Development of Disruptive Factors for Livestock Supply Chain For Small Medium Enterprises

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Abstract: This study is conducted to identify disruptive factors affecting the performance of Small and Medium Enterprise supply chains in the livestock industry. The role of supply chain management in the livestock industry starts from the selection of breeders, equipment suppliers to distribution of slaughter meat to retailers, distributors and end users. Through a preliminary study that was conducted, several disruptive factors in the supply chain of livestock farming have been identified such as natural disasters, the distribution of supplies, the behaviour of the stockman and financial. These disruptions have caused losses to stockman, the supply of meat was affected and caused subsequent losses to the country. In relation to that, to identify what are other factors occurred other than the preliminary study factors, a set of questionnaires based on previous studies was established and validation of the disruptive factors was evaluated by the expert and the survey will be conducted with the respondents. The findings reveal that the factors of husbandry process, financial, stockman, quality of livestock product, farm facilities, technology, demand, supply, information communication, sales, transportation, government involvement, disaster and *syariah* compliance have been identified as the main disruptive factors in the disruption model. This disruption model will be tested using a statistical technique to identify which factors contribute significantly to the disruption of the supply chain in the livestock farming industry.

Keywords: Performance, SMEs, Supply chain disruption

1.   Introduction

Supply Chain Management (SCM) is one of the alternatives that can be used in many industries to achieve the higher rivalry competitive. According to [1], the definition of the supply chain is the design flow of management, value-added processes running across organisational boundaries to meet the real needs of the end customer. While [2] defines that supply chain is a supply and demand process, sources of raw material and equipment, manufacturing and assembly, warehouse and inventory tracking, order management and demand, distribution across all channels, and delivery to the customer. According to the Supply Chain Expert [3], the supply chain is one of the integration activity that happens between one network to another network to get the raw material, to change the raw material to the form of the final product and finally it becomes the final product and thus deliver the final product through the delivery system. In addition, according to the other Supply Chain Expert [4], the author defines that supply chain is one of the integrated processes where there are various business entities (such as suppliers, manufacturers, distributors and retailers) work together to get raw material, to change raw material to the final product and finally

deliver it to the retailers. Figure 1 shows the basic framework of the changes and movement of raw materials to the final product in the supply chain.
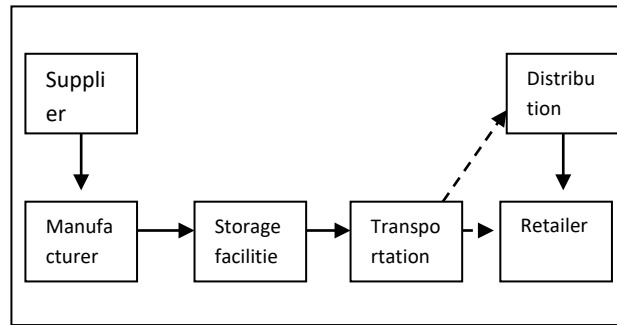

Figure 1. Supply Chain Process

In Malaysia, Small and Medium Enterprise (SME) plays an important part in the economic transformation of the country. SME has been defined as manufacturing enterprises or companies that provide services in manufacturing with an annual turnover which does not exceed RM25 million and also employs full-time staffs which do not more than 150 people. SME contributes 99.2 percent to the economic growth in Malaysia. According to [5], the government has allocated a fund of RM1 billion under the SME Development Scheme operated by the SME Bank. This step is the easiest access for SME to get financing and thus to develop their business. However, according to the Bank Negara, the global economy has grown at a more moderate pace in 2011 after a strong recovery in 2015. The momentum of growth has been affected by structural weaknesses and ongoing fiscal issues in the advanced economies, geopolitical developments in the Middle East and North Africa, as well as the impact of interference that caused SME in Malaysia, also felt the impact [6]. Disruption has been defined as an event that interferes with the flow of materials in the supply chain, resulting in the drastic movement of goods. It can be caused by natural disasters, disagreement among labours, reliance on a single supplier, the supplier experienced bankruptcy situations, violence, war and political instability [7]. Accordingly, this study is to identify disruption factors and also design the metrics that have a major disruption in the supply chain to help and raise awareness to the SME about the presence of various forms of disruption. Through this study, it is also expected to contribute to the knowledge enrichment about the field of supply chain management and not only can be used in the academic world but also help the industry in the implementation of supply chain management to be more efficient and effective.

