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RESEARCH ARTICLE

5R-BASED CHARACTER STRENGTHENING MODEL TO SUPPORT HALAL AQUACULTURE INDUSTRY PRACTITIONERS THROUGH GOOD WATER QUALITY MANAGEMENT AND SAFE MACHINERY OPERATION

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ABSTRACT

This research aims to design 5R character-based halal industry players (Ringkas, Rapi, Resik, Rawat, Rajin) or 5S (Sort, Set in Order, Shine, Standardize, Sustain), as well as their debriefing for UNY and IIUM students in supporting the Halal industry related to Good Aquaculture Practices. This area has been selected, due to some factors. The first is the occurrence of several cases of aquaculture products that changed status from being permissible to become impermissible due to the external factors, for example, the fact that the water quality is bad and contaminated with harmful chemical substances. Water quality is the most important factor affecting fish health and performance in aquaculture production system. Secondly the fish nutrition and feeding are mixed with unclean and filthy ingredients. Thirdly, it is exposed to the risk of contamination from the equipment, which eventually affects halal integrity. Halal products cannot be prepared, processed, or manufactured using equipment that is contaminated with non-halal substances (unclean defined by Shariah). Contamination can be caused by equipment that is contaminated or used together with non-halal products. Therefore, equipment and machinery used in the halal aquaculture industry play a very important role to ensure halal integrity. This paper uses a library and literature review approach. It is expected that with the arrangement of 5R or 5S-based character strengthening design, the operators of Aquaculture Industry may preserve Halal Supply Chain.

KEYWORDS

5R characters, water management, halal industry, safe machinery

1. INTRODUCTION

Water management, equipment, and hazardous activities are some of the primary obstacles and problems that occur in the halal aquaculture business. These concerns will be addressed, and the article's goal is to provide the 5R character-based halal industry participants model, with a focus on those who design and operate the machinery used, because aquaculture equipment is necessary regardless of the type of fish produced. Good aquaculture practises are described as the creation and implementation of preventative measures to meet the demands of all culture methods, environmental conditions, and species. It is critical that aquaculture stakeholders engage in the development of the system since it will be used to regulate the process and reduce risk (Fornshell & Hinshaw, 2009). Aquaculture practises that are well-executed can also help in disease prevention (Sapkota et al., 2008). Players who understand the system are less likely to abuse chemotherapeutic medicines (Bagumire et al., 2009). The risk management system may use the Hazard Analysis Critical Control Point (HACCP) principles as a tool to ensure that infections and diseases are not transmitted in aquaculture operations. HACCP principles may be used in both freshwater and marine aquaculture systems to identify and manage hazards that occur throughout the production process (Serfling, 2015).

Table 1: Aquaculture productivity in Malaysia

Year	Productivity (million)
2012	0.634
2011	0.527
2010	0.581
2009	0.472
2008	0.354
2007	0.269
2006	0.212

Source: FAO (2013)

Food safety, security, and quality are major concerns all over the globe, and aquaculture is a key business that contributes to social and economic development. It is especially essential for Muslims, whose food must be halal (permissible under Islamic law) and Tayyib (kosher) (safe, hygiene, wholesome, clean, good). The world is expected to have more than 8 billion people by 2025, with many cities in affluent countries likely to see population increase. The urban population is expected to exceed four

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billion people by 2025, making it critical to guarantee that demand for food supply is satisfied. As seen in Figure 1, Indonesia's output in 2014 followed behind China and was slightly ahead of India. This is all the more surprising given that, in 2014, more than 80% of Indonesia's fisheries companies were still traditional home enterprises and fishermen using limited technology. Thus, with the proper transfer of knowledge and technology of optimal aquaculture techniques, Indonesia is well positioned to solidify its place as one of the world's top aquaculture nations. This provides equivalent growth potential for businesses that can assist in the modernisation of Indonesia's fisheries. Aside from that, income is expected to rise, leading to an increase in food consumption (Khan et al., 2011). Increased food production is unavoidable, but it is critical to employ safe and ecologically sustainable technologies in the process (Tacon et al., 2009). Aquaculture accounts for almost half of all fish consumption on the world. To guarantee a fair level of life, about 24 million people rely on aquaculture's long-term viability (Mekouar, 2013).

