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SUPPLY DISRUPTION RISK MITIGATION: A CASE STUDY OF AUTOMOTIVE COMPANY

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Abstract: Disruption in material supply poses a potential threat to production plans and has significant financial and non-financial implications. Studies that examine the use of logistics processes at firm-specific level in mitigating supply disruption risk particularly in the automotive industry, and remain limited. Hence, this study aims to provide additional insights on how logistics processes, both internal and external, contribute towards mitigating material supply disruption risks. A qualitative in-depth single case study method was conducted in a selected automotive manufacturing company with data collected using multiple sources of evidence. Findings revealed that while the internal logistics processes are facilitated with logistics intermediaries (LIs), the external logistics processes are supported via third-party logistics providers. Both internal and external logistics processes improve operational supply chain performance in terms of cost savings, quality, speed and flexibility. The findings further provide additional references to supply chain managers in devising supply disruption mitigation strategies for enhancing operational performance.

Key words: supply disruption, risk mitigation, automotive, case study.

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Introduction

The ongoing competitive and uncertainty in a business environment led firms to become vulnerable to greater supply chain risks and face more challenges in mitigating them (Chowdhury, Lau and Pittayachawan, 2019). According to Rao and Goldsby (2009), supply chain risks may be categorised into several types: environmental, industry, organisational, problem specific and decision maker risk. The danger of not mitigating supply chain risks includes the possibility of dealing with the negative impacts when they occur (Thun and Hoenig, 2011). As noted by Agigi, Niemann and Kotze (2016) "a failure of an element in a supply chain causes a ripple effect of disruptions for potentially all associating firms, upstream and downstream" (p. 1). A supply chain disruption would not only mean an interruption

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to the planned production but also has financial and non-financial implications to companies (Loh et al., 2017).

Most studies on material supply disruptions have focused on unexpected incidents such as catastrophes such as terrorist attack and earthquakes (see Sheffi, 2001; Arto, Andreoni and Rueda-Cantuche, 2015). However, supply disruptions may also be caused by supply chain weaknesses at a firm level, including material supply disruption (Rao and Goldsby, 2009). Furthermore, Nel, de Goede and Niemann (2018) noted that disruptions can also occur at intra-organisational and inter-organisational level. Despite these findings, studies that examine the use of logistics processes at firm-specific level in mitigating supply disruption risk particularly in the automotive industry, and remain limited. There is a concern of whether recommendations for mitigating supply disruptions risks on the global scale may not be readily applicable to firm-specific disruptions. Therefore, the present study aims to address the following research objectives:

To examine why logistics processes are important in mitigating material supply disruption risks

To investigate the role of internal and external logistics processes in improving operational supply chain performance improvement

The current research contributes to the body of supply chain management research in two ways. Firstly, it offers additional insight into the importance of internal and external logistics processes to mitigate supply disruption risks. Secondly, it suggests that effective use of internal and external logistics processes improves operational supply chain performance. Moreover, this study contends that operational non-financial measures are also essential while examining the performance of logistics processes, particularly in the manufacturing environment.

Material supply disruption risk

Even the most conservative strategy balance could cause material disruption of the supply chain (Vahidi, Torabi, and Ramezankhani, 2018; Habermann, Blackhurst and Metcalf, 2015). Disruptions can take many forms, including supplier shutdowns, production stoppages at manufacturing firms (Kamalahmadi and Mahour 2017; Chang, Ellinger and Blackhurst, 2015) and material supply disruption. The risks of material supply disruption influence the smooth flow of materials from initial suppliers to the final customers (Shahbaz et al., 2020). Recent studies noted that firms can mitigate material disruptions risk by developing logistics innovation capabilities (Wang, Wood and Wang, 2020) and carefully choosing third-party logistics providers (Saglam, Cankaya and Sezen, 2020). The standard risk reduction techniques for supply chain supplies that can be efficient in terms of coordination, versatility, resilience, responsiveness and multiple suppliers and agility are regarded as having a firm impact (Ivanov et al., 2017). This ensures the smooth transfer of physical supply and information from the suppliers to the end-users by proper logistics processes (Robinson and Oriade, 2020). Reduction in material handling costs and substantial improvement in production performance reduction in material handling costs and significant improvement in production

performance can be achieved through synchronous production (Luo, Yang, and Kong, 2019; Chen, 2019; Frazier and Reyes, 2000). Material disruption risk can also be reduced by adopting JIT purchasing activities since JIT signifies a major supply chain management practice due to the large cost proportion it represents (out of the final production costs) within a firm (Taghipour, Hoang, and 2020). JIT purchasing can be viewed as purchasing practices characterised by frequent deliveries of small lot sizes that facilitate inventory reduction of raw materials (Kim and Shin, 2019). Automotive firms are among those reported to have significantly benefited from JIT purchasing (Fabri et al., 2020).

