

Supply Chain Management in Industrial Companies: Performance Assessment Model

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Abstract

The purpose of this research is to study the current measurement of supply chain management framework and to find gaps in previous research to develop a more precise measurement framework in industrial supply chain management strategy. The method used in this study is a systematic literature review, which examines previous research books and journals. Supply chain management performance measurement model found from several previous studies. The framework based on the grand theory also underlies the measurement of supply chain management performance.

Keywords : Strategic Industry, Supply Chain Management, Performance Measurement, Literature Study.

INTRODUCTION

Knowledge and insight into the world of work related to the industrial world is very necessary in connection with the condition of the country of Indonesia which is one of the developing countries, where science and technology will be applied by industry first. A complex supply chain structure that involves many parties, both internal and external to the company, can cause problems if the company does not know how far supply chain performance has been achieved. A well-managed supply chain can produce cheap, quality, and timely products so that the target market is met and can generate profits for the company. According to Indrajit and Djokopranoto (2005), the benefits of implementing a supply chain are reducing inventory of goods, ensuring the smooth supply of goods, ensuring quality, reducing the number of suppliers, and developing supplier partnerships or strategic alliances.

Ling Li (2007:8) states that supply chain management is a set of interrelated activities and decisions to efficiently integrate suppliers, manufacturers, warehouses, transportation services, retailers and consumers. Thus goods and services can be distributed in the right amount, time and location to

minimize costs to meet consumer needs. Roger (2004: 189), Supply chain management is the planning, design and control of the flow of information and materials along the supply chain in order to efficiently meet customer needs now and in the future.

Supply Chain Management (SCM) is a discipline that includes the planning and management of all activities involved in supplier selection, procurement, and all other logistics activities. This includes coordination and collaboration with partner networks such as suppliers, agents, third parties and consumers (CSCMP, 2014). Supply Chain Management includes all stages, either directly or indirectly, in meeting consumer demand. Not only related to manufacturing companies and suppliers, but also transportation service companies, warehousing, retailers, and consumers themselves (S. Chopra, P. Meindl, 2001), (I. Pujawan, E. R. Mahendrawati, 2010). In general, companies measure SCM performance by methods that are well established and widely used. Thus, companies can benchmark with best practices from other similar companies. However, companies in strategic industries have distinctive aspects that other companies outside Indonesia may not have. The fact that companies in strategic industries are manifestations of the lofty ideals contained in Article 33 of the 1945 Constitution requires performance measurements that are also unique and can accommodate this. This study aims to examine the methods of developing a performance measurement framework in SCM. In addition, this research was also conducted to find research gaps to develop an appropriate framework for measuring SCM performance in companies in strategic industries in Indonesia. This study uses a literature review to achieve these two objectives.

Supply chain management implementation able to cope with various uncertainties and variations in business, such as uncertainty demand, fluctuations in raw material prices, delivery delays, as well as requests seasonality (Kumar et al., 2013). One of Fundamental aspects of Supply Chain Management is performance management and continuous improvement. For create effective performance management a measurement system that is capable of evaluate supply chain performance holistic (Pujawan and Mahendrawati, 2017). Performance measurement plays a role important in organizational improvement. Performance measures can determine the level organizational progress and determine necessary actions for improve organization. Performance measurement can be used to assess effectiveness Strategy in Supply Chain Management (SCM) and to identify future success and opportunities (Kusrini, Subagyo, & Masruroh, 2014).

Performance measurement has enormous importance because it can tie a complex value creation system into one, provide direction for the formulation of corporate strategy, and play an important role in monitoring and monitoring the implementation of the strategy. Performance measurement does not only involve internal processes but must also pay attention to the performance of other supply chain members, with the back chain being the supplier and the front chain being the consumer (Norman and Ramirez, 1993). Supply Chain is a system where an organization distributes its production goods and services to its customers. The supply chain is a network of interdependent organizations linked to each other and

co-operatively working together to control, regulate and improve the flow of materials and information from suppliers to end users. (Indrajit and Djokopranoto 2003).