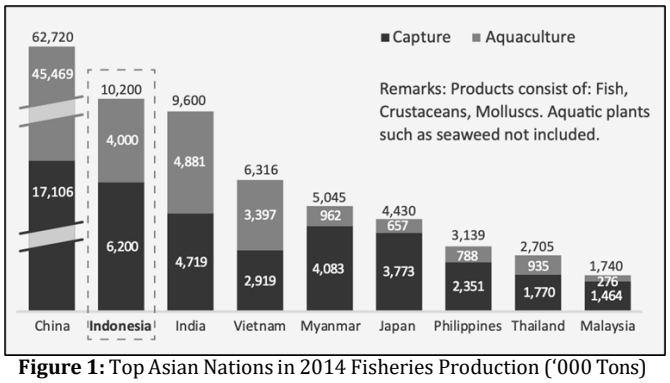

Figure 1: Top Asian Nations in 2014 Fisheries Production ('000 Tons) Source: OECD-FAO Agricultural Outlook

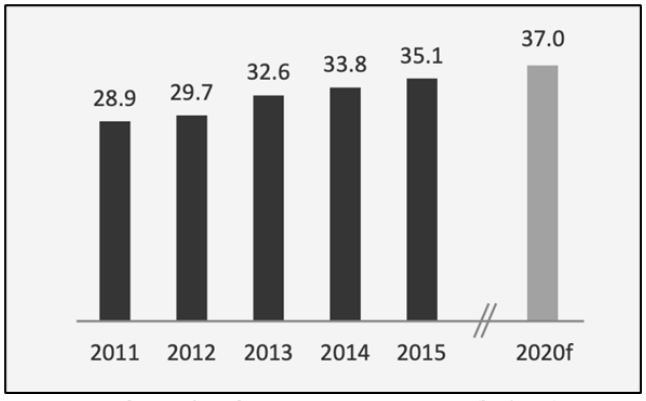

Figure 2: Indonesia's Fish Consumption per capita (kg/year) Source: OECD-FAO Agricultural Outlook

The fact that essential commodities such as fish and shrimp continue to enjoy high local and international demand is the major development engine for Indonesia's fisheries. The biggest internal issue is that the archipelago nation of over 250 million people consumes a lot of seafood. In 2014, per capita fish intake was projected to be 33.76 kilogramme per year.

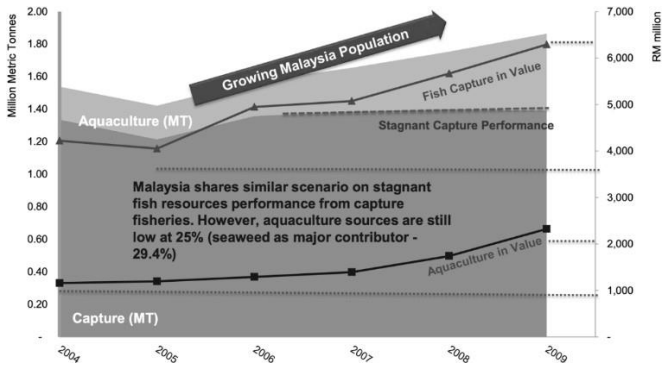

Figure 3: Malaysian Fisheries and Aquaculture Performance. Source: FAO (2009)

2. Essential Equipment

In the halal business, equipment is quite important. When it comes to machinery, the designers must be well prepared in order to produce the most efficient and effective equipment. The 5R characters-based industry participants are crucial in evaluating the quality and safety of the goods, particularly in the secondary sector of processing, as well as in the final products and tertiary sector.

