

METHODS AND TECHNIQUES FOR EVALUATING THE PERFORMANCE OF SUPPLY CHAIN MANAGEMENT AT ENTERPRISES

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ABSTRACT:

Supply chain management (SCM) has become a critical and indispensable factor in the success of organizations and businesses. In the context of fierce competition and the increasing complexity of supply chain operations, measuring SCM performance becomes an important step to ensure efficiency and flexibility in business operations. Performance in SCM is defined as the avoidance of waste and optimizing supply chain operations to create efficiency and value for all stakeholders. This paper presented an overview on the current SCM in Vietnam and introduced SCM performance evaluation techniques and methods, such as the balanced scorecard (BSC), supply chain operation reference (SCOR), analytical hierarchy process (AHP), and data envelope analysis (DEA). These methods and techniques not only help businesses better understand their supply chain but also help improve overall performance and strengthen competition in the market.

Keywords: supply chain, supply chain performance, evaluation methods.

1. Introduction

The term supply chain management (SCM) today is no longer too strange, is the management of the flow of goods and services that includes all processes from the transformation of raw materials into final products. Galaskiewicz (2011) has considered SCM as the integration of business processes that produce products, and services and distribute to end customers, thereby adding value to customers. Similarly, Lalonde (1998) identifies supply chains as a collection of companies whose forward-moving business strategy is a strategy aimed at owning or increasing control over distributors or retailers. A typical supply chain consists of raw material suppliers, manufacturers,

distributors, retailers, and consumers. In addition, the supply chain can include other components such as logistics providers, and financial service providers. The close and smooth connection of information in the chain will bring operational efficiency to the entire production and business process of the members of the supply chain. Therefore, good management of supply chain performance is a very important task and needs to be considered for research.

SCM performance is understood as avoiding waste of materials, costs, time, and resources during operation to bring about an efficient and optimal supply chain. Lee et al. (2007) after studying SCM performance also suggest that SCM

performance is associated with optimal productivity and results that supply chain operations bring. Next, Ambe (2014) has also emphasized SCM performance measurement as the process of quantifying the performance and effectiveness of an action through specific metrics. Currently, many methods and tools are used to measure SCM performance, however, 3 approaches are most used for measurement: (1) Process-based approaches, (2) Perspective-based approaches, and (3) Hierarchy-based approaches (Ka et al., 2019). SCM performance measurement facilitates a better understanding of the supply chain, positively impacting participants and improving overall performance, which is why measuring performance in the supply chain is essential. Gunasekaran & Kobu (2007) outlined the purposes of a performance measurement system including: (1) seeing the customer's need to meet it; (2) A better understanding of processes in a supply chain; (3) Recognizing bottlenecks and waste, problems and opportunities for improvement; (4) Make decisions appropriate to the actual situation; (5) Capture and monitor operational progress; (6) Facilitating more open and transparent communication and cooperation with current and potential customers.

Recognizing the importance of measuring SCM performance, the authors therefore introduce measurement methods and techniques including balanced scorecard (BSC), supply chain operation reference (SCOR), analytical hierarchy process (AHP), and data envelope analysis (DEA)

2. Current supply chain management in Vietnam

In Vietnam, supply chain and supply chain management are still relatively new areas, but in fact, these activities take place daily. According to the Agility 2022 ranking, the Vietnamese logistics market is ranked 11th in the group of 50 emerging logistics markets globally (Yen Nhi, 2023). Not stopping there, Vietnam is currently the leading country among ASEAN nations in terms of the number of businesses providing logistics services licensed by the US Federal Maritime Commission (FMC). In recent years, the global economy in general and the Vietnamese economy, in

particular, have faced many difficulties due to the impacts of the COVID-19 pandemic. Not only the economy but also the domestic and international supply chains have been disrupted and overturned, affecting supply chain performance. In this context, businesses still stand firm and succeed in the market because they adapt to continuous changes and shifts. From this, we can see the importance of a supply chain capable of adapting to business environmental fluctuations with flexibility.

