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Assessing the Role of Communication and Information Sharing in Strengthening Supply Chain Resilience During Disruptions

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Keywords: supply chain resilience; communication; information sharing; disruptions; technology; collaboration; trust

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Assessing the Role of Communication and Information Sharing in Strengthening Supply Chain Resilience During Disruptions

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Abstract: This research explores the role of communication and information sharing in strengthening supply chain resilience during disruptions. In today's interconnected and rapidly evolving business environment, supply chains are increasingly vulnerable to a variety of disruptions, including natural disasters, geopolitical crises, and supply shortages. Effective communication and the seamless exchange of information are critical for organizations to respond quickly and adapt to such challenges. The study adopts a qualitative research methodology, including interviews with key stakeholders from different industries, to examine how communication strategies and information sharing practices influence supply chain resilience. The findings indicate that clear, timely, and proactive communication between supply chain partners significantly enhances resilience by enabling swift decision-making and coordinated responses. Digital tools and platforms, such as real-time tracking systems, cloud-based platforms, and data analytics, are essential in improving communication and facilitating information sharing. Furthermore, the research highlights the importance of trust and collaboration, as well as a culture of transparency and flexibility, in fostering effective communication within organizations and across the supply chain network. However, challenges such as technological incompatibility, data overload, and concerns over information confidentiality were identified as significant barriers. The study suggests that overcoming these challenges requires investments in technology, building strong relationships with supply chain partners, and promoting a culture of open communication and collaboration. Overall, the research emphasizes that communication and information sharing are integral to enhancing supply chain resilience, and organizations must prioritize these factors to navigate future disruptions successfully.

Keywords: supply chain resilience; communication; information sharing; disruptions; technology; collaboration; trust

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1. Introduction

The ability of a supply chain to remain resilient in the face of disruptions is a critical factor in the global business landscape. The advent of global supply chain systems and the reliance on cross-border trade have significantly increased the vulnerability of these systems to various disruptions, ranging from natural disasters to political instabilities and pandemics (Agarwal & Seth, 2024). In the modern era, where supply chains span continents and involve multiple layers of suppliers, manufacturers, and consumers, disruptions can have cascading effects, causing major delays and financial losses. For this reason, understanding how to strengthen supply chain resilience is more important than ever. Resilience in supply chains is no longer solely about having contingency plans for potential disruptions but also involves developing an integrated approach that incorporates effective communication and information sharing across the entire supply chain network (Agrawal & Jain, 2022a). Communication, both within the organization and between the different stakeholders across the supply chain, has proven to be a fundamental component in improving supply chain resilience. Information sharing, which entails the timely and accurate exchange of relevant data regarding inventory levels, demand forecasts, production schedules, and supply chain risks, is a key