Some examples of linked required equipment that must be well-made and regulated are:

2.1 Pumps

This equipment is critical, especially if the fishery is using the traditional method of placing fish tanks or net enclosures inside a body of water. During hot weather, evaporation and splashing cause the water level to drop. Pumps replenish the tiny ponds or lakes used for fish farming with fresh water from a bigger nearby freshwater source to guarantee the fish have an appropriate supply of fresh water. The farmer removes the water from the pond at the conclusion of the growing season. The farmer drains the water from the pond at the conclusion of a growth cycle, or at the end of the growing season in locations where the pond freezes. He also makes use of the pumps for this. In certain places, particularly when the fish farm may be maintained all year, the pumps transport spent water to a recycling pool where sophisticated procedures remove pollutants. The pump then returns the clean water to the fish tank, where it will be used with a fresh hatch of fish.

Pond pumps are classified into two types: centrifugal and turbine. Centrifugal pumps installed horizontally along the edge of a fishpond or lake. Vertical installation of turbine pumps. Both methods are effective in moving water.

2.2 Aeration Devices

Even with pumps circulating water into and out of the fish-growing water source, aeration devices may be required to provide the fish with an appropriate amount of oxygen. Aeration devices also allow you to keep more fish in less area. Recirculation aquaculture systems, or RAS, are allowing fish producers to raise fish within tanks located in buildings. Aeration devices also make it easier to recycle water once pollutants have been removed.

Figure 4: For cultural species, the use of aerators and regular water-quality monitoring are critical measures for maintaining a high level of quality in their environment. (Source: Schwarz et al., 2010)

2.3 Seine Reels

Seine reels are used to catch fish from the water when it is time to harvest them. The seine sinks to the pond or lake's bottom. The reel begins to gather in the outer borders of the seine with the help of a tractor on shore with a power take off. As it moves, the seine collects fish in its net. The reel drags the fish inside the net to shore, where they are transferred to sorting or grading equipment by special hoists. The aerators must run at full speed during the collecting process to supply oxygen to the fish when they are in close proximity to one another.

2.4 Material Handling and Grading Equipment

When you catch the fish, you must grade them based on their size. Belts quickly transport fish from the net to the holding tank. Grading equipment may classify them into up to three distinct grades during the transfer. At this stage, you can also count the fish using counting tools. Once the fish have been sorted, they are loaded onto transfer tank trucks equipped with specific aerators. Tank trucks transport the fish to market.

3. Halal Aquaculture Industry Sustainability

According to the Cambridge English Dictionary, the term “sustainable” has two meanings. Long-term indicates “able to continue throughout time,” but in terms of the environment, it means “creating little or no damage to the environment and therefore able to continue for a long time.” The term “sustainable” in the context of aquaculture technology may be interpreted differently by different agencies or aquaculture producers.

The Food and Agriculture Organization of the United Nations (FAO) defines "sustainability" in respect to agricultural, forestry, and fisheries standards as follows: "Sustainable development is the management and protection of the natural resource base, as well as the orientation of technical and institutional change to assure the accomplishment and sustained fulfilment of human needs for current and future generations." Such sustainable development (in agriculture, forestry, and fisheries) conserves land, water, plant and animal genetic resources, is ecologically friendly, technically feasible, commercially successful, and socially acceptable" (Fezzardi et al., 2013).

The FAO also emphasized six requirements for building a sustainable aquaculture. To begin, farmers should generate a reasonable profit from their produce. Second, expenditures and income must be shared in an equitable manner. Third, a viable aquaculture must be capable of creating jobs. It must also be capable of feeding the entire globe. In terms of the environment, natural resources must be appropriately safeguarded for the use of future generations. Finally, aquaculture production must be handled methodically, with the participation of well-organized government and industry. The goal of building a sustainable aquaculture is to build wealthier and healthy communities, as well as to provide more work possibilities for the disadvantaged in order to improve their living circumstances and to empower farmers and women (Organization, 2018).