According to Investor (2024), foreign investors continue to invest in Vietnam by increasing new capital inflows, bringing the committed Foreign Direct Investment (FDI) in Vietnam to 4.29 billion USD in the first two months of 2024, an increase of 38.6% over the same period in 2023. Quan Trong Thanh - Director of Research and Analysis at Maybank Vietnam says that by maintaining competitive advantages, promoting investment in logistics capabilities, and improving quality in supply chain management, Vietnam will shine as a star attracting FDI.

Additionally, the Investment Strategy Report 2023 states that VNDIRECT Securities (VNDIRECT) recognizes Vietnam as a bright star attracting companies with a "China +1" diversification strategy due to competitive labor costs, a favorable geographical location (close to the production center in southern China) and located in the heart of Southeast Asia with a long coastline and proximity to major countries such as China, Cambodia, and Laos. This shows that Vietnam's strategic geographical location, being at the vital crossroads adjacent to diverse and strong economies, is a bridge between the maritime and continental economies of Southeast Asian and Asian countries, creating an ideal environment that helps Vietnam to connect, expand trade and develop in the region (Thanh, 2007). Additionally, Vietnam has signed many Free Trade Agreements (FTA) with major partners and regions around the world, such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), the Free Trade Agreement between Vietnam and the European Union (EVFTA), and the Regional Comprehensive Economic Partnership (RCEP).

According to Vu Khue (2023), in a survey

conducted by CEL (a leading consulting company in the field of supply chain), more than 300 business leaders and supply chain experts in Vietnam were surveyed, and it was assessed that Vietnam still faces many challenges as supply chain operations are currently stagnating. The survey showed that 46.9% of respondents believe the challenges of 2023 are to forecast demand, from supply chain disruptions (12.5%), to inventory management (12%), and issues related to logistics and transportation (9.4%).

According to Jan Tomczyk, a Fellow of the London Institute of Shipping and Forwarding, SCM management in Vietnam is limited due to a lack of human resources for operations and management of international standard logistics services. Moreover, foreign enterprises such as Lineage Logistics, SK Logistics, and Lotte Logistics are actively investing in their storage systems in the Vietnamese market. However, the situation of supply exceeding demand continues. As for the transportation system, most do not meet international standards. Additionally, major seaports in Vietnam are not designed to handle container cargo types.

From these challenges, the authors find that the supply chain in Vietnam still has many limitations and is not yet truly effective and synchronized. These stem from deeper underlying causes: first, the traffic infrastructure in Vietnam has not met the development needs of the SCM industry as the country's road system has not kept up with the pace of industrialization and urbanization, leading to frequent congestion and bottlenecks.

Second, maintaining stable business efficiency in recent years after the Covid-19 outbreak has been difficult.

Third, there are limitations in linking port services (warehouses, yards, logistics centers) and seaports because there is still a situation where many types of goods have to be handled outside the buoys, outside the channels due to a lack of port infrastructure. The supply of rental warehouses, especially cold storage, is not enough to meet the demand due to limited floor space and the quality of logistics services and supply chain management is only at a rudimentary level.

Finally, there is a lack of personnel with specialized skills and expertise in supply chain analysis, especially in small and medium-sized enterprises.

3. Methods and techniques for evaluating the performance of SCM

In the research of Ka et al. (2019) the methods commonly used globally to measure SCM performance were summarized as: BSC accounts for 35%; SCOR accounts for 16%; Hierarchy-based accounts for 12%; Process-based accounts for 8%; AHP 15% and DEA 5%. The details of these methods are as follows:

3.1. Balanced Scorecard (BSC)

The BSC model, developed by Kaplan & Norton (1992), is often applied in selecting and integrating SC performance indicators from a balanced perspective. It focuses on maintaining a balance among four critical elements: customers, internal processes, finances, and innovation. BSC does not only recognize traditional financial measures reflecting the business's past but also supports operational measures (non-financial measures) indicating performance drivers in the future.

The highlight of the BSC is the performance measurement tool related to strategic objectives in all four main areas. Businesses from different regions around the world have applied SCM and BSC by various researchers to determine their performance indicators. The BSC model is favored in both academia and practice for its benefits compared to other models.

In the Logistics industry, BSC is used as a tool to evaluate supply chain performance and is combined with other models and techniques such as Trivedi & Kumar (2013) using BSC in conjunction with AHP to evaluate performance.