2. Problem Statement

In Malaysia, the livestock farming industry is an important sector in agricultural development in the country. This industry involved livestock farming activities of cattle, buffaloes, goats, sheep, pigs, chickens, broiler ducks, hens, ducks layers, dairy cattle and swiftlet. The Ministry of Agriculture and Agro-Based Industry has allocated RM6 billion from the 2015 Budget to strengthen the Food Supply Chain while supporting the farmers, stockman and fishermen to increase their income. Also, the government provides a RM100 million

matching grant to the Farmers' Organization Authority to allow its members to borrow and increase farm productivity and marketing networks. This provision is because the current livestock industry is still small and has the potential to be expanded to guarantee food supply as well as to reduce imported meat. Currently, livestock farming in the country is monopolised by small and medium enterprises (SMEs) whereby the SME industry plays a major role in the country's economic development. However, the current situation of the livestock farming industry in Malaysia is having problems managing the farm efficiently and systematically to produce large-scale meat supply to meet the demands of the locals especially. Livestock farming process starts from livestock breed selection, quality, quantity and cost of cattle feed, livestock farming management, livestock farming consistency, support services from the Department of Veterinary Services, financial support, technology utilisation and marketing of livestock products [2]. Most stockman practice traditional livestock farming methods. Indirectly, most stockman lack of awareness in financial management and had no effective method of recording the data and resulted in data collection delay by the Department of Veterinary Services. Stockman is also having trouble getting the loan approved because there is no record of important livestock information. In the supply chain management, the problems encountered are considered to be interruptions affecting the performance of the stockman and the livestock farming industry. Thus the industry is forced to import the supply of livestock and livestock product from a foreign country. This situation deviates the objective of Small Medium Enterprises (SMEs) from the government's intention to enliven SMEs in livestock farming in Malaysia and it affects the meat supply chain.

3.   Literature Review

In recent years, the supply chain (SC) process has become much longer and complex while the level and frequency of SC disruptions has increased [3]. Disruption is defined as an event that interferes with the flow of material in the supply chain that causes the movement of goods to stop dramatically [4]. Increased supply chain route exposes each SC process to its own risk [5]. As the SC process becomes more efficient than before, each phase in SC becomes more prone to different disruptions. From the literature review, disruptions arising from inefficiency in management thus disrupting organisational activities as well as increasing operating and improvement expenses [6]. In a survey conducted by [7] with 559 companies representing 62 countries and 14 different sectors of the industry found that 85 per cent of the companies reported at least one SC disruption occurred over the last 12 months [7]. The disruptions were possibly caused by natural disasters, labour disputes, dependence on single suppliers, suppliers experiencing bankruptcy, violence, war and political instability [4]. Referring to [8], disruptions arising from natural disasters, human-made disasters such as technological disruption, transportation accident, public places failure and production failure as well as disruption due to disasters such as haze, water crisis, forest on fire and others. Disruptions due to natural disasters and extreme weather conditions are part of the threat to SC in Malaysia [9]. According to [3] other than disruption due to natural disaster, other identified disruptions are the failure of a production machine, quality issue in the final product, the quality issue at the source level, system failure, the problem with human resource, supplier delays and transportation delays. Table 1 shows a disruption framework that has been identified by [3].

