Preliminary study of reverse supply chain development in Indonesia

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ARTICLE INFORMATION	*ABSTRACT*
	As a developing country, Indonesia is experiencing various advances, including in the industrial sector. A supply chain is a science that has long been studied and explored by many academics and practitioners. That part of the supply chain referred to as the opposite is the reverse supply chain or what is widely known as the Reverse Supply Chain (RSC). This article will present preliminary studies about RSC development in Indonesia. RSC in Indonesia particularly has been studied by a lot of researchers. However, most discussions are limited to reverse logistics and waste management. An explanation of the existing RSC in Indonesia will be discussed and provided. In Indonesia, most RSC activities happen in small and medium companies that have yet to gain experience or knowledge that they have been practicing RSC. The people's purchasing power which is still quite low has made small and medium industries in the refurbished sector grow rapidly. This paper will explain what a reverse supply chain is and how the development of this study is based on the existing literature. It is also a discussion of how the reverse supply chain application in Indonesia and what steps can be taken to improve the performance of the reverse supply chain in Indonesia. **Keywords:** supply chain; reverse supply chain; Indonesia

1. INTRODUCTION

The back supply chain is closely related to the return flow of products from consumers. It can happen for various reasons, such as; the increasing use of electronic goods and the less tolerance of buyers for product defects. The reverse supply chain increases the value of the returned product so it does not end up in landfills [1]. Further, this is supported by the awareness of the industry and the public to reduce the amount of waste. The returned product is either a whole product or parts or can be processed and made into something that benefits the company [2].

The reverse product is also a concern of many industries because of the opportunity to increase profits from managing the reverse product. For companies, product returns are often seen as something that could be more profitable. However, the company can handle the returned product properly with good management and sound system design. Where the product is seen as a profitable product [3].

The reverse supply chain itself still needs to be explored compared to the supply chain. The design and strategy of the reverse supply chain itself are also underdeveloped. But it has been noted that the returned product is an opportunity to create an opportunity, not a missed opportunity. Therefore, the reverse supply chain must be managed as a business process that benefits the company.

In the reverse supply chain, it is crucial to develop both the entire system and the use of the system in the real world to implement the knowledge learned. Rostandas explains that performance measurement and improvement are essential to the reverse supply chain.

Furthermore, performance measurement provides adequate information to managers as decision-makers [3]. It means that the contribution of performance measurement in corporate decision-making is unquestionable [4].

The reverse supply chain is an activity that has been happening in Indonesia since age. Most reverse supply chain actors are small and medium industries that utilize unused goods for valuable goods. However, if the reverse supply chain is to be implemented in Indonesia as a whole, starting from the legislation that forces the industry to pay attention to the reverse supply chain to consumers as suppliers of the reverse product, they must work together. This addition, there is a need for an initial study of how they will be reversed in the supply chain in Indonesia and what steps are needed to develop it. For in this paper will be discussed: first, what are the reverse supply chain and its development based on the existing literature. Second, what analyses are needed to conduct a preliminary study on the reverse supply chain in Indonesia. This paper will end with a discussion and research planning that will carry out in the future.

2. LITERATURE REVIEW

RSC involves more processes than the forward supply chain; the processes are dependent on the condition (quality) of the returns, and appropriate channels are chosen based on recovery options [5]. To justify the need for a literature review of RSC and performance measurement, an examination of reviews on the topics was conducted. The search in the field of the reverse supply chain (RSC) and their relation to performance measurement are listed in **Table 1**

