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Logistics Performance, Supply Chain Resilience, Integrated Information System, and Performance Metrics as Correlates of Supply Chain Performance of the Downstream Integration: A Literature Review

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Abstract

This paper explores the critical factors influencing Supply Chain Performance (SCP) through the lens of four key variables including Logistics Performance, Integrated Information Systems (IIS), Supply Chain Resilience (SCR), and Performance Metrics in Supply Chain. In the context of downstream integration, a literature review was conducted of existing 72 pieces of literature selected from 15 international journals on Supply Chain, Logistics, Operations Management, and Business in general. The review reveals the interconnected nature of the four variables and their collective impact on enhancing supply chain efficiency, adaptability, and sustainability. Logistics Performance ensures operational efficiency by optimizing product flow, reducing costs, and meeting customer demands. IIS provides real-time data integration, enabling data-driven decision-making and improving coordination across the supply chain. SCR likewise focuses on the ability to adapt to and recover from disruptions, ensuring business continuity. Meanwhile, Performance Metrics and Continuous Improvement drive organizations to refine processes, monitor performance and adopt new technologies for ongoing optimization. The study highlights the interdependencies among these variables, suggesting that their effective integration can significantly enhance SCP. By adopting a holistic approach to supply chain management, firms can achieve a competitive advantage, improve operational resilience, and navigate an increasingly dynamic and uncertain global market.

Keywords

Integrated Information Systems, Logistics Performance, Performance

Metrics, Supply Chain Performance, Supply Chain Resilience

1. Introduction

In the contemporary setting, supply chain performance (SCP) is one of the most vital concerns in various industries like the manufacturing sector (Anand & Grover, 2015; Govindan et al., 2017; Luthra & Mangla, 2018). It deals with the efficiency and effectiveness of the different business processes and activities involved in creating products from raw materials to finished goods delivered to the ultimate consumer (Marinagi et al., 2015). In the manufacturing industry, SCP is beset with issues and challenges, including high logistics cost, operations complexity, lack of capacity versus demand, and constantly changing needs of the markets (Daugherty & Closs, 2016). Moreover, the increase in manufacturing cost is caused by visibility issues among other factors in the supply chain where firms work in silos lacking collaboration (Wilson, 2017), affecting financial performance and sustainability and competitiveness (Power, 2005). In the Philippines, logistics cost is the most expensive among Southeast Asian Nations at 27.16% as a percentage of sales (Factao, 2019).

The normal supply chain operations and issues are even exacerbated by the global business environment which has become disruptive (Chopra & Sodhi, 2004; Ottesen & Grønhaug, 2004; Cheng & Kam, 2008, Bode et al., 2016). Thus, understanding the downstream integration in Supply Chain Management (SCM) and how to make it efficient, productive, and sustainable is essential across various industries. In various pieces of literature reviewed, the studies on supply chains were conducted geared towards optimizing operations, enhancing customer satisfaction, or improving the overall performance of the business both upstream and downstream.

This literature review is focused on downstream integration as it means how companies can address supply chain issues to maximize customer satisfaction. The downstream integration refers to the alignment and coordination of activities closer to the customers particularly the distribution channels, sales, and after-sales services. It also includes transportation, information systems, and warehouse management, among others. The integration of the downstream processes is relevant to allow businesses to deliver a seamless experience across multiple touchpoints in the omnichannel. Whether it's through product distribution, sales interactions, or customer support, understanding and optimizing downstream activities allow companies to ensure that products and services offered reach customers in a wide manner, and in an efficient fashion, thus, enhancing customer satisfaction and loyalty.

The integration of the downstream supply chain leads to streamlined processes and better alignment between sales, distribution, and service functions (Kotler and Amstrong, 2011). It likewise reduces costs, enhances supply chain responsive-

ness, and improves delivery times (Chopra et al., 2019). Moreover, a study focused on integration helps identify key inefficiencies that businesses can address, optimizing supply chains and overall operations. Moreover, in an increasingly competitive landscape, downstream integration in SCM can provide businesses with a significant edge by enabling them to adapt more swiftly to fast-changing market conditions and increasing customer demands (Reddy et al., 2019). Through efficient coordination of downstream activities such as sales, distribution, and customer support, companies can offer better services, faster response times, and more tailored solutions.

The downstream integration furthermore, helps reduce redundancies and inefficiencies, leading to cost savings. Optimizing distribution channels is important in reducing inventory holding costs, and aligning customer service processes are all key areas where downstream integration can boost profitability by lowering operational expenses (Barcik & Jakubiec, 2013).

Ultimately, as consumer expectations and market dynamics evolve, businesses need to adapt the downstream operations to meet new customer demands. The operational and strategic improvements in the supply chain are coupled with the rise of digital platforms integrated across distribution, sales, and after-sales support to stay competitive. Integrating technology in the downstream processes often involves the collection and analysis of data from customer interactions, sales, and distribution channels. By studying how to leverage the available data effectively, companies gain valuable insights to drive decision-making, from inventory management to personalized marketing strategies. As businesses across industries increasingly embrace technology and employ data-driven strategies, the integration of the downstream processes becomes even more critical.

Thus, the importance of SCP is that when firms are effective and efficient, firms establish competitive advantage (Fritz et al., 2016), resilience (Barbosa-Póvoa et al., 2018), and sustainability (Castillo et al., 2018). Competitive advantage is necessary as market competition is intense, innovation is fast, customer behavior is ever-changing, and supply chain sustainability is challenged. It is needed for the firm's social, environmental, and economic development (Pagell & Shevchenko, 2014; Gold & Schleper, 2017).

In this literature review, SCP in its downstream operation is measured by logistics performance (LP), integrated information systems (IIS), and supply chain resilience (SCR). The relationship of these variables is that when each structure is excellent and collaborates, SCP excellence is achieved. The primary objective of this literature review on the downstream integration of SCM is to identify how SCM can optimize operations, enhance customer satisfaction, and improve overall performance.

Research Questions

1) How does downstream integration impact operational efficiency across different industries?

2) What are the key challenges businesses face when implementing downstream integration in the supply chain and customer service processes?

3) How does downstream integration influence customer satisfaction and loyalty across industries?

2. Methodology

The methodology for the literature review on downstream integration across industries will follow a structured process to systematically gather, assess, and synthesize relevant studies. This approach ensures that the review comprehensively covers the topic and lays a solid foundation for identifying gaps, challenges, and trends in downstream integration.

2.1. Objective

The literature review aims to understand the importance, impact, and challenges of downstream supply chain integration across industries, including distribution channels, logistics, sales, customer service, and post-sales support. More specifically, this literature review will evaluate pieces of published literature on supply chain management, and performance management, and how they impact downstream integration ensuring customer satisfaction.

2.2. Scope & Search Strategy

The review will focus on studies from industries such as manufacturing, retail, technology, and healthcare, examining both theoretical frameworks and empirical findings on downstream integration.

