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Impact of 3PL Outsourcing on Supply Chain Management in Manufacturing Companies in Norway: Case Study Norsk Hydro

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Abstract

3PL outsourcing is a practice in which a company outsources its logistics and supply chain management functions to a third-party logistics provider. By outsourcing logistics activities to a 3PL provider with advanced technology solutions, organizations can improve their supply chain management and achieve greater efficiency and effectiveness. Supply chain management is the coordination and management of all activities involved in the production and delivery of goods and services from raw materials to end customers. It includes activities like procurement, production, transportation, warehousing, and distribution. The research used the descriptive research design. The target population was 30 Manufacturing Companies in Norway. The research did sampling of 40 participants that were chosen from the target population of 30 Manufacturing Companies in Norway. Questionnaires were utilized to gather the data. The study concluded that the partnership between manufacturers and 3PL providers has become increasingly critical in Norway's competitive manufacturing industry. This collaboration helps to streamline processes, enhance visibility, and optimize inventory management, leading to greater supply chain performance. To ensure successful outsourcing, it is essential to conduct a thorough analysis of the supply chain, identify the right 3PL provider, establish clear communication and collaboration, develop a performance monitoring system, and regularly review and assess the outsourcing arrangement. It was recommended that before deciding on whether to outsource logistics functions to a 3PL provider, it is crucial to conduct an in-depth analysis of the current supply chain to identify areas that need improvement. The manufacturing company should establish a clear communication plan with the 3PL provider, outlining expectations, key performance indicators (KPIs), and regular reporting requirements. Effective communication and collaboration are crucial to the success of 3PL outsourcing.

Keywords: 3PL Outsourcing, Supply Chain Management, Manufacturing Companies, Norway

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1.0 Background of the Study

3PL outsourcing is a practice in which a company outsources its logistics and supply chain management functions to a third-party logistics provider (Wang, Nguyen, Dang & Lu, 2021). The third-party logistics provider is responsible for activities such as transportation, warehousing, and distribution. This enables the company to focus on its core business activities and reduces the time and resources required to manage logistics activities. There are several benefits of 3PL outsourcing. By outsourcing logistics activities to a third-party logistics provider, a company can save money on transportation, warehousing, and distribution costs (Shaiq & Hassan, 2019). The third-party logistics provider can leverage economies of scale and negotiate better rates with carriers and other logistics service providers. By outsourcing logistics activities, a company can focus on its core business activities and leave the logistics activities to the third-party logistics provider. This can improve efficiency and productivity in the company's operations. Third-party logistics providers have expertise in logistics and supply chain management. By outsourcing logistics activities, a company can leverage the expertise of the third-party logistics provider and improve its logistics operations; third-party logistics providers offer flexibility in terms of logistics services (Barker, Gibson, Hofer, Hofer, Moussaoui & Scott, 2021). They can adjust their services based on the company's changing needs, such as fluctuations in demand or changes in product lines and third-party logistics providers can scale their services based on the company's needs. As the company grows, the third-party logistics provider can provide additional logistics services to meet the company's needs.

There are three several types of third-party logistics providers (Zhang, Su, Zhao & Chen, 2022). The asset-based 3PLs, these are logistics providers that own their transportation and warehousing assets, such as trucks and warehouses. They provide logistics services using their own assets. The non-asset-based 3PLs these are logistics providers that do not own their transportation and warehousing assets. Instead, they act as intermediaries between the company and logistics service providers. They coordinate logistics activities using the logistics service providers' assets. The integrated 3PLs these are logistics providers that offer a range of logistics services, including transportation, warehousing, and distribution. They provide end-to-end logistics solutions to their clients. When selecting a 3PL provider, there are several key considerations that a company should take into account, including: Experience and expertise, technology capabilities, scalability, service level agreements (SLAs) and cost (Nguyen & Ménoury, 2022).