Table 1. Related articles

Year	Authors	Title
2009	Pochampally, Gupta [6]	Metrics for evaluating the effectiveness of a closed-loop or backward supply chain
2010	Salema, Barbosa-Povoa [7]	A general modeling framework for the simultaneous design and planning of supply networks with reverse flows
2011	Olugu, Wong [8]	Development of key performance measures for the automobile green supply chain
2012	Björklund, Martinsen [9]	Performance measurements in the greening of supply chains
2013	Kongar, Elif [10]	Performance assessment for supply chain management and setting RSC management evaluation criteria
2014	Azfar, Khan [11]	A Conceptual Framework for Supply Chain Practices: Performance Measuring
2015	Govindan, Soleimani [12]	A thorough analysis of reverse logistics and closed-loop supply chains to consider the future
2016	Balfaqih, Nopiah [13]	Review of supply chain performance measurement systems: 1998–2015.
2016	Butar Butar and Sanders [5]	Measuring performance in reverse supply chain
2017	Maestrini, Luzzini [14]	Systems for measuring the performance of the supply chain: A comprehensive analysis and study plan
2018	Kazancoglu, Kazancoglu [15]	A new, comprehensive framework based on the circular economy for evaluating the success of green supply chain management
2019	Falsafi, Fornasiero [16]	Performance Evaluation of Stochastic Forward and Reverse Supply Networks
2020	Maheswari, Yudoko [17]	Using scorecards for sustainable reverse logistics to evaluate the success of unauthorized e-waste businesses
2021	Samad, Nilashi [18]	Practices of green supply chains and their effects on business performance: The moderating role of joint ability

Companies must look into real-time data on both forward and reverse logistics as a result of shorter product life cycles and client demands for customized goods with shorter lead times. The majority of the study was on electronic waste; even though it costs less than a new one, electronic waste still has value, and many businesses and individuals are keen to process it [17]. In developing countries, these activities are primarily motivated by economic factors rather than environmental concerns.

We will then talk about the reverse supply network. It also lists the participants in the reverse supply chain and defines closed-loop and reverses supply chains. RSC will discuss the significance of performance measurement in the supply chain in addition to its relevance. The idea of current performance measurement frameworks in their field will be explored in this part.

3. RESEARCH METHOD

In this study focuses on four main actors, namely manufacturing, distribution, retailers, and end users of the product. This research methodology consists of several stages:

a. Problem formulation

The problem formulation is the stage to define what should be fixed as a result. This research will focus on four main actors: manufacturing, distribution, retail, and end users.

b. Determining research objectives

The research objective is to solve the research problem for this research. This research aims to explain what a reverse supply chain is and how the development of this study is based on the existing literature.

c. Literature review

Some journals and literature reviews studied are needed as fundamental to the theory to get the exact corrective method to be implemented and solve problems in this research.

d. Found research gap

These findings were obtained from a literature study conducted in several related journals.

e. Discussion and analysis

This stage was carried out to determine the best results from this study.

4. RESULT AND DISCUSSION

RSC has been considered increasingly important in recent years, as many published papers explore strategic tools for improving company RSC performance and reputation. This section will discuss performance measurement in Indonesia's supply chain and supply chain. Additionally, the section will identify research gaps and suggest areas for future research.

4.1 Performance measurement in the supply chain

Based on the analysis of the reverse supply chain extensively, it is often associated with reverse logistics. However, there needs to be further research on how costs are related to the reverse supply chain [19]. Furthermore, Herold and Kamarainen [20] emphasize that no studies lead to metrics for reverse supply chain performance. It shows that although performance measurement in the reverse supply chain is considered necessary, studies on it are still finite.

Simply, performance measurement can be interpreted as a process to find out whether the system is effective and efficient [21]. The development of performance measurement collides with what aspects must be chosen to make the performance measurement can be faster. Due to the primary difference between the supply chain and reverse supply chain, a supply chain cannot use performance measurement directly on the reverse supply chain. Rogers et al [22] briefly mention the importance of metrics in the supply chain management process and emphasize the importance of performance measurement itself.

Rupnow points out the importance of benchmarks for measuring performance and monitoring product returns, in some companies such as Nintendo, US Robotics, Mitsubishi, Philips, and Microsoft Xbox [23]. Some of the metrics that have been identified as key for the company to achieve its targets include: reducing back-products; reducing reverse processing costs; improving repairs; reducing inventory and increasing customer satisfaction [24]. Aside from academics, industry practitioners have also realized the importance of reverse product

management and the importance of creating a reverse supply chain system for their companies. The use of an appropriate matrix plays an important role in the continuation of the supply chain itself [25].