Logistics processes

Logistics is one of the key supply chain activities that affect supply chain performance (Huge-Brodin, Sweeney, and Evangelista, 2020; Naway and Rahmat, 2019). Improvement in logistics processes supports the organization's supply chain strategy, resulting in improved performance for the supply chain (Mangla et al., 2020; Singhry and Abd Rahman, 2019), which ultimately leads to competitive advantage (Ristovska, Kozuharov and Petkovski, 2017). Internal logistics processes form part of the key support to the implementation of the purchasing and production functions of manufacturing companies (Emde and Boysen, 2012). Successful implementation of purchasing and production system is important for reducing cost and responding to customers' requirements quickly (Chen and Sarker, 2014). Value is also created through the use of third party logistic (TPL) services (Samgam and Shee, 2017). Sinkovics, Kuivalainen and Roath (2018) found that collaboration such as resource commitment by the TPL and its innovative abilities influenced the manufacturers' performance positively. Most companies engage the services of TPL providers in order to achieve greater flexibility, operational efficiency, improved customer service levels, and a better focus on their core businesses (Premkumar, Gopinath and Mateen, 2020). TPLs have transformed from a mere transportation provider into value-driven logistics, which expands the focus to include strategic inventory and environmental management mechanisms (Kaddour, Rajaa and Medouri, 2020).

Operational supply chain performance

Due to more critical and complex business environment, companies need to focus on improving supply chain performance. Recognition of the weaknesses of traditional financially oriented measures in measuring supply chain performance has led to the incorporation of non-financial indicators in supply chain evaluations (Hussain et al., 2020; Beamon, 1999). Pattanayak and Punyatoya (2019) noted that supply chain performance measures are a combination of financial and non-financial measures consisting of project cost, project quality, project time and client satisfaction. Similarly, Brewer and Speh (2000) noted that operational supply chain performance includes service measures, cost measures and return on assets measures. Chan (2003) suggests that qualitative measures such as quality, flexibility, visibility, trust and innovativeness should complement traditional

quantitative supply chain performance measures. The present study examines operational supply chain performance as a combination of financial and non-financial measures consisting of cost, quality, speed and flexibility.

Methodology

To address the research question, the researchers conducted a qualitative case study approach, which allowed to deal with the complexities of situations while obtaining an insider's perspective (Minichiello and Kottler, 2010, Kamarudin et al., 2020, Tin 2013). Since the processes embedded in the logistics flow were naturally intricate, elicitation of information from the research participants was best studied using qualitative means rather than via remotely administered quantitative surveys. Face-to-face interviews were the best option given the tacit dimensions of logistics and material supply risks that are difficult to capture otherwise. This is consistent with the ontological assumptions of the notion of multiple realities used in qualitative studies (Creswell, 2017).

In this study, a single case company was selected. A single case study was deemed appropriate if it could adequately answer the research objectives (Yin, 2013; Cresswell, 2017). Since this study was an exploratory case study aimed at building initial understandings of a situation, the use of a single case company was justified, as suggested by Lazar, Feng and Hochheiser (2017). Consistent with Daniel, Reitsperger and Morse (2009), this study focuses on the automotive manufacturing industry since the industry demonstrates the highest commitment to synchronous-based production where logistics play a key role as compared to other industries such as heavy equipment and electronics industry. Furthermore, the automotive industry is well known for its efforts to improve its supply chains according to their demanding business environment (Thun and Hoenig, 2011).

The research process involved four stages. In the first stage, an extensive review of the literature to identify the relevant frameworks and factors to be considered in the current study was done. In the second stage, data were collected through observations, semi-structured interviews and document reviews. The interviewees were chosen due to their in-depth information and experience in day-to-day operation of the logistic processes within the selected case company. They were from departments such as logistics, production and procurement departments. This approach enabled more holistic and comprehensive insights on logistics processes, both internally as well as externally.