According to the World Bank, an aquaculture system is only deemed sustainable if it contains the following three elements: environmental sustainability, economic sustainability, and social and community sustainability (Food and Agriculture Organization of the United Nations, 2014). The term “environmental sustainability” refers to an aquaculture system that does not destroy biodiversity or create significant environmental damage. The following phase is economic development, which focuses on developing a sustainable business opportunity with long-term possibilities through aquaculture. Finally, aquaculture must fulfil its social responsibility by contributing to the expansion of community well-being in order to ensure social and communal sustainability.

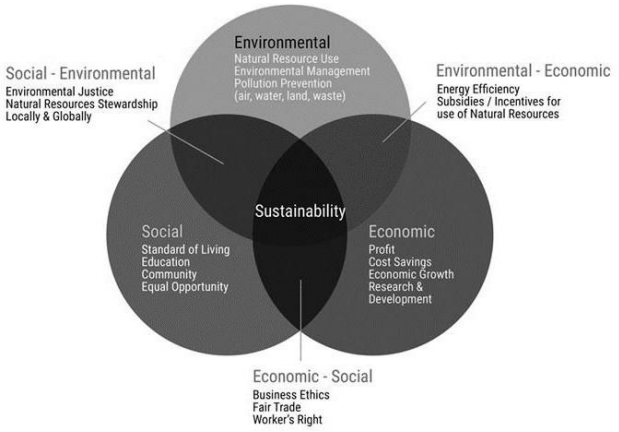

Figure 5: The Three Spheres of Sustainability (Source: T (2018)

They see sustainability differently from the Worldfish Center, focusing on creating sustainable aquaculture production growth in non-developing nations where aquaculture is still in its early stages and there is a strong reliance on fish for sustenance. As an international non-profit research organisation, their objective is to guarantee that impoverished farmer communities benefit from nutritional and economic stability, or to eliminate poverty and hunger. In order to attain this goal, the Worldfish Centre is now doing research in the domains of fish breeds and genetics, fish health, nutrition, and feeds, as well as aquaculture systems (Organization, 2017).

Sustainability is defined as the management of natural resources, economic stability, and the expansion of social well-being. Shariah enforcement, on the other hand, is primarily concerned with food safety measures and guidelines, such as methods to prevent contamination and maintaining a good code of conduct in aquaculture practises in order to produce halal, wholesome, and hygienic fish animals for human use.

4. The Importance of The Halal Supply Chain in Protecting Consumer Rights

In terms of protecting customers' rights, the halal supply chain appears to be promising. According to a study conducted by some researcher on the relationship between each component of halal food supply chain knowledge and purchase intention, knowledge about halal slaughtering, handling and storage, and packaging is the best indicator of consumers' purchase intention for halal food for slaughtered animals. Concerning aquaculture techniques that do not entail slaughtering, customers are nevertheless encouraged to know the status of the goods they get in order to guarantee that their rights in terms of the safety and wholesomeness of their consumption are protected.

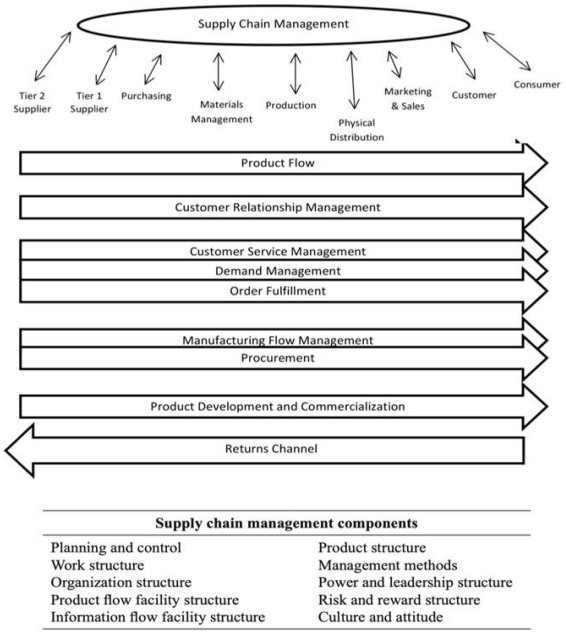

Figure 6: Conventional supply chain framework Source: Cooper, Lambert, and Pagh (1997)