Academic databases such as Google Scholar, Scopus, Web of Science, and JSTOR were used to search for peer-reviewed articles, books, conference papers, and working papers. Industry reports and white papers from sources like the Department of Trade and Industry annual journal in the Philippines were included. The keywords used in searches included the terms “Downstream integration”, “Supply chain integration”, “Supply Chain Performance and Metrics”, “Supply Chain Resilience”, “Integrate Information System”, “Customer service integration”, “Post-sales services”, “Logistics integration,” and “Logistics Performance”.

2.3. Inclusion and Exclusion Criteria

Studies reviewed were published in the last 5 - 10 years to ensure relevance to contemporary industry practices. These articles are peer-reviewed articles from reputable sources that provide empirical evidence or detailed theoretical insights into downstream integration. These research articles cover multiple industries and cross-industry comparisons are also included. There are, however, articles cited in this paper beyond 10 years in recency found by the author necessary to be cited. This review excludes non-peer-reviewed articles or non-academic publications. Studies focusing on upstream integration (i.e., supply-side rather than demand-side integration). Articles that do not provide insights into downstream

processes or operational outcomes.

3. Literature Review

3.1. Logistics Performance

The American Council of Logistics Management explains logistics performance as managing the integration of supply chain activities of planning, implementation, and control efficiently and effectively towards its goods, services, and information throughout the supply chain structure to conform to customer requirements (Sharma & Joshi, 2023). Integration in the whole supply chain is essential for effective collaboration between structures, processes, people, resources, and information. As one of the supply chain activities, logistics performance requires full integration to ensure excellent performance. In various studies, LP indicators include strategy and improvement, work organization, capacity and production planning, customer interface, production and product control, and supplier interface.

From a macro perspective, strategy and continuous improvement in logistics performance are necessary organizational factors (Gani, 2017). The author underpinned that goals in organizational strategic management and their achievement are done by managing the firm's logistics activities. In the said study, LP in the context of international trade has a positive correlation between the overall logistics performance with exports and imports specificities.

Work organization is also a determinant of LP. In a broader context, it refers to how organizational factors are utilized to influence logistical operations' efficiency and effectiveness. The work organization was pointed out as an essential part of achieving the primary aim of logistics, which is delivering the right product to the right customer, in the correct quantity. Moreover, it must be in the proper condition, at the right place, at the right time, and at the correct cost (Coyle et al., 2013). The said study claimed that the holistic implementation of logistics management would enable the firm to manage total logistics costs, influencing supply chain performance. In a related study (Litman, 2018), logistics performance includes planning, implementing, and controlling procedures for efficient and effective transportation and storage of goods performance. The said study concluded that logistics performance is also affected by traffic congestion, increases travel time, expenses, and frustrations. However, efficient management of logistics performance may help resolve these issues.

Moreover, work organization also includes transportation referring to the movement of goods in the supply chain. Its importance in the macro perspective is to ensure business sustainability and leverage economic growth in freight transport (McKinnon et al., 2015). From a firm perspective, transportation for a manufacturing company must provide goods, raw materials, or finished goods to reach the destination fully and on time. Transportation decisions may include running its transportation network or hiring third-party services whose expertise is vital and helps the manufacturing firm's strategy. A transportation management

system that provides intelligent infrastructure, intelligent vehicles, and intelligent freight makes the firm efficient (Stindt, 2017).

Another indicator of Logistics Performance is Capacity and Production Planning. As logistics tools, both help create manufacturing capabilities. Capacity and production planning in the manufacturing sector were highlighted as critical organizational elements. These activities were noted to help balance supply and demand, minimize logistics costs, and improve lead time and delivery efficiency. Both contribute to the logistical operation by ensuring the availability of production capacity to meet demands without delays. Similarly, capacity planning and logistics performance were found correlated. This is in the context of supply chain management (Chopra & Meindl, 2016). The authors noted that efficient capacity planning aligns production and distribution with customer demand. Thus, it helps improve the overall supply chain performance.

Likewise, the customer interface is an indicator of LP. It is essential to manufacturing firms as it means customer-focused innovation critical to firm performance. Interface in the context of customers is a function of the exchange of information in a cooperative manner. A manufacturing firm whose focus is on customer orientation builds internal capability to satisfy the customers' needs. In a study (Hübner et al., 2016), logistics service directly impacts the satisfaction and perception of performance among customers. The authors pointed out that the ability of a company to establish effective customer interfaces like responsive customer service, on-time deliveries, and accurate tracking of orders, plays a critical role in ensuring customer satisfaction, which in turn affects logistics performance.

Moreover, a seamless customer interface contributes to improved order accuracy, on-time delivery, and transparency, all of which are key drivers of logistics performance (Chen & Chang, 2018) highlighting the crucial role of the customer interface in determining logistics performance. The study focused on the role of technology in the interface. Effective communication, real-time updates, and responsive customer service not only improve customer satisfaction but also directly impact the efficiency, accuracy, and responsiveness of logistics operations.

Production and production control also ushers' logistics performance. The manufacturing activity was found to be effective when production and product control were data-driven and forecast-based. The primary data can create a demand plan that includes demand forecasts, inventories, and safety stock levels. Even in conditions where manufacturing capacity is a limiting factor, the demand plan is best suited to address the limitations. Thus, maximizing the physical resources. In the study of Wazed et al. (2010), the authors put forward the current issues in production planning in the manufacturing sector and proposed a model to address several issues. The primary purpose of the study was to increase the practicability in the use of production planning tools and calculations, reduce the defects experienced in current MRP planning, solve the disconnect between material demand planning and capacity demand planning, improve the working capacity, and cover the limitations of capacity demand planning, among others. Pro-

duction planning and control aim to maximize manufacturing resources to serve the customers best. Information flow or the sharing of information is significant to logistics.

Therefore, production planning and control necessitate the use of information systems. Information systems play a crucial role in bridging the gap between the company's production processes like demand forecasts, raw material requirement planning, and production capacity versus the customer's needs. Information systems will ensure the reduction of uncertainty and result in less inventory and shorter performance cycles (Giampieri et al., 2019). If managed well, information flow can lead to accuracy and information reliability, which are essential elements of vertical integration.

Furthermore, some models of integrating information systems into production planning and control are used by different manufacturing companies for various reasons. Some companies used the strategic supply chain integration model from the perspective of structure-conduct performance (Ralston et al., 2015). Some companies use the uncertainty circle model (Aitken et al., 2015), and others SCI-FEI-Agile model (Sabet et al., 2016). Whichever model is used by manufacturing companies, the primary purpose of using any information technology in production planning and control is to improve supply chain integration and SCP (Tseng and Liao, 2015; Vanpoucke et al., 2017). Both studies agree that the use of information systems in the integration of the supply chain leads to improved visibility and transparency in the system, facilitates the collaboration and coordination of partners across the supply chain, and enhances decision-making capabilities.

