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SCOR: Business Process Analysis and Supply Chain Performance in Building Materials Industry

I Rizkya[1], K Syahputri[1], R M Sari[1], I Siregar[1] and J Utaminingrum[1]

[1]Departement of Industrial Enginnering, Faculty of Engineering, Universitas Sumatera Utara

indahrizkya@usu.ac.id

Abstract. Companies engaged in manufacturing building materials such as nails have never measured supply chain performance. The Supply Chain Operations Reference (SCOR) is a supply chain method to evaluate the supply chain performance proposed by the Supply Chain Council (SCC). SCOR aims to analyze and evaluate the performance of the company's supply chain. SCOR is divided into business processes using SCOR Thread Diagrams that describe business processes in a simple and systematic way to help analyze the company's business processes and calculate supply chain performance measurements. The purpose of this study is to provide improvements to business processes and find out the current position of supply chain performance. The results obtained show that there are four performance metrics that are not achieved, namely delivery performance, perfect order fulfillment, order fulfillment lead time, and production flexibility. So, companies must make improvements to performance metrics that have not been achieved so that the company's supply chain performance will be even better.

1. Introduction

The development of the industrial world is very fast and causes intense competition between existing companies. Consumers will demand high quality products, and the company will certainly do various ways to increase customer satisfaction. Consumers will be satisfied if the product is delivered in the right amount and on time. Companies need the role of all parties, starting from agent suppliers, as well as distribution networks that will deliver products to customers. Supply chains, which include material procurement, production, inventory control and distribution from suppliers to consumers, are key to competing in competitive markets [1]. Supply Chain is a network of companies consisting of suppliers, manufacturers and distributors that work together to supply raw materials, produce goods, and deliver products to end users.

Supply chain regarding continuous relationships regarding goods, money and information. Supply chains have become of great strategic importance in today's corporate context as effective supply chain management leads to high performing supply chains [2]. Supply chain able to improve inventory management [3] and proposed a form to take supply chain inventory problems and opportunities [4] that describe the objectives and architectures of Integrated Supply Chain Management System (ISCM). Supply chain can be arrange by a set of responsibility of agent intelligent for planning and implementation. Supply chain can be used to analyze business processes through Understanding the US IS System (Current System) that is used to design the expected system for the future (The TO BE System) [5].

The main players in the supply chain are companies have the same interests, namely suppliers, manufacturers, distribution, retail outlets, and customers. Supply Chain Management is essentially an organizational network involves up-streams and down-stream relationships, in different processes and activities resulting in values that are manifested in goods and services in the ultimate customers [6].

Research in solving the problems such as measurement of supply chain performance has been a lot done before. Research [7] about a SCOR-based method for reengineering the supply chain processes applied to the automotive industry. This study focuses on how to systematically use the methodology and tools provided by SCOR to improve supply chain performance. The contribution is putting forward a systematic SCOR method for reengineering, the supply chain process and applying it to analyze, optimize and redesign the logistic process of automobile supply chain. The contents of SCOR model are very abundant, and its theory development and practice application have attracted more and more attention of scholars and managers from business field. According to the foundational theory of SCOR model, we bring forward a method for SCOR-based supply chain process reengineering. Therefore, the emphasis of further research should focuses on a deeper exploration of practical studies.

In addition, study [8] integrated supply chain and the SCOR Model, which conducted the first empirical effort to test the validity of the SCOR model. The result shows that there is a strong relationship between the supply chain processes and the SCOR model. This study with an empirical survey research perspective provides an overview of the integration of each component in supply chain and reveals the existence of quantitative relationships between some components of the SCOR model [9]. Suggested that the supply chain governance, which balances personal interest and interdependence in supply chains, can help the supply chain performance enhanced. There are also research related to measurement of supply chain performance based on SCOR model in footwear industry [10] and the limitations of SCOR models in a manufacturing industry [11].

