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STRATEGIC INFORMATION SYSTEM, SUPPLY CHAIN PERFORMANCE AND OPERATIONAL PERFORMANCE IN THE FISHING INDUSTRY: A CONCEPTUAL MODEL

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***Abstract*—Information system plays an important role in improving supply chain performance and operational performance. This article reviews several articles related to information system, supply chain and operational performance in the fishing industry. This article proposes a preliminary model which can be used to test the theory in the fishing industry. The future study will apply a survey to collect all information and generalise the model. This study found a gap in research areas and suggest future research should test the relationship between variables. Most of the existence articles are focused on service and manufacture industry and few research studies the relation between the third issues.**

***Keywords*—Information System, Supply Chain Performance, Operational Performance, Fishing Industry**

I. INTRODUCTION

The current technological sophistication has a significant impact on the changes and desires of consumers to achieve their level of satisfaction. Consumers today are very spoiled by the existence of online trading that gives consumers the opportunity to get the items they want to buy without the place of direct selling. Consumers with models like this are the type of consumers who are busy or want to shop economically without spending other costs to get the desired item. A variety of products are currently offered, from services to products. Based on this, consumer behaviour will have an impact on other products such as fish commodities that are always consumed by consumers every day which is guaranteed quality and safety.

Consumers in general will benefit from the existence of a fish supply chain information system. Consumers will get information through their smartphone devices about the details of the fish products they will consume. Information about fish species, fishing grounds, and date of arrest can be an integral part of the fish supply chain information system. In addition to price information, such basic information is not currently given to consumers. Similar information as stated earlier can provide a positive image of the consumer to the seller so that they will come back to make the next purchase because of a guarantee from the seller.

From the side of the business actors involved starting from upstream to downstream, they will also get positive benefits from the application of this fish supply chain information system. Fish quality assurance provided by parties involved directly or indirectly will ensure the sustainability of the business and increase profits. This information system will also provide security to consumers in consuming fish products provided by businesses. Both of these aspects will increase trust in consumers and reduce negative impacts that may be caused by information transparency from upstream to downstream.

However, fulfilling the desires of consumers with this facility has not received the main priority from stakeholders in the fish supply chain. This is also influenced by the absence of strict rules regarding the obligation to every business actor to record the origin and process used in producing products which will then be conveyed to end consumers as a reference in their decision making. The level of education also has an impact on the lack of knowledge about the role and function of the information system to be applied in the fish supply chain. Meanwhile, infrastructure constraints will also have an impact on the smooth implementation of the fish supply chain information system. Infrastructure facilities that have not been evenly distributed can interfere with the optimization of the application of the information system.

II. LITERATURE REVIEW

A. Strategic Information System

The competitiveness reason is the main reason and long-term plan for companies to prepare their strategic planning. This strategic require top management involvement both external and internal factors to an organization include supply chain management. Flexibility and responsiveness which are categorised as the long-term objectives and goals in Supply Chain Management should also be supported to anticipate the changing environment. Modgil and Sharma (2017) argue that companies are challenging to expand the marketplace and to compete with other competitors. Supply chain helps companies to improve their operational performance and to have cost-effectiveness in operations. Information system play an important role to provide accurate information and sharing data to other departments and to all entities in supply chain (Bayraktar, Demirbag, Koh, Tatoglu & Zaim, 2009; Mehrotra, 2010).

Coordination across business within the supply chain emphasizes the need for collaboration and synchronization between the different organizations and parties involved in a supply chain. Wang et al. (2009) emphasized that traceability systems in the food industry were, in most cases, developed for individual organizations without taking into account supply chain activities as a whole. The contrast that lies between the individual traceability system requirements and global supply chain perspective highlights the fact that synchronization and coordination continue to represent a challenge for most organizations. The second aspect that is of particular relevancy to this thesis is 'performance'. Several research (Viaene & Verbeke 1998, Golan et al. 2004, and Schwagele 2005), have identified the potential for ameliorated performance when managing effectively traceability practices in supply chains. More specifically, performance improvements were accentuated by lower inventory levels, rapid detection of issues in manufacturing processes, and increased efficiency of logistics and distribution processes.

Most of organization have lack of understanding in identify the business process and the benefit of applying IT in SCM. Strategic IS in a firm used to focus on long-term planning and formulation of polices, which will benefit the firm in long run (long-term investment justification, project analysis and capacity planning and competitor analysis). Strategic IS is valuable for creating competitive edge over others and to reduce the cost of operations (Kearns & Lederer, 2003; Oh & Pinsonneault, 2007). Strategic IS should be emphasized within the firm and across the supply chain, to share the information effectively across supply chain. Strategic IS will help firm to develop capability, which will help to achieve effective supply chain operations (Klein, Rai & Straub, 2007).