Supply chain management (SCM) is the coordination and management of all activities involved in the production and delivery of goods and services from raw materials to end customers (Lisitsa, Levina & Lepekhin, 2019). This includes activities such as procurement, production, transportation, warehousing, and distribution. 3PL outsourcing is a practice in which a company outsources its logistics and supply chain management functions to a third-party logistics provider. 3PL outsourcing plays an important role in supply chain management. By outsourcing logistics and supply chain management functions to a third-party logistics provider, a company can improve the efficiency and effectiveness of its supply chain (Yadav, Garg & Luthra, 2020). This can lead to cost savings, improved customer service, and increased competitiveness.

The 3PL provider can bring expertise and resources to the supply chain that the company may not have in-house (Tiwari, Sharma, Choi & Lim, 2023). This can include expertise in transportation,

warehousing, and distribution, as well as access to a network of carriers and logistics service providers. The 3PL provider can also provide technology solutions that can improve visibility and coordination across the supply chain. 3PL outsourcing can improve the efficiency of the supply chain by reducing lead times, improving inventory management, and optimizing transportation and distribution networks. 3PL providers offer flexibility in terms of logistics services. They can adjust their services based on the company's changing needs, such as fluctuations in demand or changes in product lines. 3PL outsourcing can improve customer service by providing faster and more reliable delivery, as well as improved visibility into the supply chain and 3PL providers have expertise in logistics and supply chain management. Prativiera, Creazza, Dallari and Melacini (2023) noted that by outsourcing logistics and supply chain management functions, a company can leverage the expertise of the 3PL provider and improve its supply chain operations.

According to Khan, Alkhatib, Ammar, Muktadir and Kumar (2022), when integrating 3PL outsourcing into supply chain management, there are several key considerations that a company should take into account, like; 3PL outsourcing should be aligned with the company's strategic objectives for the supply chain. This includes identifying the key areas where 3PL outsourcing can provide the most value. Integration with existing systems; the 3PL provider's technology solutions should integrate with the company's existing systems and processes (Meidutė-Kavaliauskienė & Činčikaitė, 2023). This can include the use of transportation management systems (TMS), warehouse management systems (WMS), and enterprise resource planning (ERP) systems. Service level agreements (SLAs); the 3PL provider should have SLAs that meet the company's requirements for service levels and performance. The company should establish processes for data management and sharing between the 3PL provider and the company's internal stakeholders. Communication between the 3PL provider and the company's internal stakeholders should be established to ensure transparency and collaboration. Therefore, 3PL outsourcing plays an important role in supply chain management. It can provide several benefits, including improved efficiency, cost savings, flexibility, improved customer service, and access to expertise (Huo, Haq & Gu, 2021). When integrating 3PL outsourcing into supply chain management, a company should consider alignment with strategic objectives, integration with existing systems, SLAs, data management, and communicate.

1.1 Statement of the Problem

Manufacturing enterprises in Norway are increasingly turning to third-party logistics (3PL) firms to handle their logistics on their behalf. However, the extent to which outsourcing affects the management of the supply chain remains unclear. In particular, little is known about what influences businesses to use third-party logistics companies (3PLs) and how this affects supply chain efficiency. Therefore, the purpose of this research is to investigate the effects of third-party logistics (3PL) outsourcing on supply chain management in Norwegian manufacturing firms by determining what factors play a role in the outsourcing decision, quantifying the level of outsourcing, and analysing the outcomes. This research was conducted to address a knowledge gap in the literature by providing empirical data on how 3PL outsourcing has affected supply chain management in Norway's industrial sector.