This study applies SCOR models to assess supply chain performance in the building materials industry, which is, has been delayed in supporting product delivery to the distribution center. Distribution center is a company of milestones to face a consumer demand. Distribution center is one of the supply chain actors, which is a source of demand satisfaction of small traders in an area, and the sales cost of product in the market becomes more competitive. Through the SCOR model especially in source and deliver components, this study will illustrate the importance of work between suppliers, producer, and customers in supply chain management to ensure products delivered to consumers. The SCOR model includes the plan, source, manufacture, delivery and return.

2. Methodology

This study was carried out on one of the industrial factories in Medan city that produces building materials. The object examined in this research is the company's supply chain performance. This study focused on supply chain performance measurement based on the performance attributes contained in the SCOR metric. SCOR is a process reference model developed by the management-consulting firm PRTM and AMR Research [12]. SCOR is a model that references supply chain operations into a framework consisting of plan, source, make, deliver, and return. SCOR is basically a process-based model. The SCOR model integrates the elements of management, namely business process reengineering, benchmarking, and process measurement into a cross-functional framework in supply chain management [13].

SCOR model is the main framework in this study. The SCOR model diagram in building materials industry is given in figure 1. Level 1 be composed of five supply chain processes, there are Plan, Source, Make, Deliver, and Return [14]. Because the return process was not in component on SCOR model and is not as sprout as the other four processes. So this study focuses on the important component, there are Plan, Source, Make, and Deliver. The variables contained in this study are the performance attributes contained in the SCOR approach namely:

1. Reliability which consists of delivery performance, performance metrics and perfect order fulfillment.
2. Responsiveness which consists of order fulfillment lead-time performance metrics.

3. Flexibility consisting of supply chain response time performance metrics and production flexibility.

3. Result and Discussion

3.1. Measurement of business process performance
SCOR is a supply chain operation reference model. SCOR is also basically a model based on processes. SCOR is used to evaluate the performance of company's in current business processes. Business processes that show the relationship between suppliers, manufacturer and consumers are explained as follows:

P1   = *plan supply chain*
P2   = *plan source*
P3   = *plan make*
P4   = *plan deliver*
P5   = *plan return*
S1   = *source stocked product*
M1   = *make-to-stock*
D2   = *deliver make-to-order product*
SR1   = *source return defective product*
DR1   = *deliver return defective product*

For supplier business processes, there are relationships between P3, P4, M1, D2, DR1, for the company's business processes, there are relationships between P1-P5, S1, M1, D2, SR1, DR1, and for consumer business processes, there are relationships P2, P5, S1, SR. SCOR Thread Diagram is a tool used to describe the business processes found in companies ranging from suppliers to customers. The depiction of SCOR Thread This diagram aims to facilitate the understanding of the business processes contained in the company. SCOR Thread Company diagram shows in the Figure 1. below.
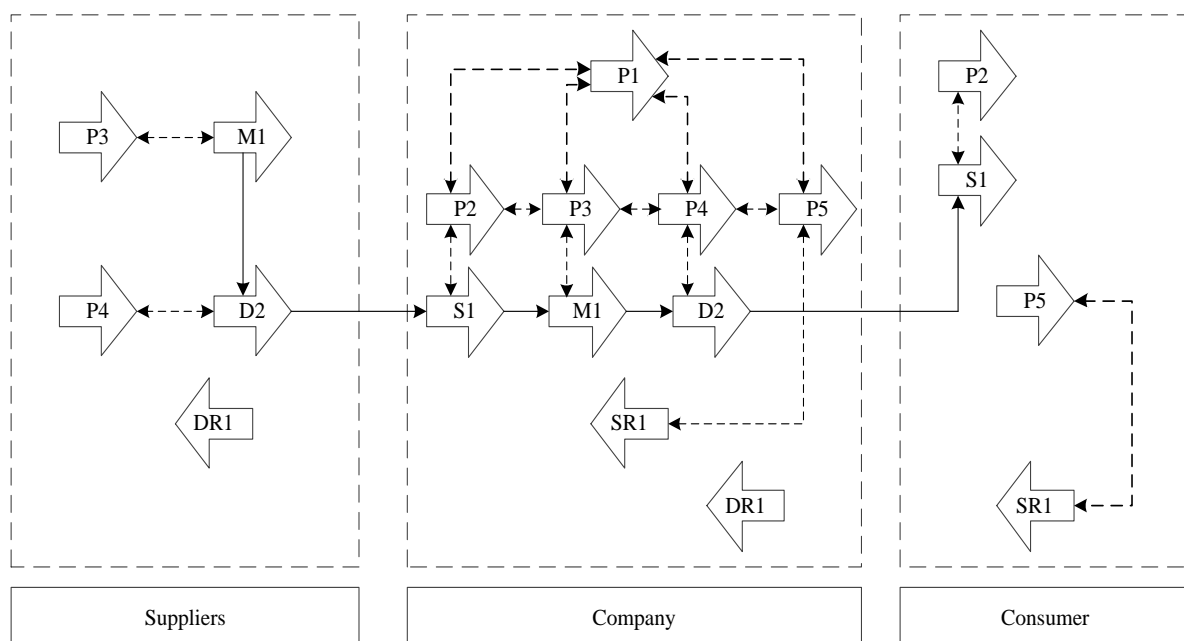