METHOD

The literature review in this study used a systematic literature review approach. adopt (C. Badole et al., 2012) and (H. Keathley, E. Van Aken, 2013). The stages of the literature review begin:

1. Selection of articles.
2. Reviews.
3. Classification according to tools and methods/methodology.
4. Analysis of findings.

Articles are collected from various sources, but the majority of articles are obtained through Proquest, Google Scholar and Garuda Portal. In order to facilitate discussion,

This literature review is divided into three parts, namely:

1. Research on Supply Chain Management Performance Measurement.
2. Conceptual Framework

RESULTS AND DISCUSSION

Publication Classification with the Theme of Supply Chain Performance Measurement

1. Yinan Qi, Baofeng Huo, Zhiqiang Wang and Hoi Yan Jeff Yeung (2017). This study aims to develop a comprehensive model that facilitates understanding of the relationship between operations strategy (OS), supply chain strategy (SCS), supply chain integration (SCI), and firm performance. This is a start to understanding the role of operations strategy in supply chain design
2. Elrod et al, 2013. Compile and synthesize the important elements related to the measurement of SCM performance.
3. Yuanqiong He, Kin Keung Lai, Hongyi Sun, Yun Chen (2018) This study aims to explore the intricate relationship between supplier integration, customer integration and new product performance through the mediating role of manufacturing flexibility and service capability under trust theory.
4. Ming-Chang Huang, Ghi-Feng Yen and Tzu-Chuan Liu. Effective and efficient supply chain coordination requires the integration of all product flow processes. However, inconsistent empirical results have been obtained with respect to the relationship between supply chain integration (SCI) and performance. Drawing on the efficiency-flexibility argument, this paper seeks to develop an SCI model that includes a buyer-supplier-supplier relationship, and proposes a contingency framework to re-examine the SCI-supplier performance relationship under demand and technological uncertainty.
5. Gopal, J. Thakkar, 2012. Report a thorough review of the SCM performance measurement system and raise new research issues

6. Charan, et al, 2008. Determining the key variables in the implementation of the SCM performance measurement system. Structural Modeling (ISM)-Based Approach
7. Beamon, 1999 reviews and evaluates the SCM performance measurement model and offers an SCM performance measurement framework for manufacturing companies.
8. Tonanont, et al, 2008. Offers a new SCM performance measurement framework. Balanced Scorecard (BSC), Analytic Hierarchy Process (AHP) and Data Envelopment Analysis (DEA)
9. Cuthbertson, W. Piotrowicz, 2011. Offering a framework for performance measurement SCM by analyzing empirical findings
10. Singh, S. K. Pandey. 2013. Reviewing several important research articles regarding SCM performance

Grounded Theory Supply Chain Management

Supply chain management is an approach used to achieve a more efficient integration of various organizations from suppliers, manufacturers, distributors, retailers, and customers. This means that goods are produced in the right quantity, at the right time and at the right place with the aim of achieving a minimum overall system cost and also achieving the desired service level (David Simchi Levi, 2000). The goal of Supply Chain Management is to maximize the overall value generated to meet customer needs and demands. On the other hand, the goal is to minimize overall costs (order costs, storage costs, raw material costs, transportation costs, etc.) (Cophra and Meindl, 2004).

Supply Chain Management Indicators Li, S., Ragu-Nathan, B., Ragu-Nathan, T.S. & Subba Rao, S. (2006) also stated that in an integrated supply chain there are the following processes:

1. Strategic Supplier Partnership Strategic supplier partnership is defined as a long-term relationship between a company and its suppliers. This is done to improve the strategy and operational capabilities of supplier companies in participating in companies that aim to achieve the expected goals (Stuart, 1997; Balsmeier and Voisin, 1996; Monczka et al. 1998; Sheridan, 1998, Noble, 1997). This strategy focuses more on joint planning (mutual planning) and joint problem solving efforts between the company and suppliers (Gunasekaran, 2001). By implementing a strategy that partners with suppliers, it allows companies to work effectively with several suppliers who are willing to share responsibility for creating and making a product successful.
2. Customer Relationship Customer relationship is a collection of practices that aim to manage customer complaints, build good long-term relationships with customers, and increase customer satisfaction (Claycomb et al. 1999, Tan et al. 1998). Noble and Tan et al stated that customer relationship is an important component in implementing supply chain management. And with the company having customers who are willing to commit to building relationships, this is an advantage for the company. With a good relationship with customers, this allows a company to differentiate its products from competitors, can increase customer loyalty, and can create value to customers.