The supplier interface is the focal issue in the study of logistics performance (LP). The authors explored the supplier interface as a critical indicator of logistics performance (LP). With downstream integration, supplier interface can mean supplier of trucking services, warehouse management services, and 3PL service providers for marketing services, among others. It highlights how the relationship between a company and these suppliers can significantly influence logistics performance outcomes, such as delivery speed, cost efficiency, and customer satisfaction. The role of information sharing and real-time data integration between companies and suppliers. The purpose of the supplier interface for manufacturing companies is to integrate LP in the SCP through materials flow, information flow among the channel participants, relationship management practice, and transportation efficiency (Abebe & Desalegn 2019). The finished goods distributed throughout the distribution channels are intended for the end-users and ensure customer satisfaction. The value of the supplier interface is to provide consistency in delivering the volume of for the consumers. In addition, supplier interface can be in four common forms, such as administered systems, partnerships and alliances, contractual systems, and joint ventures (Tarifa-Fernandez & Burgos-Jimenez, 2017). The said study applied BSR in the upstream integration. However, it can also be applied to suppliers found among various members in the downstream integration. The key to the success of the relationship is dependency be-

tween participants and reliability.

The importance of LP is emphasized among various members of the supply chain in the downstream integration. It is even more critical from the consumers' perspective as it helps maximize the entire distribution channel (Kotler & Amstrong, 2011) and it is oriented towards expanding the services for consumers (Barcik & Jakubiec, 2013). Strategically, the role of LP in the downstream integration is to help lower costs, grow the market and sales, and build strong relations with consumers. It helps them achieve a competitive advantage by using distribution channels. Moreover, Logistics helps lead to positive business results, helping create value for customers, delivering products at the right time, in the correct quantity at the right place, and the key to supply chain success. A related study concluded that Logistics allows firms to grow in a competitive environment (Goel, 2020).

There is a complex relationship between logistics and supply chain performance, influencing other elements (Maia & Cerra, 2009). The more integrated the logistics processes into the supply chain are, the more efficient they will be. Integrated logistics may be in the form of a warehouse located in in-demand markets to serve customers fast and better, a transportation system that can expediently deliver goods on time, or inventories maximized through EOQ to balance customers' needs and funds required to maintain stocks, among others.

Different authors have cited the importance of integrating logistics into the company's supply chain as an essential element in the supply chain of the business. Most of the reviewed articles and their authors emphasized logistics as an internal value creation of the company and seldom involves external activities. It is encapsulated in the study by Piriyakul and Kerdpitak (2011) concluding that the logistics performance is affected by internal variables in capability building, not externally.

In addition, logistics performance may also be affected by other internal collaborations that affect the business externally. These external collaboration elements include trust and information sharing, coordination and alignment of objectives between partners, and commitment and long-term partnership among others (Aharonovitz et al., 2018). Several authors, however, highlighted that external factors may affect logistics performance and not just internal factors including market demand fluctuations and regulatory and legal factors (Zhong et al., 2022), collaboration by partners, trust, and reverse logistics in the supply chain (Paula et al., 2020), and market demand and customer expectation, BSR relationship, and again regulatory environment (Daugherty, 2011).

Moreover, integrated logistics has a strong relation with resilience as building capabilities in agriculture (Gebresenbet & Bosona, 2012), financial capabilities (Porto et al., 2011), and integrated logistics is required for developing supply chain capabilities. To build supply chain capabilities is to build resilience (Gligor & Holcomb, 2012). These capabilities of logistics in companies may include logistics outsourcing capabilities (Wagner & Sutter 2012), delivery capa-

bilities (Simangunsong et al., 2012), construction capabilities (Yu, 2015), customer orientation capabilities (Mcfarlane et al., 2013), transportation capabilities (Sanchez-Rodrigues et al., 2010; Song & Yeo, 2017), distribution systems (Sinaga and Bahagia, 2018), and innovation capability (Wang et al., 2020).

Many authors study how to perform effective logistics integration to establish resilience in the supply chain. The reasons to perform integration are improving efficiency and reducing redundancy as a necessary tool to improve product availability and reduce costs (USAID, 2011). It is also intended to establish firm efficiency, customer value, and competitive advantage (Ralston et al., 2015). It is also aimed at gaining a cost advantage (Tarifa-Fernandez and Burgos-Jimenez, 2017). Finally, it is geared to harness economic and non-economic benefits (Ataseven & Nair 2017).

Finally, the manufacturing industry boasts of several best practices in the LP as enumerated by Mittal et al. (2018). In transportation, the best practices are maximizing transportation efficiency, frequent and timely deliveries, the use of third-party logistics providers, and transportation collaborations. The best practices in warehousing include warehouse maximization, optimization of facility location selection, adequacy in infrastructure, and efficient and effective warehouse management. Moreover, in inventory management, the best practices include inventory management systems, tracking systems, effective demand forecasting, and supplier reliability, among others.

3.2. Integrated Information System

An integrated information system uses technology to manage organizational information for safety and the fast use of data as input for decision-making. The integration of technology such as information systems when fully ex-ploited creates value in the supply chain (Kumar et al., 2022). In manufac-turing companies, the business strategy supports IIS as it helps the firm es-tablish a competitive advantage (Dehning & Stratopoulos, 2003). IIS supports the firms in identifying and defining the problem, decision-making analysis, improving decision quality, speed in decision-making, and finally, decision-making satisfaction. In this study, IIS indicators included external ICT capabilities, internal ICT capabilities, information systems, firm performance (customers), and firm performance (suppliers).

Traditionally, information is kept confidential within the confines of the company. However, in more recent studies, authors highlighted the importance of both internal and external information. Internal and external ICT capabilities refer to the willingness of the firms to make strategic and tactical data such as internal data on business strategies, inventory levels, forecasts, and external data on competitors' sales promotion and marketing strategies available to competing firms, among others (Cao & Zhang, 2013). The study posits that among other variables, information sharing is positively correlated with robust Supply Chain collaboration. In addition, internal and external ICT capabilities also refer to tech-

nological infrastructure, systems, and tools used within an organization to manage internal processes (Zhang et al, 2016). In both studies, information capability is highlighted to leverage the supply chain. More importantly, some studies show that the ability to collaborate on information sharing with various entities in the supply chain, both backward and forward integration spells success (Grant & Tu, 2007; de Frutos et al., 2020).

Information systems and firm performance, both customer and suppliers, bring organizational excellence. Both are indicators of IIS in literature. Studies showed that information systems and firm performance help enhance communication between firms. Both suppliers and customers interact more easily, faster, and more precisely with its presence (Albani & Dietz, 2011). Moreover, it improves firm performance (Bhagwat & Sharma, 2009). A robust information system in a study among cooperative channel participants is necessary for a firm's success (Baihaqia & Sohal, 2013). It helps improve the inventory system (Bjork, 2012), facilitates transactions and communications, develops management insight, and facilitates the exchange of information. Information system integration benefits are extensive, covering operations such as inventory reduction, resource optimization, capacity maximum utilization, the quick customer response, among many others (Lotfi et al., 2013).