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enabler of resilience (Agarwal & Jain, 2022b). During disruptions, clear communication helps supply chain partners coordinate their responses and mitigate the negative effects of the disturbance. Additionally, the effective use of information systems and technologies for communication can help monitor and manage risks, ultimately leading to a more adaptive and responsive supply chain (Ahmadi et al., 2024). Despite the crucial role that communication plays, many organizations still face challenges in effectively sharing information with all stakeholders, which may stem from issues such as poor technological infrastructure, organizational silos, or a lack of trust between partners (Aldhaheri et al., 2023). These barriers not only hinder the speed at which information flows during a disruption but also reduce the overall effectiveness of the response. On the other hand, organizations that prioritize open and transparent communication can better prepare for, respond to, and recover from disruptions (Aldrighetti et al., 2023). For instance, fostering collaborative relationships between suppliers, logistics providers, and customers can allow firms to share critical information, like production delays or transportation bottlenecks, enabling them to adapt their strategies in real-time (Aldrighetti et al., 2021). The COVID-19 pandemic, as a recent example, highlighted the importance of communication and information sharing within supply chains. The global health crisis disrupted supply chains worldwide, and companies that had established strong communication networks and information-sharing practices were better positioned to mitigate some of the negative impacts of the pandemic (Aldrighetti et al., 2024). Real-time information on shifting demand patterns, inventory statuses, and supplier capacity allowed organizations to make faster decisions and redirect resources efficiently, reducing the extent of disruption. This scenario underlined that having information transparency across the entire supply chain, especially in times of crisis, is indispensable for maintaining resilience (Alhawari et al., 2021). Furthermore, studies have demonstrated that leveraging modern technologies, such as blockchain, the Internet of Things (IoT), and advanced analytics, can significantly enhance communication and information sharing within supply chains. These technologies enable the seamless flow of data across different nodes in the supply chain, providing stakeholders with the most up-to-date information (Emon & Khan, 2024). For instance, blockchain technology can offer a secure, transparent, and tamper-proof platform for information exchange, ensuring that all participants have access to reliable and real-time data. Similarly, IoT devices embedded in goods and equipment can provide valuable insights into inventory levels, transportation status, and potential disruptions, allowing for swift and informed decision-making (Khan & Emon, 2024). In such contexts, businesses can make use of digital tools to enhance the precision and speed of their responses, thereby minimizing disruptions and increasing overall resilience. In line with these technological advancements, there has also been an increased emphasis on the human factor in supply chain resilience. For instance, strong leadership, clear decision-making processes, and well-defined communication channels are vital for ensuring that information is exchanged in a structured and efficient manner. Managers and decision-makers need to be equipped with the necessary tools and training to make data-driven decisions quickly and effectively, especially when faced with an unforeseen crisis (Emon et al., 2025). In many cases, effective leadership and team collaboration within organizations contribute to the success of resilience efforts, as they can facilitate the timely flow of information and help navigate the challenges posed by disruptions (Al-Husain & Al-Eideh, 2024). Moreover, resilience in supply chains is not solely the responsibility of individual companies. It is a collective effort that requires collaboration and information sharing among all supply chain partners. Building relationships based on trust and shared objectives can create a more resilient supply chain network (Ali et al., 2023). When partners are willing to share crucial data on supply chain operations, risks, and performance, they can collectively anticipate disruptions, implement preventative measures, and respond effectively during a crisis (Alikhani et al., 2023). Furthermore, by working together, companies can jointly address challenges such as capacity shortages, transport delays, or labor issues, which often escalate during disruptions. The role of communication and information sharing is not limited to responding to supply chain disruptions but extends to proactive risk management and preparedness strategies. A resilient supply chain is one that has built-in mechanisms to continuously monitor and assess risks,

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communicate potential threats, and develop contingency plans (Alikhani et al., 2021). For example, some organizations engage in regular scenario planning and risk simulations, which require a high level of collaboration and information exchange with partners to evaluate different disruption scenarios and prepare mitigation strategies (Altay & Pal, 2023). In this sense, organizations can create a culture of resilience by continuously sharing information on potential risks and vulnerabilities, helping the entire supply chain better prepare for the unexpected. Another aspect of communication and information sharing in strengthening supply chain resilience is the role of social networks. Research has indicated that social networks can significantly affect the flow of information during disruptions, as supply chain partners often rely on informal networks to share knowledge and seek solutions during crises (Alvarenga et al., 2023). Social networks, including both formal and informal relationships, can provide valuable insights into the nature of disruptions and potential solutions, making it essential for companies to maintain strong relationships with not only direct suppliers and customers but also other industry players, including competitors and regulatory bodies (Al-Zuheri & Vlachos, 2023). It is also important to recognize that the effectiveness of communication and information sharing depends on the nature of the disruption. Different disruptions may require different strategies for information exchange, with some situations demanding rapid, real-time communication, while others may require more strategic, long-term planning (Aman & Seuring, 2023). For instance, supply chain disruptions caused by natural disasters or pandemics may require immediate, crisis-driven communication, while disruptions related to technological issues or supply chain optimization can be managed with more planned and structured information-sharing practices (Arabsheybani & Arshadi Khasmeh, 2021). Regardless of the type of disruption, however, the ability to exchange relevant and accurate information remains a cornerstone of supply chain resilience. As organizations continue to face an increasingly volatile, uncertain, complex, and ambiguous (VUCA) environment, the need for robust communication systems and effective information sharing will only grow. Companies that embrace these principles will be better equipped to respond to disruptions, recover quickly, and ultimately thrive in an ever-changing global marketplace (Asafo-Adjei et al., 2023). Communication and information sharing not only serve as essential tools for dealing with disruptions but also as strategic assets for building long-term supply chain resilience. Therefore, investing in these areas is crucial for organizations that seek to maintain competitive advantage and safeguard their operations against future challenges (Ashraf et al., 2024). In conclusion, strengthening supply chain resilience requires a comprehensive approach that emphasizes the importance of communication and information sharing. Effective communication helps coordinate actions, enables rapid decision-making, and fosters collaboration among supply chain partners, while the timely and accurate exchange of information provides the foundation for proactive risk management. As organizations face increasingly complex and unpredictable disruptions, it is clear that the ability to share information transparently and efficiently will be one of the key determinants of supply chain resilience.