3. Information Sharing Information sharing refers to the extent to which important information is communicated to the company's business partners (Monczka RM, et al. 2008). Sharing information between business partners can be in the form of strategic tactics, general market conditions, and information about customers. By exchanging information between members in the Supply Chain, the information can be used as a source of competitive advantage. According to Stein and Swet, business partners in the Supply Chain Management chain who exchange information on a regular basis can work as a unit and together they can understand the needs of end customers better and the company is able to respond to market changes more quickly.

Supply Chain Management Measurement

Supply Chain Management is a network of companies that work together to create or deliver a product into the hands of end users. This includes suppliers, factories, distributors, stores or retailers, as well as supporting companies such as logistics service companies (R. Cuthbertson, W. Piotrowicz, 2011). Meanwhile, according to the Council of Supply Chain Management Professionals, SCM is a discipline that includes planning and management of all activities involved in supplier selection, procurement and all other logistics activities. This includes coordination and collaboration with partner networks such as suppliers, agents, third parties and consumers (P. Charan, et al, 2008). According to these definitions, it is clear the complexity faced when companies implement Supply Chain Management.

Searching scholarly journal articles in the ProQuest and ScienceDirect databases with the keyword "supply chain" yielded 372,641 articles. In the last five years this theme has been published as many as 116,125 articles. Supply Chain Management terminology has developed into several research topics are:

1. Green Supply Chain Management
2. Sustainable Supply Chain Management
3. Closed-Loop Supply Chain Management
4. Global Supply Chain Management
5. Supply Chain Risk Management

Furthermore, the topic is divided into three sub-topics, namely:

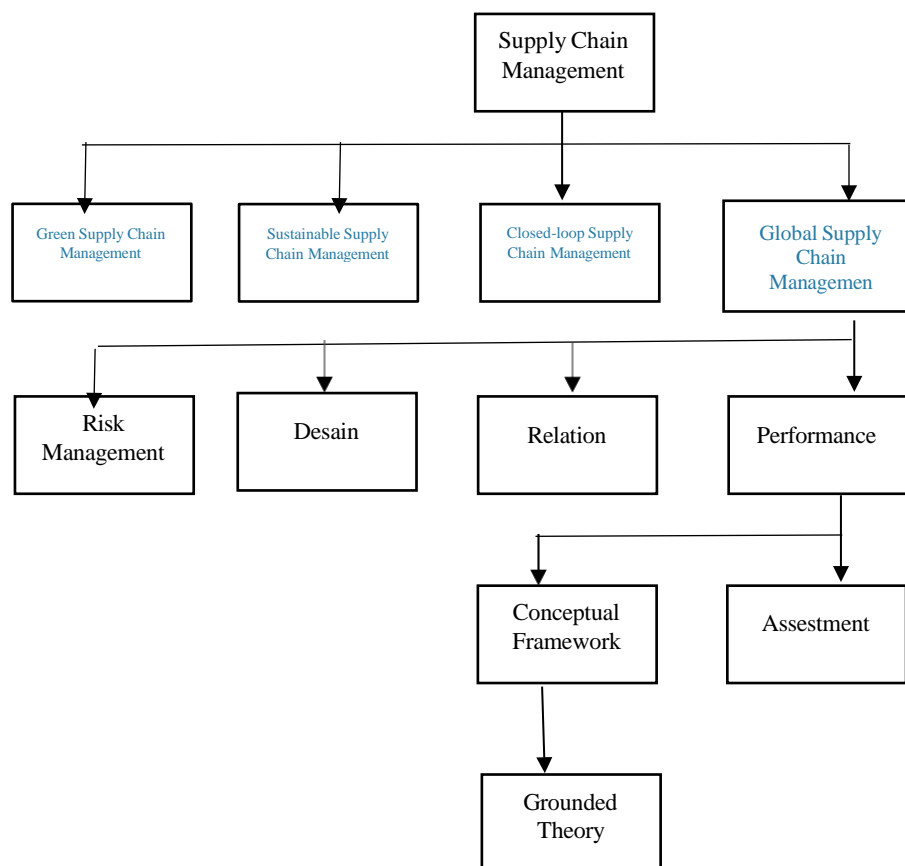
1. Design, discusses the supply chain design which includes functions such as inventory, warehousing, transportation, scheduling, maintenance and so on.
2. Relation, focuses on analyzing the relationship of nodes in the supply chain such as relationships with suppliers, distributors, agents, and consumers.
3. Performance Measurement, this section discusses performance measurement by using available methods and tools and designing a framework for measuring performance.