2.0 Literature Review

Mengistu, Derseh, Zewdu, Haile, Bahiru and Ambaye (2022) conducted study to explore the impact of outsourcing logistics to third-party providers on health-care delivery performance. The sample population will be hospital personnel and management, who will number around 200 people, the majority of whom will be involved in hospital logistics management. The study used an overall sample size of 90 hospital personnel and management, with 80 responses received, representing a 95.7% response rate. Respondents were selected using a simple random sampling method. Regression, percentages, means and standard deviations, and hierarchical regression models were used to evaluate the data, which was analysed using SPSS version 22. Warehouse, transportation, and inventory outsourcing were identified as significant independent factors that positively impacted healthcare delivery performance. Researchers found a small but statistically significant link between healthcare delivery efficiency and the practise of integrating activities. Third-party logistics service providers' information technology competence (ITC) completely moderated the relationship between their performance and healthcare delivery in this research. The findings suggest that the efficiency with which hospitals offer treatment to patients is significantly affected by the use of third-party logistics providers. Again using hierarchical regression analysis, the results demonstrate the potential efficacy of well-integrated internal units and processes in achieving the performance gains sought by businesses and hospitals using third-party logistics providers. We find that the third-party logistics outsourcing employed has a substantial impact on the hospital's efficiency and effectiveness in providing care to patients. Successful performance among supply chain partners was suggested as a result of an improved communication and feedback system being developed between the hospital and its third-party logistics service providers.

Heitz, Launay and Beziat (2019) performed study to ascertain logistics outsourcing patterns among Germany institutions. The study used a self-administered questionnaire to obtain primary data on the logistics outsourcing strategies used by universities. A research was conducted among Hamburg's universities in order to obtain such information. Descriptive statistics and regression analysis were used to analyze the data. Despite the fact that home transport was determined to be the most prevalent, it was clear that logistics outsourcing increases supply chain performance. All of the colleges polled outsourced parts of their logistical tasks, albeit to various degrees. According to the survey, there is a push to employ logistics outsourcing as a strategy to save costs, focus on core company operations, decrease risks, and achieve a competitive edge. The benefits of logistics outsourcing cannot be overstated, and the impact on the supply chain is enormous. The study also identified some of the obstacles that universities encountered as they moved to outsource their business activities, such as loss of control over the activities, student non-cooperation, industrial unrest, switching costs, loss of information to competitors, and stakeholder resistance to change.

Qureshi (2022) conducted study to investigate the impact of third-party logistics services on supply chain performance in Turkey's distribution industry. The study employed a descriptive research design as its methodology. The study's target demographic was all workers at the Aysa Shipping & Logistics office in Ankara. The study recruited 50 respondents from a total of 120 employees in the Logistics and Transportation department, and 45 of them participated in the final study. The researcher used the basic random sampling procedure because it ensures that each member of the population has an equal probability of being chosen. As the major technique for collecting primary data, a questionnaire was prepared and pre-tested, and it was presented to respondents directly by

research assistants and picked up later on the agreed-upon date. The questionnaire asked both open-ended and closed-ended questions. SPSS ver. 20 analytical software and t-Trend analysis were used to analyze the data. The results were presented by the use of descriptive statistical techniques such as graphs, tables, and other measures of central tendency, while qualitative data was evaluated to discover patterns, trends, and linkages from the data collected. The findings indicated that the four variables analyzed account for 85% of the variation and that other factors not included in this study account for 20% of the variance in the dependent variable. It was also found that ICT integration improves financial performance in the distribution sector's supply chain, but organizational policy has minimal impact on the financial performance of enterprises in the supply chain. The report suggests that the government enact distribution laws to eliminate the unnecessary and unjust clearance procedures that cause enterprises to experience delays in meeting their client lead times. Third Party logistical Services (3PLs) providers should foster an environment of information exchange among their employees and with external clients in order to decrease logistical hurdles caused by a lack of expertise in the supply chain industry.