The integration of information systems directly affects firm performance (Lorenzo-Ochoa et al., 2017). Thus, it necessitates that a firm must integrate intelligent information systems to maximize its benefits. Businesses develop central hubs to control information systems that provide real-time information on any part of the supply chain structure, including production information, deliveries, inventory data, and others (Miroudot, 2020). Despite the significance of an information system, many firms' practices show they do not maximize their value (Hartono et al., 2010; Lotfi et al., 2013).

Finally, in the several studies highlighted above, an integrated information system is correlated with SCP as it responds to multi-faceted issues in SCP of various companies and industries. It can react to the bullwhip effect, surging demand, manufacturing challenges including batching issues, and raw material challenges amidst the many risks faced by the company.

3.3. Supply Chain Resilience

The literature has studies on resilience which had been conducted since the late 1990s and early 2000s. Resilience studies have been applied to psychology (Nizri et al., 2025), psycho-social (Olson, Kemper, & Mahan, 2014), cultural resilience (Holtorf, 2018), psychiatry (Snijders et al., 2018), business and organizations (Fiksel, 2015), in the supply chain (Scheibe & Blackhurst, 2018) and many other fields of study. Resilience in the supply chain is relatively young as a field of study. In this study, SCR includes the indicators of organizational resilience, sales capabilities, market orientation, retailers' attitudes, and social capital.

Organizational resilience is needed amid business disruptions. It was defined

by ecology as the capacity to absorb change (Lake, 2013); health best describes it as an outcome of successful adaptation to adversity (Zautra, Hall, & Murray, 2010). In business, it is the firms' resourcefulness by using available internal and external resources in response to different contextual growth and developmental challenges (Pooley & Cohen, 2010). Psychology then defines it as the capability to respond to toxic stressors (Hornor, 2015). In the supply chain, resilience is the company's capability to face turbulence and survive, adapt, and grow (Fiksel, 2006). Business disruptions range from man-made disruptions to Acts of God. Technological and competitive disruptions also affect supply chain performance brought about by globalization and climate change, which create a more turbulent business environment (Hamel & Valikangas, 2003).

Many business disruptions threaten Supply Chain Performance (SCP). An earthquake in Japan caused nearly a month of closure of Toyota and caused 40 suppliers who were unable to support Nissan's requirements. The experience of the USA during the 9/11 terror attack killed people, including employees, and caused significant damage to the economy, the financial market, and the airline industry. Business disruptions may also include technological, competitive intensity, and market turbulence risks (Chopra & Sodhi, 2004; Ottesen & Grønhaug, 2004), operational disruptions (Cheng & Kam, 2008), catastrophic natural disruptions, supplier failures, logistical disruptions, and even political and regulatory disruptions (Bode et al., 2016), disruptions in raw materials, information and finances (Tang & Musa, 2011), supply disruptions, internal and external disruptions (Kilubi, 2016) among many others.

Resilience is the adaptive capability of a firm to reduce the effect of disruptions in the supply chain (Kamalahmadi & Parast, 2016). It is done by taking control over supply chain structures and functions and recovering and responding with immediate and effective reactive plans to transcend the disturbance and restore the supply chain to a robust state of operations. The explanation provided (Kamalahmadi & Parast, 2016) fits the definition of what this study is all about—a proactive approach to managing business disruptions in the whole supply chain. The primary importance of building resilience is to ensure business sustainability and continued profitability amidst the reality of disruptions in business. Along this line are the findings of Kunkel (2020) that building supply chain resilience manages the possible future disruption of business.

Managing SCR in business is to ensure that potential disruptions are controlled, minimized, or removed. Thus, resilience building is necessary in a supply chain structure (Harrison et al., 2014). The said study concluded that companies need to build and maintain resilience measures to combat business disruptions. Moreover, business managers were recommended to focus on building resilience focused on the operational areas where resilience enhancements are needed. In various studies reviewed, resilience is multi-dimensional.

Resilience as a construct is viewed differently by different authors. Resilience may mean resilience in demand changes challenging capacity, and resilience from

environmental disturbance, both manmade and acts of God. It implies the presence of risks that need to be mitigated as they influence a firm's sustainability. In this context, resilience in an organization is to maintain or restore an acceptable level of functional operation after a setback. It is also the level of an organization's ability to change due to a disturbance (Liu & Lee, 2018). The firm is also capable of recovering from disruptions it has experienced, as highlighted by Wieland and Wallenburg (2013), through the implementation of effective resilience strategies and adaptive supply chain management practices.

Resilience in business is expected to achieve the value of a firm. The certainty of the firm's supply chain disruptions calls for the study of resilience and how it is established to ensure supply chain performance. Building resilience will help customers and suppliers prepare for climate change repercussions in the supply chain (Kuczinski & Irvin, 2012) and establish a mitigation process (Scholten et al., 2014). It will also help understand the life cycle of resilience (Pettit & Tobin, 2014), determine potential sources of intentional disruptions (DuHadway et al., 2017), and establish the ability to anticipate and respond to disruptions (Pettit et al., 2010).

The study on resilience in the supply chain is also idea-generating and, at the same time, encompasses the big picture. Essential to the firm is that resilience helps firms identify measures to be profitable despite disruptions (Ponis & Koronis, 2012) and identify strategies to operationalize resilience (Ambulkar et al., 2015). Fiksel (2015) highlighted findings that the firm must reduce legal risks faced by firms (Fiksel, 2015), establish a collaborative partnership to help anticipate disruption and manage risks efficiently (Qian et al., 2018), and finally, establish sustainability (Setyowati et al., 2018).

Models of resilience are being studied by several authors to understand how firms face disturbance, prepare for it, and establish mitigation mechanisms. These models include ISO 22316, the Xiao and Cao Model, Denyer's Organizational Maturity Level, and the ROPE Model. Resilience in a firm means that it can absorb and adapt to a changing environment (Maher et al., 2017). The basic tenet of the ISO 22316 Model version 2017 about resilience and resilience building is that the model provides organizational resilience with three dimensions, nine strategies, and 16 behaviors. It emphasizes that firms need to understand resilience as the ability to anticipate, prepare for, respond to, and adapt to unexpected events or disruptions. It also means strong leadership commitment, establishing a resilient culture, and a collaborative network of supply chains.

The resilience model of Xiao and Cao (2017) puts resilience as an organization's ability to respond to unexpected disruptions and uncertainty while quickly recovering its operations and performance. This model highlights the need for a firm to be adaptable to a changing environment. It also stresses the need for firms to build redundancy into the system to help organizations maintain operations during disruptions. This involves having backup resources, alternative suppliers, or secondary transportation routes that can be used when primary systems fail. This

model also emphasizes robustness, flexibility, collaboration, and risk assessment, among others.

Another resilience model highlights resilience from the organization's maturity level over time. The Organizational Resilience model (Gupta & Varma, 2013) anchors resilience on a business firm's ability to anticipate business disruptions in the future, prepare for them, respond, and adapt to organizational changes needed to survive disruptions and prosper. The definition is a more proactive nature in handling resilience. It also advocates five stages of establishing resilience including preventative control, mindful action, performance optimization, adaptive innovation, and organizational thinking resilience (Denyer, 2017). This model introduces the unique 4 sight concept, which incorporates foresight, insight, oversight, and hindsight.