Figure 1. SCOR thread company diagram

Where:

←－→ The flow of raw materials into products, from suppliers to consumers.

———→ The flow of internal business processes that occur in suppliers, companies, and consumers.

The design of performance measurement is based on the SCOR model with the approval of the level 1 matrix which consists of the SCM process that is in SCOR. The processes include planning, sourcing, making and delivering. The description of the supplier and customer business processes is not fully described because there is no information available on this condition. The business process described is a process that is directly related to the company.

3.2. Measurement of supply chain performance

The performance attributes used to measure supply chain performance using the SCOR approach are reliability, responsiveness, and flexibility. The three performance attributes include attributes related to customers (customer facing). Performance metrics in the SCOR approach used are level 1 performance metrics. The results of the calculation of supply chain performance measurement using the SCOR approach can be seen in the following Table 1.

Table 1. Results of performance measurement

Performance Metrics	Company's Achievement (on average)
Delivery performance	87.02%
Perfect order fulfilment	86.10%
Order fulfilment lead time	33 days
Supply chain response time	9 days
Production flexibility	6 days

3.3. Performance Comparison

The calculation of the company's performance measurement having some results there are the achievement supply chain performance on delivery performance, perfect order fulfillment, order fulfillment lead time, supply chain response time, and production flexibility. The currently supply chain performance compared with the best in class based on Supply Chain Council and the company's target which can be seen in Table 2.

Table 2. Comparison of supply chain performance

Performance Metrics	Best in class (SCC)	Company Target	Achievement (on average)
Delivery performance	93.00%	90.00%	87.02%
Perfect order fulfilment	92.40%	90.00%	86.10%
Order fulfilment lead time	135 days	30 days	33 days
Supply chain response time	-	12 days	9 days
Production flexibility	-	3 days	6 days

Based on the table above, it can be concluded that performance metrics that have not achieved the target are delivery performance metrics, perfect order fulfillment, order fulfillment lead times, and production flexibility. Based on the results of measurement of supply chain performance, it can be seen

that the company's achievements are still below the target of the company, far below the best in class according to the Supply Chain Council [13]. The recommendation given to improve the performance of the supply chain in the future is to priority set for improvement, especially in the delivery of products to the distribution center and end user customers. Strategy map can be used to map improvement ways at each level of the supply chain process, namely plan, source, make, delivery and return.

4. Conclusion

The conclusion of this study is that companies have difficulty competing with other companies. Based on the results of the calculation of performance measurement using the SCOR approach, it was produced that there were four performance metrics that did not meet the company's target or the best in class target of the SCC. This is the impact of the company's business processes which caused a lack of control to all parts of the company. So, companies must be able to make improvements in the supply chain system and improve performance in terms of increasing the accuracy of delivery, product accuracy, order accuracy, and product efficiency. The research developed in the future is to develop a SCOR model at a lower metric level and identify the broader cost factors involved in the supply chain management flow. The supply chain developed not only to the distribution center but to retailers, agents, and end customers. It can be further developed SCOR model to service operations and see how the differences between manufacturing and service operations, the impact of relationships among supply chain processes.

Acknowledgement

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