This study will discuss performance measurement because a system will be very difficult to improve its performance if it does not have measurable indicators, as well as in SCM. In implementing a system, then a measurement is needed to determine the effectiveness of the application of the system. Especially in a system with the complexity of supply chain management. One of the main goals of implementing SCM is to achieve effectiveness and efficiency in such a

way that it can satisfy its customers (P. Charan, et al, 2008). Therefore, it is very important to be able to measure operational aspects in the supply chain.

There are many alternative measurement methods that can be used to evaluate the operational activities of a company or industry. These measurements generally have characteristics that are unique to a particular company. For this reason, companies need to use measurements that are in accordance with the characteristics of their organization (C. Elrod, et al, 2013). The era of liberalization, globalization, privatization, information technology and non-linear technological developments has forced companies to rethink their strategies. Because supply chain performance has been accepted as influential in the company's actions, companies need to develop a method of measuring supply chain performance (P. Charan, et al, 2008).

In other studies, performance measurement can be grouped into four namely financial costs, quality, time, and flexibility (Elrod, et al, 2013). In the study, Elrod offers a summary of metrics, limitations and recommendations with the aim of encouraging managers to carefully consider and select the measurement metrics to be applied to a particular supply chain. Furthermore, it is not recommended to use all the measurements it offers but to choose organizational measures.



A case study analysis using the Supply Chain Operational Reference (SCOR) combined with the Balance Score Card (BSC). The aim is to propose a framework for measuring SCM performance for small and medium-sized companies using qualitative and quantitative approaches. The research resulted in an integrated supply chain measurement framework to evaluate and plan activities within Small and Medium Enterprises (SMEs) organizations. The resulting framework includes tangible and intangible measurements. Included in the tangible measurements are cost, time, capacity, productivity and utility. While the intangible measurements include effectiveness, reliability, availability and flexibility (J. Thakkar, et al, 2009).

Organizational awareness of supply chain performance measurement is one of the factors driving the organization's progress significantly. For this reason, efforts are needed to identify variables that have an impact on the implementation of the supply chain performance measurement system. A model based on ISM has been developed to analyze the interactions between variables involved in measuring supply chain performance. Furthermore, a hierarchy of actions was developed - Actions that can be taken for the implementation of the supply chain performance measurement system so that top management leaders can make better decisions when implementing the supply chain performance measurement system. Thus the organization will have an effective and efficient supply chain (P. Charan, et al, 2008).

Supply Chain Performance Measurement is a process that context-dependent, where the components need to be adapted to specific organizational needs. For understand how the measurement system performance is developed and used, then organizations need to capture context, processes and operational-related content supply chain (R. Cuthbertson, W. Piotrowicz, 2011)

The three types of performance measurement required by any performance measurement system are: resources, output and flexibility (B. M. Beamon, 1999). Four main categories of performance measurement (efficiency, flexibility, responsiveness and product quality) were identified as key components of performance measurement in agricultural products (L. H. Aramyan, et al, 2007). Performance measurement in the manufacturing sector has several main aspects that drive supply chain performance, namely: information sharing, inventory planning, collaboration, cost reduction, flexibility, delivery, integration and resource utilization (S. C. Singh and S. K. Pandey, 2013).

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Conceptual Framework

Each concept from the conceptual framework plays a role in explaining ontology and epistemology. Conceptual frameworks are not a collection of several concepts but a building where each concept has an integral role (Y. Jabareen, 2009). One method that is widely used to build a conceptual framework is

grounded theory. Grounded theory is a general theory of the scientific method that deals with the generalization, elaboration, and validation of social science theory.