Another resilience model is the Risk-Oriented Process Evaluation (ROPE) Model. It is a resilience model that looks at an organization's vision, culture, and adaptive leadership. These three elements are intertwined, and their relationships are assessed in terms of external results, business skills, organizational structure, strategic planning, and business agility. These elements are evaluated to create a resilience program (Gracey, 2018). Moreover, ROPE combines the advantages of business process modeling, risk management, and business continuity. It aims at securing business processes by incorporating risk and business continuity management as an integral part. The business process modeling part enables the optimization of a company's processes regarding financial and workflow aspects. The risk management element is considered in-depth separately. Finally, the concepts of risk management and business continuity effectively provide the management of risks holistically. The ROPE methodology consists of five iterative processes. These are the strategic decision process, re-engineering process, ROPE diagrams, ROPE simulation, and prototype.

The turbulent business disruptions affect the people socially and economically and, therefore, including the manufacturing firms. The manufacturing sector in the Philippines accounts for 23% of the Gross Domestic Product (GDP) (PSA, 2017). The study on resilience is vital because disruption is inevitable and real, both internal and external, may it be man-made (Chopra & Sodhi, 2004) or acts of God (Canis, 2011). The proactive and systematic approach to resilience helps understand firms' operationalizing resilience. The firm's various resources and capabilities are the catalysts for operationalization (Blackhurst et al., 2011).

What is common to the definitions is the firm's opportunity to rebound after a disruption and that firms strategically prepare the organization to be resilient and sustainable. Organizational resilience has been highlighted in the study of Liu and Lee (2018). It concluded that of the three types of integration—internal integration, customer integration, and logistics collaborator integration used by Third Party Logistics, internal integration had the most significant effect on SCR. Moreover, customer integration was found to have three fully mediating effects on the relationships between internal integration and service performance, logistics col-

laborator integration and SCR, and logistics collaborator integration and service performance. Furthermore, integration is an essential element of SCR.

3.4. Supply Chain Performance Metrics

Supply Chain Performance (SCP) is the ability of the firm to manage its supply chain structure with effectiveness and efficiency (Reddy et al., 2019). The said study implies that SCP excellence can be achieved by effectively managing the structures that bring out the efficiencies of each supply chain element from raw materials management to finished goods delivery. Ultimately, bringing the benefits of integration of all supply chain participants because of efficiencies. From a specific operations perspective, SCP also refers to the extended supply chain's activities in meeting end-customer requirements, including product availability, on-time delivery, and all the necessary inventory and capacity in the supply chain to deliver that performance responsively (Liu et al., 2018).

The study of Teece (2007) focuses on how the supply chain of the firm performs. The supply chain integrates activities of a firm that primarily includes supplier management, manufacturing, distribution, and information systems, among many other sub-categories. The integration of these activities is needed to establish the firm's competitive advantage (Teece, 2007). The supply chain's performance in a strategic view includes the performance of the supply chain in terms of its flexibility, resources employed, and output.

Supply Chain is responsive if it is aligned with the performance indicators: resource (R), output (O), and flexibility (F) measures (Brandon-Jones et al., 2014). In another study, performance in the supply chain as applied to food supply can be distinguished through the three levels of performance: supply chain, organization, and process (Sahu et al., 2017). Another performance metric is the six variables, including inventory, lead time, order fulfillment, quality, customer focus, and customer satisfaction (Ramdas & Spekman, 2000).

Moreover, some researchers have investigated SC performance based on a hierarchy of metrics. Another performance metric is measuring the supply chain from a hierarchy perspective. It measures strategic, tactical, and operational levels (Gunasekaran et al., 2004). Finally, the supply chain operations reference (SCOR) model measures the supply chain using a process-based approach with five categories, including the processes: plan, source, make, deliver, and return. It measures the supply chain from a qualitative and quantitative view.

Supply chain flexibility performance has been highlighted in a study (Sanchez & Perez, 2005). The practical implication of the study is better to understand the constraints firms face with flexibility capabilities. The study found a positive correlation between superior performance in flexibility capabilities and firm performance, although flexibility dimensions are not equally important for firm performance.

The study has a conceptual model that supply chain integration is essential to firm performance. The performance measurement of the supply chain resource,

and the metrics used, have a crucial role in setting goals and objectives, evaluating firm performance, and determining future direction (Singh & Sohani, 2011). The study's conclusion stems from the internal and external integration of the firm. Singh and Sohani stated that excellent performance in the supply chain is brought about by all participants committed to a common goal. It also includes enhancing customer satisfaction, the firm's market performance, and financial performance.

In recent studies, the supply chain is applied to performance vis-a-vis green supply chain management to emphasize the value of the supply chain (Qin et al., 2017). In the context of the fourth industrial revolution, the study concluded that supply chain performance refers to a high degree of visibility in the sharing of on-time and accurate data capability throughout the entire supply chain and the co-ordination among supply chain partners (World Economic Forum, 2019).

Supply chain output performance is also an indicator of SCP. Performance metrics abound in practice, and the most common supply chain metrics include costs, resource utilization, and quality (Chan & Qi, 2003). Other forms of performance metrics cash to cash cycle time, freight cost and freight bill accuracy, perfect order rate, days sales outstanding, inventory turnover, gross margin return on investment, on-time shipping, returns reason, inventory velocity, and inventory days of supply (Durcevic, 2018). In another classification, supply chain metrics include time, cost, and quality (Huo, 2012). The Cerasis, an article on Supply Chain Management, identified three critical and ten soft performance metrics. The three key performance metrics include inventory measures, working capital, and time measures.

Moreover, the ten soft performances have collaboration, customer service levels, balanced scorecards, technology efficiency, IOT systems, risk management, cybersecurity, GPS, supply chain visibility, and state-of-the-art supply chain management. Noting the differences in how firms measure supply chain performance, there is no commonality in measuring supply chain performance. However, a study of related literature was conducted and found groups of methods used to measure performance. It includes the process-based approach, perspective-based approach, and hierarchical-based approach.

The process-based approach includes the use of top and bottom measures (Bullinger et al., 2002). An example of top and bottom measures is using the four elements of a plan's supply chain management framework, source, make, and deliver (Gunasekaran et al., 2004). Other measures include a process-based approach for small and medium-scale industries (Thakkar et al., 2009) and Six Sigma measures. The perspective-based approach includes interrelationships of supply chain elements (Otto & Kotzab, 2003; Ramaa et al., 2009), balanced scorecard models, and supply chain reference models (Kurien & Qureshi, 2011). The hierarchical-based approach measures the supply chain in different levels of the supply chain such as the strategic level (Gunasekaran et al., 2004), three levels of the supply chain (Bhagwat & Sharma, 2009), safety, risk, and Health measures (Pramod et al., 2014). Finally, the Association of Supply Chain Management (ASCM, 2020)

measures the supply chain according to SCOR attributes, including reliability, responsiveness, agility, costs, and asset management efficiency.

