How Do Service Competency and Logistics Flexibility Influence Supply Chain Performance of Thai Paper Manufacturers?

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Abstract

This research aims to study the levels of supply chain integration, service capability, logistics flexibility and supply chain performance of paper manufacturing businesses in Thailand plus influences of supply chain integration, service competency and logistics flexibility on the supply chain performance of paper manufacturing businesses in Thailand, and to study the indirect influence of logistics flexibility and service competency on the supply chain performance of paper manufacturers in Thailand. The sample was 300 paper manufacturing companies obtained from stratified sampling. The tool was a questionnaire. Statistics used in data analysis included frequency, percentage, mean, standard deviation, confirmatory factor analysis and structural equation models. The results found that supply chain integration, service capability, and logistics flexibility and the supply chain performance of the paper manufacturing business in Thailand were at a high level. In addition, supply chain integration, service capability, logistics flexibility influenced supply chain performance of paper manufacturing businesses in Thailand. The findings can provide guidelines for developing and improving the paper manufacturing business in Thailand in increasing the efficiency and effectiveness of the supply chain. For theoretical and suggestions, academics or interested parties can use these findings to conduct additional research to develop logistics and supply chain management in other industries in the future.

Keywords: supply chain integration, supply chain performance, service competency, and logistics flexibility

1. Introduction

From The report on supply chain performance in Thailand's paper industry highlights the intensifying competition driven by globalization, prompting businesses to enhance their organizational capabilities for sustainability. Analyzing supply chain performance against national and international benchmarks is essential for identifying strengths and weaknesses to improve competitiveness (Wisedsin et al., 2020). Effective supply chain management, encompassing cost, time, and customer satisfaction, is vital for success in today's competitive landscape (Srisawat & Aunyawong, 2021). In Thailand, supply chain management has significantly contributed to economic growth by increasing efficiency, reducing costs, and creating jobs. The paper industry, particularly in packaging, has embraced environmentally friendly practices like recyclable paper packaging, supporting sustainability and product

identity (Setthachotsombut et al., 2022). Comprehensive supply chain integration strengthens competitiveness and enhances efficiency and organizational quality, with research showing a positive impact on performance (Kursat & Turker, 2022; Alshurideh et al., 2022).

1.1 Research Objective

1) To study the levels of supply chain integration, service capability, logistics flexibility and supply chain performance of paper manufacturing businesses in Thailand

2) To study influences of supply chain integration, service competency and logistics flexibility on the supply chain performance of paper manufacturing businesses in Thailand.

3) To study the indirect influence of logistics flexibility and service competency on the supply chain performance of paper manufacturers in Thailand.

2. Literature Review

Service Competency

Service competency refers to the necessary knowledge and skills of the employee. In serving customers, the ability to provide service is involved with individuals ranging from raw material manufacturers, processing plants, wholesalers, and retailers to the consumer (Jose et al., 2022). Its main transportation activities, inventory services, purchase orders, information services, related financial activities, and additional activities are warehouse management, product care, purchasing, and packing including the management of customer needs. In addition to directly related activities, such a process will require Infrastructure: transport networks communicate information and finance including factors that regulate and support the relevant regulations (Alkire & Hammedi, 2021). The scope covers public and private sectors, local, national, and global, all of which lead to satisfaction to customers through effective management (Espino-Rodríguez & Taha, 2020). From the factor synthesis of service competency, it comprised 4 factors: tangibility, responsiveness, assure, and empathy.

Logistics Flexibility

Logistics flexibility is one of the logistic competencies (Aunyawong et al., 2020). Production flexibility is often considered as a physical resource, such as a flexible production system. transportation flexibility etc., But the current market is cheap and driven by customer demand, which has more diverse needs, obtain high quality and speed of delivery (Arunachalam et al., 2021). This caused the organization to adapt to keep up with the needs of customers originally; most people only viewed flexibility, in terms of production flexibility which is related to the management within the organization. Therefore, insufficient support for unstable external conditions because the business model relates to the supply chain, is complicated (Tweedie et al., 2019). To address challenges, and develop competitiveness, organizations need to improve greater flexibility at various levels. From the factor synthesis of logistics flexibility, it consisted of 4 factors: physical supply flexibility, purchasing flexibility, physical distribution flexibility, and demand management flexibility.

Supply Chain Integration

Supply chain integration means managing production and distribution in close and efficient coordination (Lai & Lee, 2023). Supply chain members must see themselves as part of a team with the aim of working together to maximize the benefits for all parties in the supply chain in

line with supply chain integration (Waiyawuththanapoom et al., 2023). They are a strategic collaboration and supply chain management for the purpose of supply chain integration to make operations in the supply chain efficient (Asare et al., 2023). There is accurate information enabling us to deliver products and services to customers with satisfaction. From the factor synthesis of supply chain integration, it involves 3 factors: supplier integration, customer integration, and internal integration.