Additionally, the interviewees include personnel from different levels of positions held, such as the general manager, section managers and assistant managers. A total of seventeen interviews were conducted with each interview lasted on average of one to 1.5 hours. Additionally, a review of documentation such as websites, newspaper clippings, and archival records was conducted. The third stage of the research involved analysing the qualitative data. The use of qualitative data analysis software, ATLAS.ti, enabled the process of transcribing of text, writing

memos, coding of data and grouping codes into categories and themes to be carried out more efficiently. Finally, in the fourth stage, data were interpreted based on the themes and conclusions were drawn. Data triangulation was done by cross-checking the information gathered from interviews with company documents, reports, internal circulars, company websites and field notes of the researchers to ensure internal validity,.

Background of case company

The single case company, Company X, is a manufacturing plant of a holding company, which undertakes manufacturing activities of automobiles and related products such as accessories, spare parts and components. The company was initially incorporated as a government-linked entity but was later taken over by a foreign automotive company. Using a flexible manufacturing system, Company X is able to be responsive to market demand due to its capability of producing multi-model products on a common production line. The overall supply chain structure of Company X is shown in Figure 1. The structure consists of: (1) the focal company, i.e., the manufacturer; (2) its upstream suppliers; (3) third-party logistics providers; (4) downstream internal and external distributors and (5) end customers.

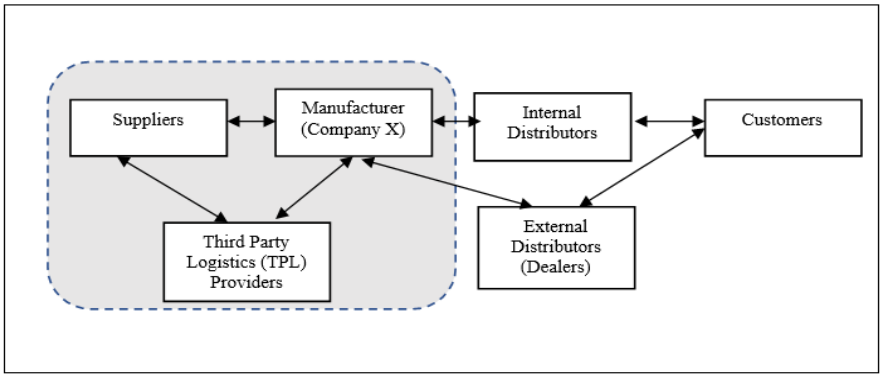

Figure 1: Overall Structure of Company X and Scope of the Study (Source: Authors)

Company X has two types of distribution channels, i.e., their own sales and distribution branches and a separate chain of external dealers. Both channels link directly to the end customers. In this study, Company X is viewed as the focal company. A focal company represents a member within the supply chain having the largest power usually in terms of financial, the best know-how of products and processes or has the greatest share of values created during order fulfilment (Pohlmann et al., 2020; Stadtler, 2005). The focus of this study is to examine the logistics processes from the perspectives of the 'supplier-TPL-focal firm' link as indicated by the area within the dotted boundary. This is consistent with prior studies, which suggest that the key link within the supply chain is at the input-end

of the chain, that is the "supplier- focal firm" link (Kahkonen et al., 2017; Presutti 2003).

Logistics processes facilitated by logistics intermediaries (LIs)

At Company X, two types of purchasing modes were employed: the traditional approach and Just-In-Time (JIT) purchasing. The traditional purchasing entails keeping inventory at the desired level to be used for manufacturing process when needed. Conversely, the JIT purchasing was employed only for certain components, i.e., the "big parts", such as bumpers and instrument panels. This decision was driven by the need to save on storage space as well as the readiness of suppliers to support JIT implementation at company X. In both traditional and JIT purchasing of materials, three inter-related logistics processes are carried out involving the external, internal material and logistics intermediary, as shown in Figure 2.

