of the extra hand whether or not capable to perform the farming activities in the given site. It is strongly being advocated here that financing institutions

would be a great help, but whether or not the micro credit process is easy to get through since formal institutions required documentation and guarantee. It is not a time issue but rather of an approval issue.

(7) Poor Crop Management

Several visits made and interview with the local farmers and middlemen, crop management have been improved from time to time since the 1990's to mid 2010's. Government has come up with farming practices that promote clean seaweed drying (on platform). The guideline was set up and established by the Department of Fisheries Malaysia.

(8) Lack of Fund for R&D Programmes

Research and development (R&D) is certainly important. Government has initiated the fund NKEA EPP3. The NKEA EPP3 is under the Agriculture National Key Economic Area programme. It is a programme that focuses on transforming a traditionally small-scale, production-based sector into a large scale agribusiness industry that contributes to economic growth and sustainability. This transformation is based on integrated and market-centric model that comprises for key themes: capitalizing on competitive advantages, tapping premium markets, aligning food security objectives with increasing national gross income (GNI), and participating in the regional agricultural value chain. Sixteen entry point projects have been identified to spur the growth of this sector, and seaweed industry is under EPP3: Mini-Estate Farming for Seaweed.

(9) Seaweed Farming among Malaysian Islanders and Immigrants

Enforcement under the ESSCOM in strengthening the security in Sabah islands areas of Semporna, Lahad Datu, Kunak, Sandakan. There is less contestation for sea land now as the Tun Sakaran Marine Park is managed by Sabah Park. Documentation and sea land occupancy require approval and permit by district offices. Lesser immigrants are reported coming into Semporna now. The indication is based on feedback from the locals that run business in market, public transport, and grocery stores. Furthermore, the NKEA EPP3 has accepted several companies to be the pioneer/champion companies for its purpose, which has given a proper zoning for companies to farm seaweed.

(10) Seaweed Farmers and Middlemen

Based on the earlier discussion related to issue no. 6, there seem to be no problem between farmers and middlemen. Middlemen in Semporna have become the actual catalyst for the transaction between semi-refinery companies and farmers. Middlemen

also acted as money lender for fund start up that would not abuse the farmers (seem to be different than other countries) as the middlemen are depending on the farmers to farm. Greater risk is placed at them. Apart from these, middlemen also acted in exporting the seaweed to Peninsula Malaysia, and China. Without the middlemen, the industry would have difficulties to create multiple economic activities that provide economic access to various levels of farmers, producers, collectors, exporters and others.

(11) Seaweed Quality and Pricing

Seaweed quality and pricing issue have been tackled and resolved by the semi-refinery companies where the companies are accounting additional RM0.30-0.50 for cleaning purposes. In year 2009 and 2010, meetings between companies and farmers to discuss on how dried seaweed affecting production rush on seaweed, leads to immature harvesting, unclean drying and untying, that finally gave effect to the pricing. Hence, the companies and middlemen (since early time itself) have taken their liberty in accounted additional cost for cleaner dried seaweed without the nylon rope and other alien/foreign materials in packing. As told by the companies, the nylon and other foreign materials would damage the machine, and the grinded powder would have foreign colour powder resulted from the colour of the nylon rope.

CONCLUSION

Seaweed farming in Semporna still has a great potential. Sea water quality provides a pulling factor for its farming. Somehow, Semporna if able to get the community to farm in large scale, would be a good start up point in revolutionizing the local economy regardless with or without government financial assistance, as much as foreign governments would assist mostly on fair procedure, policy, and zoning and land occupancy matter. Seaweed associations in foreign countries also are giving a high positive impact on seaweed farming. Malaysia, with such great assistance surely would boost the commercialization of seaweed farming and its industry. The successfulness of seaweed farming is a focal point that is getting clearer and sharper from time to time. It is hoped that (as seen as it is now) the selected champion companies would able to expand their operations and changing the seaweed farming industry in Semporna.

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