Supply Chain Performance

Supply chain performance is the process of planning, organizing, and executing all activities related to the product. From the beginning to the last point, it may use the word from the process of upstream to downstream of the supply chain resulted in a good performance or stood out from the established standard, along with the creation of a system for the flow of information that causes the process (Purwanto & Juliana, 2022). The work of each department is transmitted throughout the organization with supply chain efficiency and supply chain effectiveness. From the factor synthesis of supply chain performance, it contains 2 factors: supply chain efficiency and supply chain effectiveness.

Hypothesis Development

From the objectives of this research, the researchers occasionally have reviewed the concepts, theories, and related research of many scholars (Espino-Rodríguez & Taha, 2020; Pintuma et al., 2020; Tirastittam et al., 2020; Alkire & Hammedi, 2021; Arunachalam et al., 2021; Srisawat & Aunyawong, 2021; Jose at al., 2022; Laguir et al., 2022; Wararatchai et al., 2022; Hambali et al., 2022; Asare et al., 2023; Lai & Lee, 2023). Thus, the model, as shown in Figure 1, may still be inconsistent with empirical data and the relationship of cause and effect variables. Therefore, the following hypotheses are proposed.

H1: Supply chain integration has a positive direct influence on Service competency.

H2: Supply chain integration has a positive direct influence on supply chain performance.

H3: Supply chain integration has a positive direct influence on logistics flexibility.

H4: Service competency has a positive direct influence on supply chain performance.

H5: Logistics flexibility has a positive direct influence on service competency.

H6: Logistics flexibility has a positive direct influence on supply chain performance.

H7: Supply chain integration has a positive indirect influence on supply chain performance, mediated by service competency.

H8: Supply chain integration has a positive indirect influence on supply chain performance, mediated by logistics flexibility.

3. Methods

Data Collection

The sample size of this research was obtained by calculating the sample size according to the condition for using Structural Equation Modeling (SEM) statistics is that the sample size is not less than 20 times the observed variable in the model because it will cause the variable to be distributed more normally (Hair et al., 2010). The conceptual framework of this research has 13 observed variables, so a sample group of not less than or equal to 260 samples (13 x

20). The researcher then determined to collect data from 300 samples of paper manufacturers. The questionnaire was adopted from the previous studies and the questionnaire was rated on a five-point Likert scale that ranged from 1 which shows strongly disagree and 5 for strongly agree.

Data Analysis

The descriptive analysis of the study had been conducted by using SPSS. The Supply Chain Integration (SCI) mean score was 3.83 which explains the manager had a perception of a high level of supply chain performance. The service competency (SVC) mean score was 3.63 which shows that managers give greater importance to competitive advantage. Moreover, the logistics flexibility (LOF) mean score was 4.01 which explains the logistics flexibility that has an extraordinary awareness level of supply chain performance. Supply chain performance (SCP) mean score was 3.87 which demonstrates a high level of awareness among respondents about efficiency and effectiveness.

Inferential Analysis

The Structural Equation Modeling (SEM) technique has been applied for conducting the inferential analysis. This section was divided into the following two sections: measurement model and path analysis, as recommended by Henseler et al (2009).

3. Results and Discussion

Before the assessment of the structural model, the assessment of the measurement model was necessary to check its reliability and validity. The reliability and validity could be checked through convergent and discriminant validity. The Cronbach alpha value could not decrease below 0.7, factor loadings could not decrease from 0.5, composite reliability could not decrease below 0.7 and lastly, average variance extracted (AVE) could not decrease by 0.5. These suggested criteria have been explained in the following previous literature (Hair et al., 2014; Hair et al., 2017). The all the values fulfill the criteria of convergent validity.

The discriminant validity could be checked through three criteria's, Fornell and Lacker, cross loadings and Hetromonotrait correlations (HTMT). The discriminant validity in the Fornell & Lacker could be assessed through the AVE square root that diagonal values should have greater correlations from other below values (Hair et al., 2017; Henseler et al., 2015). For the recommended values for the HTMT in the discriminant value, the correlation among the construct should be less than 0.85 (Hair et al., 2017; Henseler et al., 2015).

After the measurement model assessment, the next process was to test the structural model of the study to test the study hypotheses. For this purpose, the company 300 resampling technique has been applied in the SEM. The SEM direct effect has shown Supply chain performance (SCP) had a significant and positive connection with Service competency (SCV). In addition, Logistics flexibility (LOF) and Supply chain integration had a positive and significant effect on Supply chain performance. The findings have shown that competitive advantage and logistics flexibility are integral factors that could help enhance the Supply chain performance of the paper industry in Thailand. This could also have been seen from the mean score of managers which have similar average values as compared to others. Another possible reason is that there could be an overlapping of other variables in the model.