The value of supply chain performance is better experienced by the firm when brought to excellence, whichever metric is used, and whichever element of the supply chain structure. In contemporary times when the business environment is characterized by fast-changing and volatile conditions, it is not enough to be reactive to the many challenges that beset its supply chain. In the study, Stefanovic (2014), concluded that businesses have to anticipate future supply chain performance intelligently and recommend predictive analytics, which is primarily an information system working for the company to complement the supply chain.

The literature on Supply Chain Performance (SCP) highlights the interconnected roles of four key variables—Logistics Performance, Integrated Information Systems (IIS), Supply Chain Resilience (SCR), and Performance Metrics and Continuous Improvement—in enhancing overall supply chain efficiency, flexibility, and sustainability. Each of these variables contributes distinctively but also interacts with one another to shape an organization's ability to manage and optimize its supply chain.

3.5. Supply Chain Performance

Logistics plays a fundamental role in optimizing supply chain operations by improving the efficiency of product flow, reducing costs, and ensuring timely delivery. Logistics performance focuses on key metrics such as inventory management, order fulfillment, transportation, and warehousing. Efficient logistics operations contribute directly to supply chain success by minimizing lead times, improving customer satisfaction, and managing costs effectively. The alignment of logistics with other aspects of the supply chain, such as integration with suppliers and customers, further strengthens its contribution to SCP. Authors emphasize that logistics performance is critical for operational efficiency, but it requires collaboration across multiple stakeholders to achieve excellence (Reddy et al., 2019).

The integration of information systems is crucial in the digital age for enabling data-driven decision-making and enhancing operational efficiency. IIS facilitates real-time information exchange between supply chain participants, improving visibility and coordination across the entire supply chain. According to Dehning and Stratopoulos (2003), firms that leverage internal and external ICT capabilities are better positioned to enhance decision-making speed, quality, and responsiveness. Integrated information systems not only streamline internal processes but also strengthen relationships with suppliers and customers, improving responsiveness and reducing costs. Furthermore, the literature underscores that despite the clear benefits of IIS, many companies still struggle to fully capitalize on their potential, which limits their ability to optimize supply chain performance (Bhagwat & Sharma, 2009; Lorenzo-Ochoa et al., 2017).

The importance of resilience in supply chains has gained significant attention, particularly in the face of increasing disruptions caused by both man-made and

natural disasters. SCR refers to a supply chain's ability to anticipate, respond to, and recover from disruptions while maintaining or improving performance. Resilient supply chains are characterized by flexibility, adaptability, and risk management capabilities (Kamalahmadi & Parast, 2016). Studies indicate that building resilience involves not only preparing for disruptions but also fostering the capacity to quickly recover and continue operations. SCR is strongly correlated with SCP, as resilient supply chains can better handle unexpected events, minimize operational downtime, and ensure business continuity. Companies with higher levels of resilience are also better equipped to absorb shocks and return to optimal performance post-disruption, thus ensuring long-term supply chain success (Pettit et al., 2010).

Supply Chain Performance Metric is critical to achieving supply chain excellence. Establishing clear performance metrics helps organizations assess and monitor their operations across various dimensions, such as cost efficiency, customer satisfaction, and delivery performance (Gunasekaran et al., 2004). Metrics such as inventory turnover, on-time delivery, and cost-to-serve are commonly used to evaluate supply chain performance. Performance metrics also drive continuous improvement by providing measurable targets and benchmarks for organizations to strive toward. In a rapidly changing business environment, the ability to continuously refine and optimize supply chain processes is essential. According to authors like Stefanovic (2014), predictive analytics and the incorporation of modern technologies such as IoT systems and data analytics tools can play a vital role in improving supply chain performance and making data-driven decisions for ongoing improvement.

3.6. Synthesis

The literature reveals that these four variables are not independent but rather interdependent, forming a robust framework for enhancing SCP. For instance, an effective IIS enhances the efficiency of logistics operations by enabling real-time data sharing and coordination, which improves logistics performance. Simultaneously, resilient supply chains can ensure that logistics processes remain functional during disruptions, contributing to overall performance stability. Performance metrics act as feedback mechanisms, guiding continuous improvement in logistics, IIS, and resilience strategies. These interconnections suggest that optimizing each variable individually can lead to improvements in supply chain performance, but the most significant benefits arise when they are integrated into a cohesive strategy.

4. Results and Discussion

4.1. Summary of Articles Reviewed

The summary of articles presented in **Table 1** provides an overview of the total number of articles reviewed and published within the four key variables of Logistics Performance (LP), Integrated Information System (IIS), Supply Chain Resili-

ence (SCR), and Supply Chain Performance (SCP).

Table 1. Summary of articles reviewed.

Variable	Total Articles Reviewed	Total Published
Logistics Performance	15	14
Integrated Information System	10	9
Supply Chain Resilience	24	22
Supply Chain Performance	23	21
Total Articles	72	66

The Logistics Performance variable has a high publication rate of approximately 93.3% (14 published out of 15 reviewed). This suggests that a majority of the studies in this area have been successfully published and are likely considered valuable contributions to the field. The 1 unpublished article could potentially be in progress or under review.

Like Logistics Performance, the IIS variable shows a very high publication rate of 90% (9 published out of 10 reviewed). The high percentage of published articles indicates that IIS is an active and significant area of research in the context of supply chain management. Again, there is 1 unpublished article, which could reflect ongoing research or awaiting peer review.

Supply Chain Resilience shows a 91.7% publication rate (22 published out of 24 reviewed), with 2 articles unpublished. The relatively high number of reviewed articles in this category suggests that resilience is a growing area of interest and importance in supply chain studies. The 2 unpublished articles may indicate emerging research or a need for further refinement.

With a publication rate of 91.3% (21 published out of 23 reviewed), Supply Chain Performance is another area with a strong research output. The 2 unpublished articles suggest that while many studies in SCP are being successfully published, there is still ongoing work in progress.

Across all four variables, 72 articles were initially reviewed but only 66 articles were published, resulting in an overall 91.7% publication rate. This highlights a significant level of productivity and research output within the supply chain field, with a relatively small number of articles remaining unpublished.

Table 2 summarizes the journals reviewed for the articles across the four supply chain variables. The table provides a clear overview of the distribution of articles across various reputable journals, showcasing the breadth of research conducted in the field. Journal of Business Research leads with 10 articles, reflecting its significant role in publishing supply chain-related research. Following closely are the International Journal of Production Economics with 8 articles and Computers in Industry, along with the International Journal of Physical Distribution & Logistics Management, each contributing 5 articles. This concentration of articles in prominent journals like these underscores their importance in disseminating research

on supply chain performance and related topics.

Table 2. Summary of journals reviewed.