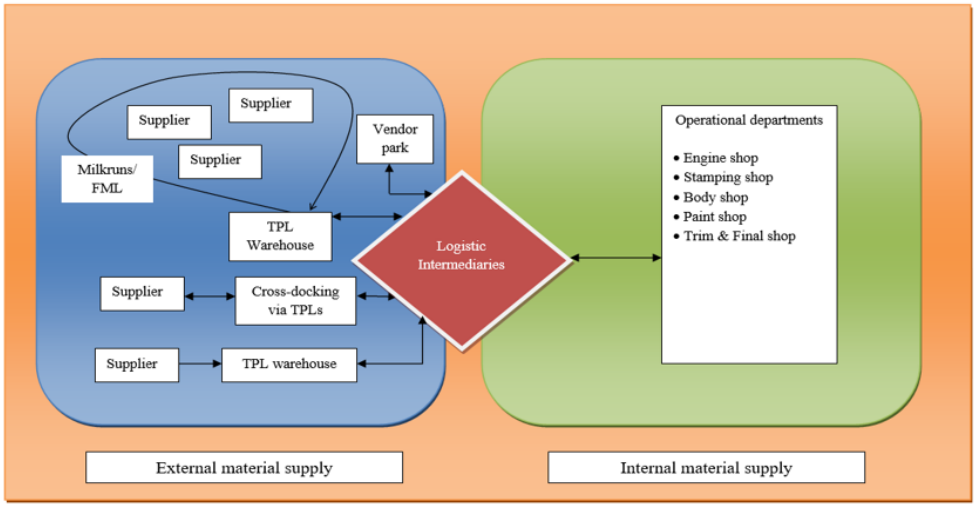

Figure 2: Internal and external material supply in Company X (Source: Authors)

The external suppliers and the TPL providers are key external members in the Company X's logistic process, whilst the operational department and the logistics intermediaries (LI) form the key internal member in the case company's logistic processes. To mitigate the risk of supply disruption, Company X established the Logistic intermediary (LI) as an intermediary between the external suppliers and TPL providers with the internal operational departments. More specifically, the LI processes are coordinated and controlled by two departments: the production planning and control (PPC) and the logistic department. These departments are directly involved in both the external and internal material supply processes at Company X. The PPC is responsible for the formulation of the operational production plans and the subsequent control of the manufacturing process. For

planning purposes, the PPC department prepares an operational production plan on a monthly, weekly and daily basis. This operational plan is prepared in alignment with the master production plan set at the strategic level by top management.

The role of LI is important in Company X as it is directly involved in making sure that material supply disruption risks are mitigated. For instance, the internal material supply cycle in Company X involves both information flow and physical flow of materials. From the physical flow perspective, once received, the incoming parts and components are distributed via the logistics intermediary process to the operational departments. The actual usage of materials at these operational departments triggers the demand for materials purchases when a certain limit is reached. This trigger for material replenishment induces the flow of information from the operational departments to the logistics intermediary, which dictates the quantity of material purchases needed. Hence, the need to replenish the materials is acted upon by the logistics intermediary by generating subsequent purchase orders. Timely orders are critical in ensuring that there will be a continuous flow of material supply to Company X.

In Company X, a modified kanban system is used within the internal inventory control system. The modified kanban system provides a monitoring mechanism of the internal supply of materials to the various operational shops. This kanban system acts as a sub-system that supports a more effective and efficient Just-In-Time (JIT) logistic process. The materials are replenished based on a list of maximum and minimum levels for each material. The rule under this system dictates that the level of materials held at the manufacturing site must not be below the stated minimum and also must not exceed the maximum point at any one time. On average, materials are issued to manufacturing at every 1-hour intervals to the various locations within the manufacturing site to keep the materials within the acceptable minimum-maximum range.

During the production planning process, the case company needs to consider several factors before deciding on the detailed production plan. These factors include capacity utilization, production rates, delivery lead-times, customer demand, delivery frequency, production quantities and inventory levels. Once finalized, the operational production plan is then further detailed in the form of production schedules, which are later used to determine the production sequence. The production sequence provides detailed information on how each vehicle unit is manufactured at the production site. Based on these operational plans, the production process is executed by the various operational departments. During the production process, constant monitoring of the parts and component usage at the production site is undertaken by the LI team. The team goes on their rounds at frequent intervals to check on the level of material held during the production process. Whenever the volume of materials in the storage area at the production line reaches a certain minimum level for subsequent operations, the LI team will respond by replenishing the material back to its maximum level. The quantity of

materials to be replenished depends on the need to keep the inventory level within the pre-determined minimum-maximum range.

A listing is used to indicate the quantity of parts replenished to production, and based on this quantity, an order for equal quantity will be placed to the suppliers. This is because the actual volume of material supplied to the production line indicates the quantity of materials that need to be repurchased from the suppliers. Such information on material replenishment is then relayed to the PPC department since it is the responsibility of the PPC to generate purchase orders for parts and components that need to be purchased. Upon receiving the purchase orders, the parts and components are delivered by the suppliers to Company X, either directly or through the TPL providers. On average, the materials are received every 1 to two hours at different locations within the plant for direct usage in production or held temporarily as inventory at the store.