Table 2: Differences between conventional and halal supply chains

Elements	Conventional Supply Chain	Halal Supply Chain
Definition	Involves the coordination of production, inventory, location, and transportation between the participants in the supply chain, with the aim to achieve the best responsiveness and efficiency in the market presented	Covers everything from the preparation and enforcement of halal ingredients to be manufactured and delivering the final product to the customer, according to Shari’ah law.
Objective	Minimize cost, maximize profit	Preserves the integrity of halal food and to ensure the food is halal and toyyib.
Cross-contamination occurrence	Possibilities of cross-contamination exists	Avoids direct contact with haram goods, manages the risk of cross-contamination between halal and haram goods, ensures supply chain management is in line with Muslim consumers’ perception (Tieman, 2011)
Segregation needs	Mixing of halal and non-halal cargo	Segregation of halal products from non-halal products; requires dedicated halal facilities

Adapted from: Mohd Bahrudin et al. (2011)

5. As A Solution, 5R Based-Characteristics of Operators

The success of effective aquaculture practises is also heavily dependant on the practises of aquaculture farmers (Gawde et al., 2006). All related actions must be thoroughly regulated, monitored, and assessed to ensure that the best technical experience is acquired.

Unsustainable aquaculture practises would almost definitely result in environmental degradation, disrupting the natural equilibrium of ecosystems. The implications are even more severe in regions near aquaculture systems (Witus & Leong, 2016). As a result, it is critical to consider both the environmental repercussions and the solutions that can assist avoid terrible things from happening. Such ethical aquaculture practises must be implemented to ensure long-term production sustainability (Lotze et al., 2006). Good aquaculture methods for recirculating aquaculture system (RAS) design also allowed for optimal size of support-system components in order to ensure suitable water-quality parameters for the species under production.

Table 3: Optimum values for major water-quality parameters.

Parameter	Optimum Concentration	Frequency of Monitoring
Dissolved oxygen	> 4.0 mg/l	Twice daily in ponds, more frequently in RAS
pH	6.5-8.5	Twice weekly in ponds, several times daily in RAS
Alkalinity	Minimum of 50 mg/l, 100-400 mg/l preferred	Several times a year in ponds, 2-3 times per week in RAS
Hardness	Same as alkalinity	Same as alkalinity
Ammonia (NH3)	< 0.15 mg/l	Twice weekly in ponds, once daily in RAS
Nitrate (NO3)	< 50 mg/l	Once daily in RAS
Nitrite (NO2)	< 0.5 mg/l in low-chloride water	Weekly in ponds, once daily in RAS
Hydrogen sulfide	< 0.15 mg/l	Upon initial use and periodically throughout season

Source: Schwarz et al., 2010

Good aquaculture practises must be enforced since they help to protect the ecosystem and the environment's surrounds. Certain safeguards must be included to ensure the system's long-term survival (Othman, 2010). Environmental sustainability and safety must be prioritised in order to be sustainable and responsible. Aside from that, healthy aquaculture practises are significantly associated with enhanced production and product quality (Witus & Leong, 2016). Good management practises can not only enhance efficiency and quality, but they can also contribute to increased profitability (Kastens et al., 2021).