Journal Name	Number of Articles
Journal of Business Research	10
International Journal of Production Economics	8
Computers in Industry	5
International Journal of Physical Distribution & Logistics Management	5
Journal of Supply Chain Management	4
Supply Chain Management: An International Journal	4
Journal of Operations Management	2
International Journal of Information Management	2
International Journal of Production Research	2
International Journal of Services and Operations Management	2
International Journal of Logistics Management	2
Business Process Management Journal	1
Journal of Purchasing and Supply Management	1
Operations Management Research Journal	1
Journal of Strategic and International Studies	1
TOTAL	66

The remaining journals, including the Journal of Supply Chain Management with 4 articles and several others with 2 articles each, represent specialized niches within supply chain research. Journals like the Journal of Operations Management and the International Journal of Information Management are key contributors to discussions around operational and information systems management in supply chains. Lastly, journals like the Business Process Management Journal and the Journal of Purchasing and Supply Management each contribute a smaller but still valuable portion of the overall research. The distribution of articles across a diverse set of journals highlights the multi-disciplinary nature of supply chain research and its integration with various operational and strategic management fields.

4.2. RQ1 How Does Downstream Integration Impact Operational Efficiency across Different Industries?

The integration of the downstream supply chain is efficient and brought about by a variety of factors. Primarily, it is brought about by meeting customer demands. Various articles reviewed underscore that supply chain performance is measured by the ability to meet end-customer requirements, including product availability, on-time delivery, and responsive inventory management. The role of the down-

stream integration is to connect the products with customers and understanding their needs—is essential in ensuring that the supply chain delivers these metrics efficiently. A key to downstream integration is ensuring that customer demands are met consistently, which directly impacts metrics like inventory turnover, on-time delivery, and order fulfillment (Liu et al., 2018; Ramdas & Spekman, 2000).

In several studies reviewed, customer satisfaction was highlighted as a core metric. By integrating downstream elements like customer service and communication into the supply chain, businesses can improve satisfaction and reduce risks associated with poor performance. Integration with customers helps anticipate demand fluctuations, improve inventory planning, reduce stockouts, and enhance overall customer experience (Singh & Sohani, 2011).

Moreover, the articles likewise pointed out that despite the structure of the supply chain, it has to deliver flexibility. Flexibility is a key metric for supply chain performance, and downstream integration plays a crucial role in ensuring that supply chains remain adaptable to changes in customer demand, seasonal fluctuations, or disruptions. The study notes a positive correlation between flexibility capabilities and overall firm performance. By aligning the supply chain with downstream stakeholders, companies can increase their ability to respond to sudden shifts in customer demand, which improves responsiveness and customer service levels (Sanchez & Perez, 2005).

Supply Chain on top of flexibility requires speedy response which is real-time information sharing. In the 5th Industrial Revolution, interconnectivity highlights organizational roles. The integration of information systems (IIS) facilitates real-time data exchange with customers, enhancing decision-making and responsiveness. Downstream integration through information systems ensures that businesses can quickly react to changes in customer orders or market conditions, improving the timeliness and efficiency of operations. This level of integration with customers boosts agility and resource utilization metrics (Dehning & Stratopoulos, 2003).

Interconnectivity may refer to connection with suppliers, buyers, manufacturing, among other members of the Supply Chain. More importantly, it also means deeper cross-functional collaboration. Some articles reviewed highlighted that strong collaboration between supply chain participants, including suppliers and customers, is crucial to improving performance. In downstream integration, coordination with customers helps firms streamline operations, reduce costs, and enhance operational efficiency. A common goal across the supply chain participants, driven by performance metrics such as cost-to-serve and inventory velocity, allows firms to optimize processes, reduce inefficiencies, and improve customer delivery times (Reddy et al., 2019; Gunasekaran et al., 2004).

Furthermore, the integration of the downstream helps facilitate risk management and resilience. Downstream integration also plays a role in enhancing resilience. Some studies discussed Supply Chain Resilience (SCR), businesses with resilient supply chains are better able to absorb disruptions and return to optimal

performance. By integrating downstream partners in risk management processes, firms can better anticipate and respond to potential disruptions, ensuring quick recovery and minimizing downtime in customer-facing operations. This ultimately ensures business continuity and improves the overall supply chain output performance (Kamalahmadi & Parast, 2016; Pettit et al., 2010).

The integration of the downstream is also strategic and provides operational benefits. The articles reviewed emphasized how performance metrics are used to set goals and evaluate performance at various levels of the supply chain. Downstream integration aids in setting and achieving strategic goals like market penetration and customer loyalty by ensuring that the supply chain is aligned with customer expectations. Tactical goals such as order-fulfillment accuracy and cost efficiency also benefit from downstream integration, as firms can better synchronize their operations with customer needs and minimize inefficiencies (Gunasekaran et al., 2004).

Among some studies, an emphasis on the ole of predictive analytics has been highlighted in improving supply chain performance. Downstream integration supports the use of predictive analytics by enabling real-time communication with customers. This helps businesses forecast demand more accurately and manage inventory levels accordingly, leading to inventory turnover improvements and better cash flow management (Stefanovic, 2014).

The use of predictive analytics helps also in the firms' continuous improvement and data-driven decision-making. The data on performance monitoring allows faster feedback. The use of performance metrics drives continuous improvement. Downstream integration provides valuable feedback from customers, which can be used to optimize supply chain processes, improve delivery performance, and enhance overall customer satisfaction. By collecting data from downstream partners, businesses can identify areas for improvement and make data-driven decisions to refine their operations and achieve higher levels of performance (Chan & Qi, 2003).

Finally, one of the challenges of a supply chain is the lack of visibility, with carefully thought of downstream integration, there is an improved visibility and transparency. Integration with downstream stakeholders ensures better visibility across the supply chain. This transparency allows companies to make informed decisions based on real-time customer data, which in turn improves supply chain visibility and operational efficiency metrics (World Economic Forum, 2019).

4.3. RQ2 What Are the Key Challenges Businesses Face When Implementing Downstream Integration in the Supply Chain and Customer Service Processes?

Based on the articles on Logistics Performance, Integrated Information Systems (IIS), Supply Chain Resilience (SCR), and Supply Chain Performance Metrics, there are several challenges that organizations face. More important are the challenges of data sharing and system integration, managing customer expectations, supply chain resilience to disruptions, cross-functional collaboration and align-

ment, and challenges in cost and resource management.

Integrating different IT systems between supply chain participants, including customers, can be difficult due to the complexity of aligning data formats, communication protocols, and platforms. Ensuring real-time information exchange while maintaining data integrity is a major challenge (Dehning & Stratopoulos, 2003). Companies may struggle to synchronize their systems with customers and suppliers, leading to delays, inaccuracies, and poor decision-making.

The impact of this particular challenge—poor integration of information systems can lead to disruptions, lack of visibility in the supply chain, and inefficiencies in customer service, such as delayed deliveries and order inaccuracies.

Another challenge in downstream integration requires businesses to meet customer demands with a high level of responsiveness, often under uncertain or volatile market conditions (Reddy et al., 2019). Balancing flexibility in supply chains while maintaining cost efficiency and meeting service-level agreements (SLAs) can be a significant challenge, particularly when customer expectations are high or unpredictable. The failure to meet customer expectations can damage customer satisfaction, hurt long-term relationships, and result in lost business.