Third-Party Logistics (TPL) Providers

The use of third-party logistics (TPL) providers was found to be a critical link in mitigating material supply risks in Company X. The TPL providers represent an intermediary between the suppliers and Company X who handles the inbound and outbound inventory. The TPL providers provide the warehousing, international freight forwarding and transportation services. Among the facilities include dedicated warehouses equipped with customised racking systems, pre-delivery inspection (PDI), transportation, communication, advanced information technology and documentation systems. The external material supply, as depicted in Figure 2, indicates that TPL represents one of two types of supply chain partners to Company X besides the suppliers. The external suppliers are firms who manufacture and supply parts and components directly to Company X whilst the TPL providers are intermediary firms who provide services such as transportation and warehousing. The external material supply process concerns the information flow (ordering of materials) from Company X to its suppliers and the subsequent physical flow of materials from the suppliers to Company X.

From the material ordering perspective, the purchasing order process is triggered by the need to replenish materials on hand when it reaches a re-ordering point, which is monitored by the LI team. The same purchase orders are also transmitted to the TPL providers for deliveries made through them. The TPL providers are engaged by Company X mainly for the transportation and warehousing services for certain parts and components that are not directly delivered by the suppliers to Company X. Following the purchase orders, the suppliers respond by preparing the required material for delivery to the case company. The expertise and services of the TPLs are crucial in ensuring a better flow of incoming parts and materials from their suppliers to support JIT logistic processes. This is because when material supply is disrupted, the production process will be held up, and this would cause financial losses to Company X. As part of its initiatives to mitigate material supply disruption risk, Company X selected two main TPLs providers as ‘anchor’ TPL companies. These “anchor” TPLs represent the first tier TPLs within the TPL

network who serves Company X directly. By selecting these 'anchor' TPL providers, Company X was able to foster greater commitment from these companies to support their logistics processes.

The TPL providers made multiple delivery methods to supply materials to Company X. These include kanban deliveries, frequent-mixed loading (milkrun deliveries) and synchronized deliveries. A substantial portion of the deliveries is based on the kanban system, and these deliveries are mainly run by the third-party logistics (TPL) providers. Within the kanban system used, cross-docking method is also commonly employed. Cross-docking deliveries involve the unloading of materials from suppliers and reloading onto outbound lorries with little or no storage in between. In contrast, the frequently mixed loadings (milkrun) deliveries involve the TPL providers to collect parts from various suppliers and subsequently store these parts and components together in the TPL providers' warehouses. When the demand for material deliveries are received by the TPL providers, the parts and components from various suppliers are then jointly delivered to Company X at frequent intervals. This method enables the TPL providers to deliver various parts in a single trip and thus optimizes the transportation process. As such, the frequently mixed loadings (milkrun) delivery method ensures economies of scale and enables frequent material deliveries to Company X in smaller lot sizes. This approach supports the JIT implementation of Company X.

A more sophisticated method of deliveries used by Company X is the synchronized supply of parts which is significantly consistent with the JIT principles. This is because the supply of materials is made exactly at the point of consumption at the production line with literally no storage in-between. At Company X, the synchronized deliveries are made directly from the TPLs warehouse as well as from the same suppliers located within the vendor park. Under the synchronized supply method, real-time data are transmitted to the suppliers/TPL providers to enable them to supply the materials according to the requirement on the production site. Upon receiving the signal to deliver, the suppliers/TPL providers would prepare the material supply so that it exactly matches the sequence at the production line. Thus, the delivery is made just-in-time for the particular parts installation process at the production line. However, not many parts are found to be suitable to be delivered using this method. For instance, Company X decided that synchronized deliveries were only implemented for critical parts that are either too bulky to be stored in-house or those that are subject to large variations and unpredictability in demand. The evidence in this study also provides additional insights as to how to further strengthen the role of TPLs in mitigating risks during JIT implementation. For example, the need to educate the TPL providers about the firm's requirements is highlighted. This is because supply disruptions could not be prevented successfully without full commitment from other supply chain partners, including the TPLs. Hence, it has become crucial for the TPL providers to change their "business as usual" mentality to support JIT-oriented deliveries.