H1: Strategic information system is positively associated with supply chain performance

B. Fresh food supply chain performance indicators

As the aim of this research is to assess if the traceability and identification solutions can contribute to supply chain performance, an adequate supply chain performance measurement framework must be presented. The framework should permit each partner of the supply chain to assess its own performance within its boundaries, but also provide a global chain perspective to enable the evaluation of the supply chain as a whole. Aramyan et al. (2007) developed a framework resulting from a literature review and regrouping key performance indicators from academic papers in logistics and manufacturing. The authors identified seven reasons for the complexity and the specificity of measuring performance of agri-food supply chains:

1. Perishability and shelf life constraints of raw materials and products;
2. Long production throughput time;
3. Seasonality in production;
4. Physical product features such as taste, odour, appearance and colour;
5. Requires conditioned transportation and storage;
6. Product safety issues;
7. Natural conditions affect the quantity and quality of farm products

The latter specificity and complexity are what differentiate fresh food supply chains from any other one. After having incorporated the latter complexities to general supply chains, Aramyan et al. (2007) proposed the following four main categories for agri-food supply chain performance indicators (Appendix 13)

1. Efficiency: which is responsible for the measurement of how well the resources are utilized.
2. Flexibility: which is responsible for the measurement of how well supply chains can cope with a changing environment and with extraordinary customer service request.
3. Responsiveness: which is responsible for measuring the lead-time between requested products and their delivery.
4. Food Quality: which is responsible for the measurement of product safety and health, sensory properties and shelf life, and product reliability and convenience.

An essential attribute of the latter performance measurement framework is that it provides indicators both for the organizational level and for the supply chain level. That is, each fresh food supply chain partner can adjust the different categories (efficiency, flexibility, responsiveness and food quality) of its own

framework based on its own organizational objectives while maintaining the overall picture of the supply chain performance. As a result, both organizational level and supply chain level are represented in the performance framework.

The assembly of the general model of agri-food supply chain with the agri-food supply chain performance framework provides the ground to analyse the effect of the different traceability technologies on supply chain performances. As one of the aims of the research is to identify what identification technology fits best each stage and partner of the supply chain, regrouping and opposing them in one framework provides the rationale for an appropriate comparison. Two main technologies for the identification of products are recognized by the academic literature. These are Barcode ID and RFID. They are presented and discussed in the next section.

H2: Supply chain performance is positively associated with operational performance

C. *Operational Performance*

Operational performance focuses on continuous monitoring, daily improvement and kaizen activities, which helps executives to take daily decisions. Operational performance promotes the improvement of day-to-day operations for achieving shift-wise or day-wise operational goals (minimum number of defects, inventory management, supplier relationship management, order fulfilment, total production, quality assurance and control). The day-to-day operational performance plays a critical role by integrating technologies in manufacturing and inter-departmental information sharing (Thakur & Jain, 2008).

H3: Strategic information system is positively associated with operational performance

D. *Final Model*

Prior studies show that the constructs in this model has been used in manufacturing sector and few studies has been focusing on fishing industry. This research is categorised as cross-correlation and involving actors or entities in fish supply chain. Actors in fish supply chain include fishermen, first collectors, second collectors, fish processing, wholesale, and retailers. They are chosen because all activities in fish supply chain are managed by them. Sample size is expected larger with the aim to have generalisation from theory. Questionnaire distribution will be done through cluster sampling. In order to design questionnaire, the researcher will apply sources from valid articles. They have used the five-point Likert spectrum to examine main variables of the research in which 1 is totally disagree to 5 totally agree. Smart PLS software is used for testing the model.

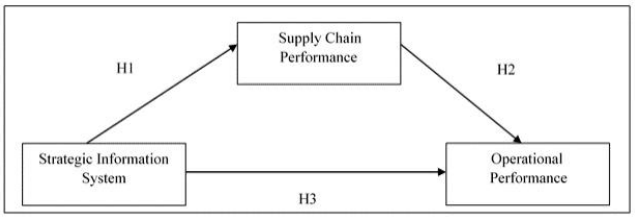

Fig. 1. Research Framework

III. THE FUTURE RESEARCH

The research will examine the relationship between strategic information system on the link between supply chain performance on operational performance. Dimensions of this research are derived from literature that it is related to fishing industry, information system, supply chain and operations. A single industry is chosen to ensure validity (Wong et al., 2011). In the same context, deductive approach will be applied by allowing the concept in literature and conducting a test for the empirical data (Saunders et al., 2009). Therefore, this study will be supported by established survey methodology. The questionnaire will be tested in a pilot test. Therefore, there are sample of thirty will be asked to give feedback and check the measures. This will help respondents to provide useful data. Then, the questionnaire will be distributed after any required modifications. Several big cities in Indonesia will be selected because of the population of potential respondents is very large. The scale in the questionnaire will use the five-point Likert in order to improve scale of reliability (Ryu et al., 2009). The questionnaire will be delivered to respondents through direct interview because this technique is appropriate to obtain a large sample, faster, cheaper and effective to cover the population. All potential respondents would be invited and late responses would be evaluated to avoid any bias. The distribution of respondents as a basic information will be analyzed. Several constructs in this research will be tested by using partial least square (PLS).

IV. CONCLUSION

Fishing industry has significant contribution on Indonesia GDP so the results of this research will contribute to enhance the performance of this industry. This study is important for both academics and business professionals. In academics context, dimensions have been identified to indicate how those dimensions can be effectively measured. Also, testing the theoretical model in this paper with different economics context will enrich the generalization of supply chain operational capability. In the context of business professionals, the association between dimensions in the framework will be tested and validated. This will improve operations of Indonesia fishing industry to be more effective and efficient. The investigation of strategic information system, supply chain performance, and operational performance in

fishing industry will enable manager or owner to prevent any risk into their business.

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