Numerous researches on aquaculture development have been done in the previous decade (Anh et al., 2011; Banu & Christianus, 2016; Chuah et al., 2016; Idris et al., 2013; Khan et al., 2011; Lebel et al., 2013; Tacon, 2017). These studies took part in analysing the instances and offering recommendations to improve the situation. One of the most essential decision-making processes in aquaculture is the selection of a site that is relevant to the species produced (Khan et al., 2011; Nurdjana, 2006). It is also critical to use the best culture system (Fornshell & Hinshaw, 2009; Husen & Sharma, 2014), to find the best feed and feeding applications (Tacon, 2002, 2017; Tacon & Metian, 2009), to implement a bioremediation system (Hai, 2015), to use proper waste management (Akinrotimi et al., 2011), and to manage compliance certification (Martinez-Porchas & Martinez-Cordova, 2012).

To improve aquaculture methods, biological, chemical, and physical safeguards are implemented. Biological practises include the safe use of chemotherapeutic drugs as well as the correct function of vaccinations in infection therapy. Furthermore, separation from incoming seed stock is critical for preventing the spread of hazardous diseases (Serfling, 2015). Chemical activities are employed in the preparation of goods before they are put into aquaculture farms. This is significant because vectors and pathogens are expected to develop more slowly as a result. Several chemical practises include water chlorination or ozonation, as well as treating potential vectors such as clothing, boots, and equipment with chlorine and iodine (Sapkota et al., 2008). In aquaculture facilities, physical practises are taken out to reduce vector pollution (Anh et al., 2011).

6. Conclusion

The halal supply chain is a method that employs the idea of halalan tayyiban compliance with Islamic law across the supply chain, beginning with the sources of supply and ending with the customers. The procedures involved include warehousing, sourcing, shipping, product handling, inventory management, procurement, and order management, all of which must adhere to Shariah law. Along with these procedures, there are several chances that a food product will be subjected to non-halal components as well as dangers that could be biological, chemical, or physical in nature, therefore altering the halalan tayyiban status of the product.

Aquaculture is a farming-related practise that involves the regulated growth of aquatic organisms in controlled environments. One of the most significant elements determining the effectiveness of aquaculture production is the application of management practises. The appropriate implementation of management practises results in output sustainability. Production sustainability is critical to ensuring a high degree of efficiency and finished goods quality. Water is very highly valued in Islam, and the aquaculture method employed determines the constancy of the bodies of water. It is critical to remember that water quality is critical for all living beings on the earth. Since a result, proper aquaculture practises are heavily encouraged, as we must preserve the water, animals, and the sanitation of the water supply.

Summary

Aquaculture activities must be designed in such a way that the harmony of the ecosystem is not disrupted. The necessity of having a structure that allows everything to be done in a methodical manner is also emphasised in the Quran. As khalifah, it is our responsibility to establish a moral and intellectual aquaculture system that is environmentally friendly and does not affect the environment.

Quality is one of the most important components of excellent fish farming. There are also certain Quranic verses regarding quality control, competitiveness, performance, and effectiveness, all of which are signs of success if correctly applied. One way to achieve this goal, is that the application of 5R character-based halal industry players model (Ringkas, Rapi, Resik, Rawat, Rajin) or 5S (Sort, Set in Order, Shine, Standardize, Sustain) is also recommended.

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References

Tacon, A.G.J. 2017. Biosecure Shrimp Feeds and Feeding Practices: Guidelines for Future Development, J. World Aquac. Soc., 48(3), pp. 381–392.

Tacon, A.G.J. 2002. Thematic Review of Feeds and Feed Management Practices in Shrimp Aquaculture, Intellect. Prop., 69.

Husen, A., Sharma, S. 2014. Efficacy of Anesthetics for Reducing Stress in Fish During Aquaculture Practices- a Review, J. Sci. Eng. Technol., 10(1), pp. 104–123.

Adura, Fara, Yusoff, Mohd, Nerina, Raja, Raja Yusof, Raja, Siti, Hussin, Siti Rahayu. 2015. Halal Food Supply Chain Knowledge and Purchase Intention. International Journal of Economics and Management, 9, pp. 155-172.