Operational supply chain performance

Planning and synchronizing operations are fundamentally essential to ensure material flow continuity in supply chains such as inventory and production planning (Mangla et al., 2020; Bag et al., 2020). As discussed previously, within the logistics processes, material supply disruption risks are mitigated through both logistics intermediaries and TPL providers. Effective use of LI and TPL providers was found to improve operational supply chain performance. The significant impact on operational supply chain performance is measured by cost savings, quality, speed and flexibility, as shown in Table 1.

Table 1. Operational supply chain performance dimensions in Company X

	Operational performance			
Logistics processes	**Cost**	**Quality**	**Speed**	**Flexibility**
Logistics intermediaries	Eliminates excessive parts storage by implementing modified kanban inventory control system	Elimination of temporary parts storage results in lower defects	Reduces manufacturing cycle time significantly	Production process more flexible
Third-Party Logistics	Reduced need to build special warehouse; Efficient and cheaper transportation	Material transportation is handled by experts thus less defect occurs	Frequent deliveries in smaller lot sizes increased delivery speed	Milk-runs and synchronized methods enable flexible deliveries

Traditionally operations management is primarily focused on efficiency, effectiveness, and economy of supply chains (Magla et al., 2020; Szymonik, 2012). Findings from this study indicate that synchronized deliveries within Company X's logistics processes improve operational supply chains performance in terms of cost savings, quality, speed and flexibility. Firstly, substantial cost savings are gained through the elimination of inventory holding, which is a non-value-added cost. The synchronized deliveries allow for the parts to be arranged and sequenced in a manner which matches the requirement at the production line. Although this synchronization practice is deployed for only two critical parts and

components in Company X (the instrument panels and bumpers), it has been found to shorten the manufacturing cycle time normally taken, hence resulting in an improved speed. The elimination of temporary storage at the production line results in lower material defects while simultaneously helps Company X to be more flexible in adjusting for changes in customer demand.

The synchronized deliveries of materials supply enabled the case company to significantly eliminate waste since purchases in excess of actual material usage are avoided. The synchronized deliveries mitigate risks in two ways. Firstly, it is implemented to reduce storage at the production site. With just in time deliveries of bulky parts such as instrument panels, significant savings on storage space and material handling costs is made. Secondly, the synchronized approach enables Company X to react responsively towards changes in customers' demand. An added advantage of the synchronous supply of parts is the improved production tracking ability and thus, overall production efficiency. However, this particular delivery method is not appropriate for parts that are installed very early along the production line. This is because a certain time lag is required for the suppliers to prepare the parts and delivering them to Company X. Hence, the synchronized deliveries mostly apply to parts assembled at the Trim and Final Shop, where final assemblies are made to the vehicle such as the instrument panels. This allows for some time to elapse before the parts enter the production line. These results are in line with the findings by Nawir and Rahmat (2019), which also explain that synchronous supply is essential since this will increase the operational performance. Their findings explored the link between supply chain capability and supply chain operational performance.

From the external logistics perspective, the engagement of TPL providers within Company X promotes operational supply chain performance in terms of four dimensions, namely cost savings, higher quality and speed as well as greater flexibility. In essence, the TPL services are required by Company X mainly for two reasons: (1) for transportation purposes (to optimize the efficiency of delivery of inbound materials from suppliers across the country) and (2) for provision of integrated warehousing services (to utilize the specialized warehousing facilities for materials that need special requirement such as bulky steel coils). Another advantage of using the services provided by the TPL providers is gained through the frequently mixed loadings or the milk-run deliveries. Through the milk-run method, the TPL providers would collect parts from suppliers who may be geographically dispersed and deliver them at frequent intervals to Company X. Such arrangement leads to greater efficiency and cost advantages to Company X.

The use of TPL providers, who are external experts in transportation and warehousing services, provides the case company with the expertise to deliver the parts on a JIT basis more efficiently and cheaper than having to provide the services internally. This is consistent with Premkumar et al. (2020) and Ashokbhai (2020). In addition, in Company X significant cost advantage is gained through the reduced need for in-house storage space and the outsourcing of expensive

specialized warehousing facilities. Apart from resulting in cost savings, the findings in Company X also revealed that this JIT production practices also improves operational supply chain performance in terms of quality. This is due to the expert handling and transportation of materials by the TPL providers that reduce the potential of damages during the inbound material deliveries. Moreover, through the milk-run and synchronized deliveries by the TPL providers, the time taken for the materials to arrive at Company X is shortened if compared to direct deliveries by the suppliers. Thus, the 'milk-run' and synchronized deliveries enable Company X to respond more effectively to changes in customer demand, thus promoting flexibility. This result complements previous studies on TPL involvement among Malaysian manufacturers. For example, Sohail, Bhatnagar and Sohal (2006) concluded that major benefits of TPLs surveyed among Malaysian manufacturers include time savings, improved customer services and payment/credit terms.