International and complex supply chains are emerging. The introduction of third-party logistics (3PL) services can assist the supply chain reduce costs while also shortening lead times. Sergeevna (2022) conducted research to determine the effect of third-party logistics service providers on the supply chain performance of Russian manufacturing firms; the overall goal of the research is to examine the effect of 3PL service providers on supply chain performance in Russian manufacturing firms, using Arzamas Machine-Building Plant as an example; and the specific goals are as follows: To ascertain the impact of lead time, storage management, cost reduction, and transportation management on Arzamas Machine-Building Plant procurement performance. Descriptive Research Design was utilized in the research. The sample size examined is 60, which represents 13.3% of the target population of 450 logistics workers, top management, financial staff, operations staff, human resource staff, and suppliers of Arzamas Machine-Building Plant. Data was analyzed using descriptive statistics and SPSS ver. 20 to determine the influence of independent factors on the dependent variable. The study discovered that lead-time, warehousing management, cost-cutting, and transportation management all had a significant impact on supply chain effectiveness overall. The study findings using regression analysis demonstrated that 55.7% of third party logistics had an impact on supply chain performance in Arzamas Machine-Building Plant.

Dimitrov and Dimitrova (2021) performed study to determine the impact of outsourcing to Third Party Logistics Providers on business performance in Bulgaria manufacturing enterprises. It accomplished this by researching the impact of integrating operations, outsourcing warehouse operations, outsourcing transportation operations, and outsourcing inventory operations on the performance of Bulgaria's manufacturing enterprises. The manufacturing enterprises in Bulgaria and its surrounding were the study's target demographic. The study sample was created using cluster sampling, which divided both manufacturing enterprises into groups depending on sector. In general, the researcher used a descriptive research design since it allowed the researcher to examine all types of data and also allowed respondents to reply to all types of data such as personal narratives, case studies, or observations. Data was collected using self-administered questionnaires and analyzed using SPSS (22). The findings of this research were then utilized to draw accurate conclusions and provide suggestions to all parties engaged in the manufacturing sectors in terms

of the efficacy of 3PL Practices and Firm Performance. According to the study's findings, outsourcing logistics to third-party suppliers has a beneficial influence on corporate performance. This was drawn from the fact that the study found that all four components of logistics outsourcing had a favorable influence on business performance. Integrating activities, Warehousing operations, Transportation operations, and Inventory operations were among them. As a result, the study indicated that outsourcing these four components improves corporate performance. In order to increase business performance, the report suggests that manufacturing firms explore merging operations with third-party logistics organizations. It is crucial to note, however, that the study used a qualitative measure of business performance and urges more research into the amount to which each component affects firm success.

3.0 Research Methodology

The study used the descriptive research design. The target population was 30 Manufacturing Companies in Norway. The study did sampling of 40 participants that were selected from the target population of 30 Manufacturing Companies in Norway. Questionnaires were used to collect data.

4.0 Research Findings and Discussion

4.1 Correlation Analysis

The findings presented in Table 1 shows the correlation analysis

Table 1: Correlation Analysis

		SCM	3PL Outsourcing
SCM	Pearson Correlation	1.000	
	Sig. (2-tailed)		
3PL Outsourcing	Pearson Correlation	.164**	
	Sig. (2-tailed)	0.000	0.000

The correlation results from Table 1 indicate that the 3PL outsourcing was positively and significantly associated with supply chain management ($r=.164$, $p=.000$). This concurs with Mengistu, Derseh, Zewdu, Haile, Bahiru and Ambaye (2022) who noted that better communication and feedback mechanism need to be implemented to enable an efficient flow of information between the companies and its third-party logistics service providers in order to ensure successful performance among supply chain partners.

4.2 Regression Analysis

The section consists of model fitness, analysis of variance and regression of coefficient. The findings presented in Table 2 indicate the model fitness

Table 2: Model Fitness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.164a	0.202	0.122	0.003124

The results from Table 2 show that 3PL outsourcing was found to be satisfactory in explaining the supply chain management of Norsk Hydro Company in Norway. This was supported by the coefficient of determination, i.e. the R square of 0.202. It shows that 3PL outsourcing explain 20.2% of the variations in the supply chain management of Norsk Hydro Company in Norway.