Supply Chain resilience to disruptions is another challenge for businesses. Building a resilient supply chain capable of absorbing disruptions—whether man-made or natural—while continuing to meet customer demands is crucial. However, creating an adaptive and flexible system that can recover quickly from such disruptions requires significant investments in risk management and contingency planning (Kamalahmadi & Parast, 2016). Without strong resilience measures, businesses risk significant downtime or loss of service continuity, which can impact downstream customer service, resulting in stockouts, delays, or order cancellations.

Achieving effective collaboration across all stakeholders (customers, suppliers, logistics partners, etc.) in the downstream supply chain is also challenging. Misalignment between different functions—like sales, logistics, and production—can lead to inefficiencies and poor performance. Coordination across these functions is critical for delivering on customer expectations (Singh & Sohani, 2011). This challenge can impact the company through misalignment which may cause delays, customer dissatisfaction, and increased operational costs, especially if different departments have conflicting priorities or lack the communication tools for smooth coordination.

Finally, there is a challenge in cost and resource management. Implementing downstream integration can be costly, especially when it requires new technology, process changes, and resource allocation. Companies need to balance the cost of integration (e.g., technology implementation, employee training, infrastructure) with the benefits of improved customer service and supply chain efficiency (Chan & Qi, 2003). If the costs outweigh the benefits, businesses may find themselves investing in integration solutions that don't yield sufficient returns, leading to lower profit margins and operational inefficiencies.

4.4. RQ3 How Does Downstream Integration Influence Customer Satisfaction and Loyalty across Industries?

Downstream integration plays a significant role in enhancing customer satisfaction and loyalty by ensuring seamless and efficient interactions between businesses and their customers. The integration of supply chain processes—such as logistics, order fulfillment, and communication through Integrated Information Systems (IIS)—allows businesses to provide real-time visibility and accurate tracking of customer orders, improving delivery times and reducing errors (Dehning & Stratopoulos, 2003). With better coordination and collaboration across supply chain partners, companies can enhance their responsiveness to customer needs, making it easier to meet expectations for product availability, on-time delivery, and personalized service (Reddy et al., 2019). This enhanced efficiency fosters a better customer experience, making customers more likely to return and recommend the company to others, thus driving long-term loyalty.

Furthermore, Supply Chain Resilience (SCR) contributes significantly to customer retention by ensuring that companies can anticipate and recover from disruptions, whether caused by supply shortages, logistics challenges, or market fluctuations (Kamalahmadi & Parast, 2016). A resilient downstream integration ensures that customers experience minimal service disruptions, even in times of crisis. When customers feel confident that their orders will be fulfilled despite external challenges, their trust and loyalty to the brand are strengthened. As businesses achieve higher levels of flexibility and agility in their supply chains, they not only improve their ability to meet customer expectations but also create a reputation for reliability and responsiveness, crucial elements for maintaining competitive advantage across industries. This proactive approach to managing downstream integration solidifies both customer satisfaction and long-term customer relationships.

4.5. Integration of Pillars

Figure 1 presents the four pillars of this framework—Logistics Optimization, Information System Integration, Supply Chain Resilience, and Performance Metrics and Continuous Improvement—which are interdependent and should work together in synergy for a supply chain to achieve optimal performance.

Logistics Optimization feeds into Information System Integration by improving the flow of goods, which needs to be tracked and monitored through real-time data. In turn, Information System Integration ensures that all logistics operations are visible to key stakeholders, enabling better decision-making and efficient resource allocation.

Supply Chain Resilience is supported by Logistics Optimization, as resilient supply chains require robust logistics infrastructure that can respond to disruptions (e.g., flexible distribution systems). Meanwhile, resilient firms are better able to adjust logistics operations in response to unexpected events.

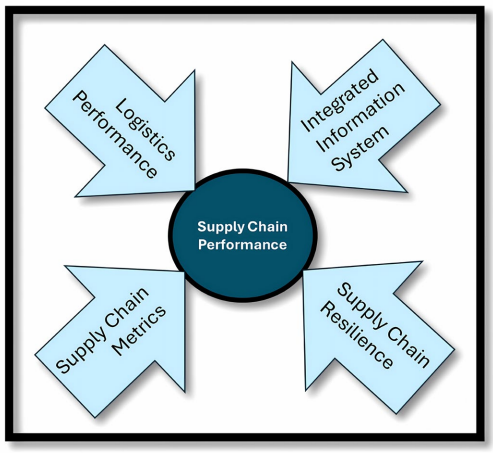

Figure 1. Supply chain downstream integration framework.

Performance Metrics ensure that all three pillars are functioning as expected. By continuously measuring logistics performance, tracking the effectiveness of information system integration, and assessing resilience strategies, firms can identify areas for improvement and make data-driven decisions to maintain or enhance SCP.

Impact on Supply Chain Performance (SCP). This integrated framework is designed to optimize supply chain performance by focusing on the core operational areas (logistics, information systems, resilience, and performance metrics). Each pillar addresses specific challenges within the supply chain and contributes to enhanced efficiency, resilience, and responsiveness, which are the key drivers of SCP.

By adopting this framework, firms can achieve the following enhanced efficiency. Through logistics optimization and real-time information sharing, companies can reduce lead times, costs, and inefficiencies in their supply chains. In addition, it also can improve flexibility and adaptability. The resilience pillar ensures that firms can respond to disruptions without compromising overall performance. Moreover, the framework can foster continuous performance enhancement. Regular monitoring and improvement through performance metrics ensure that supply chains remain competitive in an evolving market.

4.6. Conclusion

This study has reviewed and synthesized a range of articles on four critical variables influencing Supply Chain Performance (SCP): Logistics Optimization, Integrated Information Systems (IIS), Supply Chain Resilience (SCR), and Performance Metrics and Continuous Improvement. The findings highlight that these four factors are interconnected and collectively contribute to enhancing SCP.

Each of the variables plays a significant role in shaping supply chain effectiveness. Logistics Optimization ensures efficient flow and cost management across the supply chain, while IIS enables better decision-making through enhanced data sharing and real-time insights. SCR emphasizes the need for resilience and adaptability in the face of disruptions, ensuring that the supply chain remains robust in

uncertain environments. Lastly, Performance Metrics and Continuous Improvement provide measurable targets that help monitor, evaluate, and improve supply chain operations over time.

The literature shows that these factors are not isolated but are closely intertwined. For example, effective logistics management can be optimized further with integrated information systems, while resilient supply chains are better equipped to manage logistics disruptions. The performance metrics act as feedback loops, guiding improvements in each of these areas. By considering these variables together in a unified framework, companies can adopt a holistic approach to improve supply chain performance and achieve long-term sustainability in a highly dynamic business environment. Thus, a comprehensive approach that incorporates logistics, information systems, resilience, and performance evaluation is essential for businesses aiming to achieve excellence in supply chain management.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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