Table 1. Disruptive Framework

Disruptive Factors		
Organization level		Production machine failure
		Quality problems in the final product
		IT system failure
		Problem from human sources (strike)
Networking Level	Demand	Distribution network breakdown
		Fluctuate demand
	Supply	Quality issues at source level
		Supplier delay
		Supplier loses
	Transportation	3PL bankruptcy
		Delay of transportation
		Strike
Environment Level		Natural disaster
		Safety risk (terrorist treat)
		Communication failure between several chain
		Unstability of politics and economy
		Rules and regulation risk

From the study, the purpose of identifying the disruption factors is to evaluate and determine the performance measurement to improve the supply chain efficiency in the livestock farming industry. Selection of key factors is important based on the existing performance measurement factors in the supply chain [10][11]. Good performance measurement features must meet the main criteria of inclusiveness, universality, measurable and consistent [10]. A few disruption models have been constructed using theories in the supply chain. Existing disruption model involves operational cost (financial) factor as disruption benchmark for performance measurement purposes. This model is easy to understand but does not take into account the involvement of stakeholders, and there are other disruption factors of uncertain importance in the supply chain. [10] In addition to model development, Balance Scorecard (BSC) has also been implemented taking into account some of the existing performance measurement factors in the supply chain namely finance, customer, process and learning [12]. The BSC based disruption framework took into account both the financial and non financial

aspects [13]. A total of 59% of researchers used BSC, and the development of disruption frameworks was implemented by [14][15][16][17][18]. However, the BSC has some weaknesses such as the difficulties in using BSC [19] due to limited guidance on BSC application [19]. The supply chain is not an easy process. Due to some unexpected complexity, a variety of benchmarking factors were proposed for performance measurement purposes. [20] recommended Multiple Criteria Decision-making Methods or MCDM to solve problems caused by various parameters. Also, the Analytical Hierarchy Process (AHP) method was also proposed and among the popular ones that are used for the selection of key factors. Besides, in the supply chain, the use of the Supply Chain Operation Reference (SCOR) model seems to assist in the selection and formation of interference factors. The SCOR model was formed in 1996 by Pittiglio Rabin Todd and McGrath and endorsed by the Supply Chain Management Council as the industry standard model in the supply chain management. SCOR is a process-oriented that involved Plan, Source, Make, Deliver and Return. It seems to cover the entire supply chain process. However, the factors involved in the SCOR are not fixed and constantly changing according to industry requirements [21]. Hence the disruption factors were identified under each SCOR phase and adapted into the livestock farming industry for performance measurement purposes.

4.   Research Methodology

This study adopted quantitative approaches. The methodology applied in this study was adapted from Marakas [23]. There were five phases in this study. Evaluation in each phase uses the Mini Delphi method for the rounds that require such as in the Model Development Phase. Mini Delphi is a Delphi technique that uses a discussion approach between moderators and livestock stakeholder experts and breeders involved [19]. This study uses a four-round Mini Delphi approach by [20] formally through face-to-face and email methods.

First phase: This study started with identifying issues and questions. Then the objective of the study was identified based on the issues and questions of the study, background and previous studies. This stage of study produces a conceptual disruptive factor.

Second phase: Survey questionnaire as well as expert and stakeholders interviews. At this stage, the disruptive factors other than those specified in the literature review are identified.

Third phase: Checklist instrument to assess and choose disruptive factors.

Fourth phase: Data collection based on the designed questionnaire.

Fifth phase: Model validation based on statistic analysis.

Sixth phase: Developing information system prototype based on the validated model.

5.   Discussion

The disruptive factor on supply chain model has been proposed. The findings reveal that the factors of husbandry process, financial, stockman, quality of livestock product, farm facilities, technology, demand, supply, information communication, sales, transportation,

government involvement, disaster and syariah compliance have been identified as the main disruptive factors in the disruption model. However the combination disruption which gives optimum disruption still given less attention. Therefore, supply chain disruption must be understood and effectively addressed through the development of suitable factor. Through development of disruption model of a supply chain in SME, they has the guidelines to operate in a more productive way and able to produce quality products at the competitive cost.

A suggestion for future research is to consider increasing the number of respondents, respondents who are breeders only and expanding the sampling of the study to produce more accurate and comprehensive analysis results.

The next suggestion is to consider external constructs such as livestock management skills, livestock management experience, planning and current economics, social relations, networks and marketing to be evaluated and given due attention in the livestock disturbance model.

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