The research findings and discussions reveal that in analyzing supply chain integration, the most influential variables are supplier integration, followed by internal integration and customer integration. Consequently, paper manufacturing businesses must strategize collectively within the network of paper traders and suppliers, sharing production and quality data, methodologies, and strategies to reduce production costs while collectively enhancing operational capabilities in quality, cost, and meeting customer demands (Hiranphaet et al., 2022; Sooksai et al., 2022). Additionally, engaging in procurement practices to ensure value and cost reduction in operations will significantly improve the economic efficiency and growth of the business. Furthermore, supply chain integration plays a pivotal role in enhancing a company's service capabilities efficiently and directly impacts the efficiency of the supply chain as a crucial tool in organizational operations (Aunyawong et al., 2018; Aunyawong et al., 2020).

The analysis of Service competency reveals that the most influential variables are assure, followed by empathy, tangibility, and responsiveness in order. Therefore, paper businesses must uphold agreements with their supply chain partners as agreed, proactively solve issues, and establish long-term business partnerships that involve shared tangible aspects. Sharing techniques to enhance productivity and cost reduction, exchanging risk related information, preventing operational interruptions, and maintaining paper quality are crucial to continuously earn customer trust (Pintuma & Aunyawong, 2021; Yuyangyuen & Aunyawong, 2023). To improve service capability, close collaboration in planning and executing supply chain activities toward common goals and benefits is essential. Manufacturers in the paper industry need to actively engage in joint development efforts. Such businesses need to actively contribute to cooperative activity development (Som et al., 2019; Nualkaw et al., 2021).

The analysis of logistics flexibility indicates that the most influential variable are physical supply flexibility, physical distribution flexibility, purchasing flexibility, and demand management flexibility, in that order. As a result, paper manufacturing businesses must ensure the quality of paper before delivering to customers, ensuring on-time and in-full delivery, and consistently meeting customer demands for continuous customer purchases. This involves developing supply chain capabilities, utilizing existing resources efficiently, and aligning with previous research findings, emphasizing building trust in supplier relationships, continuous understanding of customer needs, fostering closer customer relationships, and enhancing inter-departmental coordination to improve efficiency and effectiveness (Espino-Rodriguez et al., 2022; Waiyavat et al., 2022). Moreover, many companies prioritize developing supply chain performance to elevate competitive abilities by focusing on delivering quality products and reducing operational costs across different operational domains (Hendijani et al., 2022; Wisedsin et al., 2020).

The analysis of supply chain performance reveals that the most influential variable is efficiency, followed by effectiveness. Therefore, paper manufacturing businesses should prioritize having logistics service providers that suit their operational needs directly, thereby reducing operational costs and enhancing overall operational efficiency (Phrapratanporn et al., 2022; Prachayapipat et al., 2022). Practices and policies supporting collaborative efforts to improve service efficiency contribute significantly to overall economic performance (Lenuwat and Boon-Itt, 2019; Kerdpitak et al., 2022).

The analysis of the Structural Equation Modeling discovered that supply chain integration, service competency, and logistics flexibility positively influence the supply chain

performance of Thai paper manufacturing businesses. Furthermore, the supply chain integration has both direct and indirect positive impacts on the supply chain performance of these companies. The research highlights that service competency and logistics flexibility significantly contribute to supply chain performance, as observed in past studies. The service competencies have a meaningful and positive correlation with the effectiveness and efficiency of the organization's supply chain, enhancing overall visibility across the entire supply chain (Laguir et al., 2022; Srisawat & Aunyawong, 2021; Wararatchai et al., 2022). Moreover, competitiveness and supply chain fosters stakeholders' engagement, allowing for predictive analytics, needs assessment, collaborative practices, and information sharing, which are instrumental in enhancing competitive capabilities and managerial efficiency in supply chain operations (Hambali et al., 2022; Pintuma et al., 2020; Tirastittam et al., 2020).

4. Conclusion

The research highlights that supply chain integration, service competency, and logistics flexibility are key factors influencing the performance of Thai paper manufacturing businesses. Collaborative strategies among suppliers, manufacturers, and traders are essential to reduce costs, enhance quality, and meet customer demands. Effective service competency, including reliability, empathy, and responsiveness, strengthens trust and long-term partnerships. Logistics flexibility, such as managing supply and distribution efficiently, ensures on-time and quality delivery. These practices improve efficiency, reduce costs, and align with the goal of competitive supply chain performance. Overall, integrating these factors fosters collaboration, enhances visibility, and drives operational and economic success.

Future studies should explore factors influencing supply chain performance, focusing on areas such as analysis, planning, decision-making, and management. Key aspects could include procurement, automated ordering systems, real-time production management, inventory optimization, accurate shipment tracking, timely delivery, and efficient information and document tracking. Additionally, research could examine strategies for enhancing customer experience and predicting potential risks to effectively manage uncertainties. These insights would contribute to more resilient and customer-centric supply chain systems.

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