Bagumire, A., Todd, E.C., Muyanja, C., Nasinyama, G.W. 2009. National food safety control systems in Sub-Saharan Africa: Does Uganda's aquaculture control system meet international requirements. Food Policy, 34(5), pp. 458–467. https://doi.org/10.1016/j.foodpol.2009.05.002

Cooper, M., Lambert, D., Pagh, J. 1997. Supply Chain Management: More Than a New Name for Logistics. International Journal of Logistics Management, 8(1), pp. 1–14.

Fezzardi, D., Massa, F., Àvila-Zaragoza, P., Rad, F., Yucel-Gier, G., Deniz, H., Hadj, M., Hamza, H.A., Salem, S. 2013. Indicators for sustainable aquaculture in Mediterranean and Black Sea countries. Guide for the use of indicators to monitor sustainable development of aquaculture. 10.13140/2.1.3789.5366.

Food and Agriculture Organization of the United Nations. 2014. The State of the World Fisheries and Aquaculture 2014: Opportunities and Challenges (State of World Fisheries and Aquaculture). FAO.

Fornshell, G., Hinshaw, J.M. 2009. Better Management Practices for Flow-Through Aquaculture Systems. Environmental Best Management Practices for Aquaculture, pp. 331-388. https://doi.org/10.1002/9780813818672.ch9

Lotze, H., et al. 2006. Depletion, degradation, and recovery potential of estuaries and coastal seas, Science, 80(312), pp. 1806–1809.

Witus, I.W., W.V. Leong. 2016. Aquaculture in Malaysia: A short review on current policy and legislation, Trans. Sci. Technol., 3(1–2), pp. 150–154.

Idris, K., Shaffril, H.A.M., D Silva, J.L., Man, N. 2013. Identifying Problems among Seabass Brackish-Water Cage Entrepreneurs in Malaysia, Asian Soc. Sci., 9(9), pp. 249–256.

Kastens, Terry, Dhuyvetter, Kevin, Nivens, Heather. 2021. Management Factors: What is Important, Prices, Yields, Costs, or Technology Adoption? (updated November 2001 - data from 1990-1999).

Khan, M.A., Khan, S., Miyan, K. 2011. Aquaculture as a food production system: A review. Biology and Medicine, 3(2), pp. 291-302.

Chuah, L.O., Effarizah, M.E., Goni, A.M., Rusul, G. 2016. Antibiotic Application and Emergence of Multiple Antibiotic Resistance (MAR) in Global Catfish Aquaculture, Curr. Environ. Heal. reports, 3(2), pp. 118–127.

Nurdjana, M.L. 2006. Indonesian aquaculture development, Tech. Pap. Present. FFTC-RCA Int. Work. Innov. Technol. Ecofriendly Fish Farm Manag. Prod. Safe Aquac. Foods, 3, pp. 56–70.

Gawde, M.M., Chandge, M.S., Shirdankar, M.M. 2006. Adoption of Improved Aquaculture Practices By, Adopt. Improv. Aquac. Pract. By Shrimp Farmers South Konkan Reg. Maharashtra, India, 6(2), pp. 1–8.

Martinez-Porchas, M., Martinez-Cordova, L.R. 2012. World aquaculture: Environmental impacts and troubleshooting alternatives, Sci. World J.

Othman, M. 2010. Challenges Ahead in Meeting Aquaculture Production in Malaysia Under the Third National Agricultural Policy, Nap3 (1998-2010), Aquac. Res. Center, Minist. Agric., 3.

Mohd Bahrudin, S.S., Ilyas, M.I., Desa, M.I. 2011. Tracking and Tracing Technology for Halal Product Integrity Over the Supply Chain. Paper presented at the International Conference on Electronic Engineering and Informatics, Bandung, Indonesia.