3.2. Supply Chain Operations Reference (SCOR)

Following the BSC model, the SCOR model also attracted many researchers to use the method. This model, developed by the Supply Chain Council (SCC) in 1996, has become an important tool in evaluating supply chain performance. SCOR provides a reference framework for five core management processes:

Plan, Source, Make, Deliver, and Return. SCOR also presents thirteen main performance metrics corresponding to level one, categorized into five groups: reliability, flexibility, responsiveness, cost, and asset management. The initial metrics focus on the customer aspect, while the remaining metrics assess internal SC operations called internal-facing.

In SCM performance management research, SCOR has been widely used. For instance, Thakkar et al. (2009) applied SCOR with BSC to create a performance evaluation system for small and medium-sized enterprises in India. Additionally, Ghatari et al. (2013) adjusted the SCOR model to assess compatibility with distributors in the pharmaceutical industry based on building qualitative and quantitative data.

However, using SCOR also poses challenges in minimizing the complexity of the supply chain, requiring further research and refinement of performance metrics to meet the increasing needs of organizations. This shows the necessity of continuing to research and improve the SCOR model so that it can better meet the complex demands of the modern market.

3.3. Analytic Hierarchy Process (AHP)

The AHP technique, developed by Thomas Saaty in the 1970s, is a useful decision-making tool that supports the organization and analysis of complex issues through a mathematical and psychological approach. Initially, AHP was not widely applied in the context of SCM, but at the end of the 20th century and the beginning of the 21st century, it began to receive significant attention to this day.

Many studies have applied AHP; for example, Askariazad & Wanous (2009) aimed to build a comprehensive PMS to evaluate SC performance, they combined AHP for pairwise comparison of important SC functions; Charkha & Jaju (2018) used AHP integrated with Six Sigma to measure performance in specific industries such as textiles. Many researchers believe that AHP has significant potential in measurement applications.

3.4. Data Envelopment Analysis (DEA)

The Data Envelopment Analysis (DEA) model, developed by Charles and associates in

1978, is a tool for evaluating supply chain (SC) performance in terms of in-depth efficiency analysis of inputs and outputs based on both quantitative and qualitative metrics. To calculate SC points, Shafiee et al. (2014) applied the DEA model in the Iranian food industry. More recently, Dobos & Vurřsmarty (2019) used the models in selecting green suppliers. They integrated into the selection of green suppliers, considering sustainability factors as output indicators and management as input variables. This proves that DEA is a flexible and effective tool, capable of adapting to various contexts in SC management.

4. Developing a process for measuring supply chain performance in enterprises in Vietnam.

After the author introduced the methods commonly used globally to measure SCM (Supply Chain Management) performance, we found the SCOR (Supply Chain Operations Reference) method to be user-friendly and readily adaptable for businesses. Therefore, the author has developed a process to measure supply chain performance using Scorecards for enterprises in Vietnam as follows, process for applying performance measurement in supply chains using Scorecards methodology,

Step 1: Objective and Purpose Identification

Determine the specific objectives of measuring supply chain performance, such as improving efficiency, enhancing flexibility, reducing costs, strengthening responsiveness, etc. Identify the purpose behind utilizing scorecards, like tracking progress, assessing performance, or guiding improvement initiatives.

Step 2: Performance Metric Determination

Utilize the SCOR model to identify key performance indicators (KPIs) aligned with core management processes (Plan, Source, Make, Deliver, Return). Classify these indicators into groups: reliability, flexibility, responsiveness, costs, and asset management.

Step 3: Data Collection

Identify necessary data sources for measuring performance indicators. Gather data from various sources such as supply chain management systems, ERP systems, supplier and customer reports.

Step 4: Scorecard Development

Create an Excel spreadsheet or use specialized software to develop the scorecard. List the performance indicators and assign weights to each according to their importance relative to the objectives and purposes identified in Step 1. Score each indicator based on data collected in Step 3, using methods such as evaluating current supply chain performance against a standard or benchmarking against similar supply chains in the industry. Aggregate scores to compute the overall score of the supply chain.