Summary

The findings of this study indicated that logistics processes are the backbone of supply chain management within the manufacturing case company. While internally, the case company's logistics processes are supported by LIs, seamless external flow of materials is facilitated through the use of TPLs. Using TPLs, the case company was able to outsource critical processes involving inbound parts and components from their suppliers. Additionally, these internal and external logistics processes deliver effective supply chain risk mitigation strategies, which are manifested in the improvement of operational supply chain performance in terms of cost, quality, flexibility and speed. Managers need to direct more attention to mitigating supply disruption risks. However, there has not always been a clear-cut solution. Nevertheless, this study offers several managerial implications. Managers within the organization would be in the best positions to assess the sources of material disruption risks affecting their organisation. Besides that, it is also possible for managers to strategize on how further improvements can be made on internal and logistics processes in their effort to improve operational performance. Although the study offers significant insights on how logistics processes contribute towards mitigating supply chain risks, few limitations are noted. Firstly, the use of qualitative case study approach inherently limits generalisation of findings to a larger population and secondly, the study focuses on the manufacturing industry alone. As such, future research could examine the present research issues from a quantitative perspective as well as broaden the scope to include service industries.

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OGRANICZANIE RYZYKA ZAKŁÓCEŃ DOSTAW: STUDIUM PRZYPADKU FIRMY MOTORYZACYJNEJ

Streszczenie: Zakłócenia w dostawach materiałów stanowią potencjalne zagrożenie nie tylko dla planów produkcyjnych, ale mają również istotne konsekwencje finansowe i pozafinansowe. Badania, które analizują wykorzystanie procesów logistycznych na poziomie firmy w celu łagodzenia ryzyka zakłóceń w dostawach, szczególnie w przemyśle motoryzacyjnym, są nadal ograniczone. W związku z tym niniejsze badanie ma na celu dostarczenie dodatkowych informacji na temat tego, jak procesy logistyczne, zarówno wewnętrzne, jak i zewnętrzne, przyczyniają się do łagodzenia ryzyka zakłóceń w dostawach materiałów. Jakościowa, pogłębiona metoda pojedynczego studium przypadku została przeprowadzona w wybranej firmie motoryzacyjnej z danymi zebranymi przy użyciu wielu źródeł dowodów. Wyniki ujawniły, że podczas gdy wewnętrzne procesy logistyczne są wspomagane przez pośredników logistycznych (LI), zewnętrzne procesy logistyczne są obsługiwane przez zewnętrznych dostawców logistycznych. Zarówno wewnętrzne, jak i zewnętrzne procesy logistyczne poprawiają wydajność operacyjnego łańcucha dostaw pod względem oszczędności kosztów, jakości, szybkości i elastyczności. Odkrycia zawierają ponadto dodatkowe odniesienia do menedżerów łańcucha dostaw przy opracowywaniu strategii łagodzenia zakłóceń w dostawach w celu zwiększenia wydajności operacyjnej.
Słowa kluczowe: zakłócenie dostaw, ograniczanie ryzyka, motoryzacja, studium przypadku

供应中断风险的缓解:以汽车公司为例

摘要:物质供应中断不仅对生产计划构成潜在威胁，而且对财务和非财务方面都具有重大影响。在企业特定级别检查物流流程在缓解供应中断风险方面的研究仍然有限，特别是在汽车行业。因此，本研究旨在提供有关内部和外部物流流程如何有助于减轻物料供应中断风险的更多见解。在选定的汽车制造公司中进行了定性深入的单案例研究方法，并使用多种证据来源收集了数据。调查结果表明，虽然物流中介机构(LI)促进了内部物流流程，但外部物流流程则由第三方物流提供商提供支持。内部和外部物流流程均在节省成本，质量，速度和灵活性方面提高了供应链的绩效。调查结果进一步为供应链经理在制定缓解供应中断的策略以提高运营绩效方面提供了其他参考。
关键词:供应中断，风险缓解，汽车，案例研究