The use of Grounded Theory in SCM research includes:

1. Manuj, T. L. Pohlen, 2012. Providing a framework for grounded theory research in logistics and supply chain
2. Thornton, 2013. Investigating the dynamics and dimensions of supply chain employee behavior that can hinder successful supply chain relationships
3. Randall, J. E. Mello, 2012. Provide step-by-step guidelines in order to improve researchers' understanding of using grounded theory methodology in the context of supply chain.
4. Ambe, J. A. Badenhorst-Weiss, 2011. Providing practical examples in theory development using grounded theory in supply chain implementation in South Africa
5. Kaufmann, N. Denk, 2011. Increasing the credibility of SCM research with grounded theory.
6. Denk, L. Kaufmann, C. R. Carter, 2012. Examining the quality of research in SCM using grounded theory
7. Rauer, L. Kaufmann, 2015. Interesting theory to provide guidelines for research on the theme of GSCM

Grounded Theory research needs to find acceptable rules to shape knowledge (consistency, reproducibility, generalization ability, etc.). General purpose of grounded research

Theories are (1) inductively derived from data, (2) those that require theoretical development, and (3) those that are adequately judged for their domains taking into account a number of evaluative criteria (B. G. Glaser, A. L. Strauss, 1965). At the beginning of its development, Grounded Theory was widely used for the social sciences. However, currently other disciplines are also using Grounded Theory as a strong method to form a conceptual framework. Likewise in supply chain management topics.

The table above provides information on several studies that try to analyze the use of Ground Theory in Supply Chain Management. In general, these studies attempt to provide an outline and guidelines for conducting research with the theme of Supply Chain Management using Grounded Theory as its method (I. Manuj, T. L. Pohlen, 2012), (W. S. Randall, J. E. Mello, 2012), (I. M. Ambe, J. A. Badenhorst-Weiss, 2011). More specific guidelines in the application of Green Supply Chain Management are given by J. Rauer, L. Kaufmann, 2015. Meanwhile, efforts to improve the quality of research are consistently carried out by (L. Kaufmann, N. Denk, 2011) followed by (N. Denk, L. Kaufmann, C. R. Carter, 2012). The use of Grounded Theory on SCM issues is clearly demonstrated in the investigation of the dynamics and dimensions of supply chain employee behavior that can hinder the success of relationships in the supply chain (L. M. Thornton, 2013).

SCM Performance Measurement Model

SCM Performance Measurement Models include:

1. POA (Performance of Activity) Activity performance is measured in various dimensions, namely:

- a. The costs involved in executing an activity.

Costs arise because in the implementation of an activity there are resources used. These costs can be associated with labor, materials, and equipment. Costs can be measured in absolute terms or in terms of relative to a reference value. For example, the cost of materials can be measured in terms of rupiah per year or measured relative to the value of sales in a year. Past costs can be used as a reference value in measuring performance. For example, reductions in inventory costs are usually measured as a percentage, relative to costs in the previous fiscal year.

- b. The time it takes to do an activity.

This measure is very important in the context of SCM, especially to compete on the basis of response speed, which is generally determined by the time required by each activity. New product development time, customer order processing time, time to get raw materials and set-up time for production activities are some of the important contributors in creating response speed in SCM.

- c. Capacity.

Capacity is a measure of how much volume of work a system or part of SCM can do in a given period. For example, the production capacity of a factory, the delivery capacity of a supplier, the storage capacity of a warehouse. The size of the capacity needs to be known as a basis for planning production or delivery and as a basis for providing delivery promises to customers. The amount of installed capacity relative to the average demand provides information on flexibility in SCM. In an era where the SCM network is very dynamic, outsourcing and subcontracting activities are very commonplace, the capacity of an SCM can also be dynamic and is not determined only by the resources owned by an organization.

- d. Capability.