Table 3: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.33	1	8.33	20.88	.000b
	Residual	11.97	30	0.399		
	Total	20.30	29			

The result in Table 3 indicates that the overall model was statistically significant. The findings show that supply chain management is a good predictor in explaining the 3PL outsourcing in Norsk Hydro Company in Norway. This was supported by an F statistic of 20.88 and the reported p-value of 0.000 which was less than the conventional probability significance level of 0.05.

Table 4: Regression of Coefficient

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.324	0.026		12.46	0.098
3PL Outsourcing	0.867	0.265	0.869	3.27	0.025

Based on the results presented in Table 4, it was found that 3PL outsourcing was positively and significantly associated to supply chain management ($\beta=0.867$, $p=0.025$). This was supported by a calculated t-statistic of 3.27 that is larger than the critical t-statistic of 1.96. The results implies that when 3PL outsourcing improves by one unit, the supply chain management of Norsk Hydro Company in Norway will increase by 0.867 units while other factors that influence the supply chain management are held constant. Qureshi (2022) articulated that 3PLs providers should foster an environment of information exchange among their employees and with external clients in order to decrease logistical hurdles caused by a lack of expertise in the supply chain industry.

5.0 Conclusion

In conclusion, 3PL outsourcing has a significant effect on supply chain management in manufacturing companies in Norway. It provides numerous benefits such as cost savings,

enhanced flexibility, and improved customer service. By outsourcing logistics functions, manufacturers can focus on their core competencies, reduce operational costs, and improve efficiency. The partnership between manufacturers and 3PL providers has become increasingly critical in Norway's competitive manufacturing industry. This collaboration helps to streamline processes, enhance visibility, and optimize inventory management, leading to greater supply chain performance. Moreover, Norway's unique geographic location, with its many fjords and rugged terrain, makes logistics and transportation particularly challenging. 3PL providers can provide valuable expertise and resources in this regard, helping manufacturers navigate the complexities of the Norwegian supply chain.

To ensure successful outsourcing, it is essential to conduct a thorough analysis of the supply chain, identify the right 3PL provider, establish clear communication and collaboration, develop a performance monitoring system, and regularly review and assess the outsourcing arrangement. The manufacturers in Norway can maximize the benefits of 3PL outsourcing and drive business growth in today's fast-paced market environment. Overall, 3PL outsourcing is a viable option for Norwegian manufacturers seeking to improve their supply chain management. By leveraging the expertise and capabilities of 3PL providers, manufacturers can gain a competitive advantage and succeed in Norway's challenging business landscape. In conclusion, 3PL outsourcing can provide several benefits to a company, including cost savings, improved focus on core business activities, access to expertise, flexibility, and scalability. When selecting a 3PL provider, a company should consider the provider's experience and expertise, technology capabilities, scalability, SLAs, and cost.

6.0 Recommendations

Norway is a significant player in the manufacturing industry, and as such, its companies can benefit greatly from the effect of 3PL outsourcing on supply chain management. It was recommended that before deciding on whether to outsource logistics functions to a 3PL provider, it is crucial to conduct an in-depth analysis of the current supply chain to identify areas that need improvement. This analysis should include an evaluation of current transportation and distribution networks, inventory management, and customer service levels. Once the analysis is completed, it is essential to identify the right 3PL provider who can meet the specific needs and requirements of the manufacturing company. Consider the provider's experience, capabilities, and resources, as well as their reputation in the industry. Effective communication and collaboration are crucial to the success of 3PL outsourcing. The manufacturing company should establish a clear communication plan with the 3PL provider, outlining expectations, key performance indicators (KPIs), and regular reporting requirements. It is vital to monitor the performance of the 3PL provider regularly. The manufacturing company should establish a performance monitoring system that measures the provider's performance against the established KPIs. This will help identify areas for improvement and ensure the 3PL provider is delivering the desired results. The manufacturing company should regularly review and assess the outsourcing arrangement to ensure it is still meeting its needs and objectives. This review should include an evaluation of costs, service levels, and customer satisfaction levels.

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