Step 5: Analysis and Reporting

Analyze the results from the scorecard to understand the supply chain's performance. Identify strengths and weaknesses of the supply chain. Generate reports with charts and analyses evaluating the performance of core management processes. Present findings to stakeholders and propose improvement measures.

Step 6: Monitoring and Improvement

Monitor performance indicators over time to ensure the supply chain operates efficiently.

Implement improvement measures based on the analysis of results and feedback from stakeholders. Repeat the performance measurement process to evaluate the impact of improvement measures and continue enhancing the performance of the supply chain.

5. Conclusion

In ensuring SCM performance, the use of measurement tools plays an important role, the authors have presented some models and measurement methods such as SCOR, BSC, AHP, and DEA. These tools provide a comprehensive approach to evaluating and optimizing SCM performance.

SCOR offers a standard framework for measuring and evaluating SCM performance from various aspects, from process management to financial efficiency. BSC focuses on balancing financial and non-financial indicators to ensure a balanced and multidimensional approach to performance evaluation. AHP provides a multi-criteria decision-making method to determine priorities and distribute resources in SCM based on

Table 1: Scorecards

Indicator Groups	Key Performance Indicator (KPI)	Objective /Benchmark	Actual Performance	Score	Remarks
Reliability	On-time Order Fulfillment Rate	-	-	-	-
Responsiveness	Market Response Time	-	-	-	-
	Manufacturing Flexibility	-	-	-	-
Agility	Order Cycle Time	-	-	-	-
	Inventory Turnover Rate	-	-	-	-
	Product Conversion Time	-	-	-	-
Cost	Supply Chain Management Cost	-	-	-	-
	Cost of Goods Sold	-	-	-	-
	Inventory Value	-	-	-	-
Assets	Fixed Asset Utilization Efficiency	-	-	-	-
	Inventory Turnover Efficiency	-	-	-	-
	Return on Assets	-	-	-	-
	Demand Fulfillment Capability without Stocking	-	-	-	-

Source: Prakash et al. (2013)

critical criteria. DEA is an advanced data analysis tool that measures the relative performance of units in SCM based on multiple inputs and outputs. By combining and using these methods and techniques flexibly and effectively, not only do they help

businesses assess current performance, but they also support proposing and implementing improvements to optimize SCM operations, enhancing the competitive capability of enterprises in today's market ■

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PHƯƠNG PHÁP VÀ KỸ THUẬT ĐÁNH GIÁ HIỆU QUẢ QUẢN LÝ CHUỖI CUNG ỨNG TRONG DOANH NGHIỆP

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TÓM TẮT:

Quản lý chuỗi cung ứng đã trở thành yếu tố quan trọng, góp phần quyết định trong sự thành công của các tổ chức và doanh nghiệp. Trong bối cảnh cạnh tranh khốc liệt và sự phức tạp ngày càng tăng của hoạt động chuỗi cung ứng, việc đo lường hiệu quả hoạt động của chuỗi cung ứng là bước quan trọng để đảm bảo tính hiệu quả và linh hoạt trong các hoạt động kinh doanh. Tính hiệu quả trong quản lý chuỗi cung ứng được đánh giá dựa trên việc giảm lãng phí và tối ưu hoá hoạt động của chuỗi cung ứng để tạo ra hiệu quả và giá trị cho tất cả các bên liên quan. Bài viết này trình bày thực trạng quản lý chuỗi cung ứng tại Việt Nam. Bài viết cũng giới thiệu các kỹ thuật, phương pháp đánh giá hiệu quả quản lý chuỗi cung ứng như Thẻ điểm cân bằng (BSC), Mô hình tham chiếu hoạt động chuỗi cung ứng (SCOR), Phương pháp phân tích thứ bậc (APH), và Phương pháp phân tích bao dữ liệu (DEA). Những phương pháp và kỹ thuật này không chỉ giúp doanh nghiệp hiểu rõ hơn về chuỗi cung ứng của mình mà còn giúp cải thiện hiệu suất tổng thể và tăng cường sức cạnh tranh trên thị trường.

Từ khoá: chuỗi cung ứng, mức độ hiệu quả của chuỗi cung ứng, phương pháp đánh giá.