Capability refers to the aggregate ability of a supply chain to perform an activity. Some of the capability sub-dimensions that are often used in measuring supply chain performance are:

- Reliability (reliability) Measures the supply chain's ability to consistently deliver on promises. For example, delivery from a supplier is said to be reliable if the deviation of the delivery time is relatively small relative to the promised or expected time. The machine is said to be reliable if it can work well within the expected timeframe and produces output with relatively small variability compared to the specification limits.
- Availability measures readiness The supply chain's ability to provide a product or service when it is needed. For example, inventory availability measures the availability of inventory at the time and place where the customer needs it. Fill rate and customer service level are two examples of metrics that measure availability in a supply chain.
- Flexibility SCM's ability

to quickly change according to the needs of the output or the work to be done. The level of flexibility needed by each SCM is of course different and depends on their strategy to compete in the market. SCM flexibility is determined by many factors such as procurement flexibility, production flexibility, and delivery flexibility.

e. Productivity

Measures the extent to which resources in the supply chain are used effectively in converting inputs into outputs. Mechanically, productivity is the ratio between effective output to all inputs consisting of capital, labor, raw materials, and energy.

f. Utilization

Measure the level of resource usage in supply chain activities. For example, machine utilities, warehouses, factories, and so on. A machine that only operates an average of 6 hours a day out of a daily 8 hour working hour is said to have a utility of 75%. In SCM, which has a relatively long product life cycle and does not compete on the basis of innovation, utility is an important measure to monitor.

g. Outcome

Is the result of a process or activity. In the production process, the outcome can be in the form of added value given to the products produced. Outcomes are not always easy to measure because they are often intangible. Example: storage process outcomes are not easy to quantify. The seven metrics above have different levels of difficulty in measuring in the field. In practice, cost, time, capacity, productivity are relatively easy to measure while other metrics are relatively difficult. For example, the flexibility of SCM can be interpreted differently by different measures

Company performance

Performance is a description of the level of achievement of the implementation of tasks in an organization, in an effort to realize the goals, objectives, mission, and vision of the organization (Bastian, 2001). Company Performance Indicators Several experts reveal that the company's performance measures that are most often used in empirical research are financial performance (financial performance), operational performance (operational performance), and market-based performance (Jahanshahi, Rezaie, Nawaser, Ranjbar & Pitamber, 2012).

1. Financial Performance

Performance is usually assessed using measurements based on accounting data or financial data. The drawback of all accounting data-based measures is the focus on past performance (Kaplan & Norton, 1992). company performance cannot be measured only based on accounting data-based measurements (Ursula & Wilderom, 1997). Some experts use the rate of return on sales (return on sales), profitability, sales growth, improved work productivity, and improved production costs to measure financial performance (Cho, Ellinger, Ellinger, & Klein, n.d.; Prieto & Revilla, 2006).

2. Operational Performance

In addition to measuring company performance based on financial performance, it is also important to measure based on non-financial performance. The increasing use of the balanced scorecard concept shows that non-financial performance is also an important aspect in measuring company performance (Kaplan & Norton, 1992). This non-financial performance is also known as operational performance where its aspects are able to measure performance when available information related to opportunities already exists, but has not been realized financially (Carton, 2004). Operational performance can be measured using measures such as market share, new product launches, quality, marketing effectiveness, and customer satisfaction (Carton, 2004; Carton & Hofer, 2006; Venkatraman & Ramanujam, 1986).

3. Market-Based Performance

Overall market-based performance will be affected when the market finds out information about the company's operations that is not included in the results of financial performance (Carton, 2004). Market-based performance measures include: the rate of return to shareholders, market value added and annual profits (Carton, 2004). In this study, the company's performance measurement will only be represented by financial performance and operational performance. This is because market-based performance measurement can only be carried out on public companies while the objects in this study are not necessarily all public companies. So in such conditions, the combination of financial performance measurement and operational performance is sufficient to represent the company's overall performance (Carton, 2004).

CONCLUSION

Theories are (1) inductively derived from data, (2) those that require theoretical development, and (3) those that are adequately judged for their domains taking into account a number of evaluative criteria. At the beginning of its development, Grounded Theory was widely used for the social sciences. However, currently other disciplines are also using Grounded Theory as a strong method to form a conceptual framework. Likewise in supply chain management topics.

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