The supply chain that is still underexplored is one of the research gaps that must bridge immediately. It is closely related to supply chain linkages, reverse supply chains, and all their elements.

4.2   Supply Chain in Indonesia

The reverse supply chain in Indonesia has occurred in small and medium industries but not large ones. The absence of legislation forces the industry to think about products that are no longer used. In general, of course, expired products will end up in landfills. Still, the waste, (especially) electronics and machines that are difficult to recycle, will take up space and eventually become a severe problem in the future.

Small and medium industries in Indonesia have reversed supply chains indirectly, mainly because of the economy. Purchasing used electronic devices, which are then repaired and resold, is one example of reverse supply chain implementation in Indonesia. The author thinks that it is crucial to start how these small and medium enterprises get more profits with an understanding of the back supply chain and the management of the returned products received well-systematically.

Therefore, it is crucial to conduct a thorough study beforehand on the reverse supply chain in Indonesia, its development, and its features. Because each supply chain has its specialty, and each industry has a different supply chain system. The initial research on supply chains in Indonesia will make it easier for the author to design a system to create an appropriate reverse supply chain framework. In the future, it is hoped that the reverse supply chain system created can be utilized not only by small and medium enterprises but, more broadly, by all players and companies involved in the reverse supply chain in Indonesia.

4.3   Research gap

Although supply chain and performance measurement have been discussed and mentioned as two crucial things, performance measurement in the reverse supply chain has received less attention from academics. The need for further research on performance measurement in the reverse supply chain is closely related to the preparation in the future, where the reverse supply chain will require more attention along with the enactment of the new environmental law. Can start measuring performance in the supply chain with the adaptation of the supply chain. However, the performance metrics involved are only for the reverse supply chain.

The uncertainty, the disruption, and the fragility of the reverse supply chain are the things that make it a challenge to measure performance in the reverse supply chain. It is still being determined when a product is returned from consumers and how the condition of the returned product has become a challenge in the reverse supply chain. The returned products are returned with quality on a scale of 0 to 100, which means that the returned product could be outdated. The consumer could only use it again once the product is returned because they are unsatisfied with the chosen color and all the circumstances in between.

Furthermore, the author's desire to create a reverse supply chain system for small and medium industries in Indonesia needs to be improved by the absence of thorough research on its development and how the reverse supply chain in Indonesia. It is also contentious that the supply chain activities in Indonesia have standards that industry players can follow as a minimum basis for determining the process.

The first step that must do is to determine the work chain for the supply chain itself. A framework based on the general model of the reverse supply chain is required. The supply chain model itself must be general and flexible. It is general means it can represent some industries that have a reverse supply chain. It must be flexible means that the model can be adjusted according to the reverse supply chain process itself because every industry has its uniqueness.

The next step is to examine further and thoroughly how the reverse supply chain in Indonesia. The reverse supply chain and the reverse product management process in Indonesia have long

been happening and carried out by industry players in Indonesia. But the need for existing research and writing on this is certainly dubious. The importance of the initial study of the reverse supply chain in Indonesia is closely related to creating an appropriate framework. The general model of a reverse supply chain in Indonesia would also be better designed if conducted this research first.

4. CONCLUSION

Formulation of performance measurement for RSC is very needed due to the extreme growth of RSC activities. Due to their unique situations and cultural differences, the current performance indicators used in developed countries may not be suitable for developing countries. It can materialize a general framework and model for Indonesia's industries and a returned product process. This framework could predict the RSC performance in Indonesian SMEs and other developing countries with the same characteristics. This framework will further explain the reverse product process and the supply chain system. The goal is to establish an accurate performance measure that can assist the company that deals with RSC to gain more profit. Furthermore, industry players can plan well the processes related to their returned products.

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