Mekouar, M.A. 2013. Food and Agriculture Organization (FAO). Yearbook of International Environmental Law, 24(1), pp. 587–602. https://doi.org/10.1093/yiel/yvu027

Hai, N.V. 2015. The use of probiotics in aquaculture, J. Appl. Microbiol., 119(4), pp. 917–935.

Akinrotimi, O.A., Abu, O.M.G., Aranyo, A.A. 2011. Environmental Friendly Aquaculture Key To Sustainable Fish Farming Development in Nigeria, Cont. J. Fish. Aquat. Sci., 5(2), pp. 17–31.

Omar, Emi Normalina, Jaafar, Harlina. 2011. Halal supply chain in the food industry - A conceptual model, pp. 384-389.

Organization, F.A.A. 2017. World Aquaculture 2015: A Brief Overview (Fao Fisheries Aquaculture Circular). Food & Agriculture Organization.

Organization, F.A.A. 2018. The State of World Fisheries and Aquaculture 2018 (SOFIA): Meeting the Sustainable Development Goals [E-book]. Food & Agriculture Organization.

Lebel, P., et al. 2013. River-Based Cage Aquaculture of Tilapia in Northern Thailand: Sustainability of Rearing and Business Practices, Nat. Resour., 4(5), pp. 410–421.

Anh, P.T., MyDieu, T.T., Mol, A.P.J., Kroeze, C., Bush, S.R. 2011. Towards eco-agro industrial clusters in aquatic production: The case of shrimp processing industry in Vietnam, J. Clean. Prod., 19(17–18), pp. 2107–2118.

Banu, R., Christianus, A. 2016. Giant Freshwater Prawn Macrobrachium rosenbergii Farming: A Review on its Current Status and Prospective in Malaysia, J. Aquac. Res. Dev., 7(4), pp. 3–7.

Samah, R., Kamaruddin, R. 2015. The Influence of Socio- Demographic Factors in Adopting Good Aquaculture Practices: Case of Aquaculture Farmers in Malaysia, J. Sustain. Dev., 8(9), pp. 97.

Sapkota, A., Sapkota, A.R., Kucharski, M., Burke, J., McKenzie, S., Walker, P., Lawrence, R. 2008. Aquaculture practices and potential human health risks: Current knowledge and future priorities. Environment International, 34(8), pp. 1215–1226. https://doi.org/10.1016/j.envint.2008.04.009

Serfling, S. 2015. Good aquaculture practices to reduce the use of chemotherapeutic agents, minimize bacterial resistance, and control product quality. Bull Fish Res Agen, 40, pp. 83-88.

Schwarz, Michael, Jahncke, Michael, Lazur, Andrew. 2010. Overview of Good Aquaculture Practices 600-054. Virginia Tech Cooperative Extension Fact Sheet-600-054.

Tacon, A.G.J., Metian, M., Hasan, M.R. 2009. Feed ingredients and fertilizers for farmed aquatic animals. Sources and composition. FAO Fisheries and Aquaculture technical paper, 540. FAO, Roma, Italy.

Talib, Faisal, Rahman, Zillur, Qureshi, M. 2010. The relationship between total quality management and quality performance in the service industry: A theoretical model. International Journal of Business, Management and Social Sciences, 1.

Tieman, M., Ghazali, M.C., van der Vorst, J.G.A.J. 2013. Consumer Perception on Halal Meat Logistics. British Food Journal, 115(8), pp. 1112–1129.

Tieman, M. 2011. The application of Halal in supply chain management: in-depth interviews. Journal of Islamic Marketing, 2(2), pp. 186–195.

World Halal Forum. 2009. A critical reflection of the Global Halal Industry. The executive review, pp. 10-16.

Zailani, S., Iranmanesh, M., Aziz, A.A., Kanapathy, K. 2017. Halal logistics opportunities and challenges. Journal of Islamic Marketing, 8(1), pp. 127–139. https://doi.org/10.1108/jima-04-2015-0028