2. Literature Review

The importance of resilience in supply chains has garnered significant attention in recent years, as organizations increasingly face a multitude of risks and disruptions. Supply chains have grown more complex and interconnected, making them more susceptible to a range of disturbances such as natural disasters, political instability, economic fluctuations, and pandemics (Al-Husain & Al-Eideh, 2024). As a result, the role of communication and information sharing has become central in developing and enhancing supply chain resilience. Effective communication facilitates rapid responses, informed decision-making, and the ability to adapt quickly to changes, thereby mitigating the effects of disruptions (Ali et al., 2023). Furthermore, information sharing among supply chain partners enables organizations to access critical data regarding risks, inventory levels, production schedules, and market demands, ensuring that they remain agile and responsive during crises (Alikhani et al., 2023). A significant body of literature has explored the role of communication and information sharing in supply chain resilience, focusing on various factors such as the nature of

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information flows, the impact of technology, and the human aspect of collaboration. One critical finding in recent research is that communication plays a fundamental role in coordinating activities among supply chain partners, particularly in times of disruption. According to Alikhani et al. (2021), communication during a crisis is essential for ensuring that all stakeholders are on the same page and are able to make quick, collective decisions. This is particularly true in the context of supply chain disruptions, where delayed or inaccurate information can exacerbate the problem, leading to longer recovery times and greater financial losses. Thus, organizations that invest in communication systems and strategies are better equipped to respond to unexpected events (Altay & Pal, 2023). The ability to share information effectively is also a critical determinant of supply chain resilience. In many cases, disruptions occur due to a lack of information or a delay in its exchange across the supply chain network (Al-Zuheri & Vlachos, 2023). In contrast, firms that are able to establish transparent information-sharing channels with their suppliers, distributors, and customers are more likely to minimize the negative effects of disruptions. Information sharing allows firms to identify potential risks early, manage uncertainties, and collaborate more effectively in response to disruptions (Aman & Seuring, 2023). In this context, several studies have highlighted the importance of building trust among supply chain partners to ensure that information is shared accurately and promptly (Arabsheybani & Arshadi Khasmeh, 2021). Without trust, companies may be reluctant to share critical information, which can lead to inefficiencies and delays in responding to disruptions. The role of technology in enhancing communication and information sharing has also been widely discussed in the literature. Technological advancements such as the Internet of Things (IoT), blockchain, and data analytics have the potential to revolutionize the way information is shared across supply chains (Asafo-Adjei et al., 2023). IoT devices, for example, can provide real-time data on inventory levels, transportation conditions, and product status, allowing supply chain partners to monitor the situation and make adjustments as needed (Ashraf et al., 2024). Similarly, blockchain technology can facilitate secure, transparent, and tamper-proof information sharing, ensuring that all stakeholders have access to reliable data at all times (Badhotiya et al., 2022). These technologies not only improve the speed and accuracy of information exchange but also enhance the overall efficiency of supply chains by reducing the reliance on traditional communication methods, such as emails and phone calls, which may be prone to delays or errors (Baghersad et al., 2022). Despite the promise of these technologies, challenges remain in their widespread adoption and integration into supply chain processes. One key challenge is the need for standardization across different supply chain partners, as organizations may use different systems, platforms, or technologies for communication (Baghersad & Zobel, 2021). To fully leverage the benefits of technology, supply chain partners must be willing to adopt compatible tools and systems that facilitate seamless data exchange. Moreover, the implementation of advanced technologies requires significant investment in infrastructure, training, and maintenance, which can be a barrier for smaller firms (Badhotiya et al., 2022). Nonetheless, the growing interest in digital transformation and Industry 4.0 has led to increasing investments in supply chain technologies, which is expected to improve communication and information sharing in the future (Khan et al., 2025). Another important factor in building supply chain resilience is the human element of communication. While technology can facilitate the exchange of information, it is ultimately up to individuals within the supply chain to interpret, act upon, and share the data effectively. According to Emon et al. (2024), effective communication during disruptions requires not only the right tools but also the right skills and attitudes. For example, decision-makers must be able to interpret data quickly, make informed decisions, and communicate these decisions clearly to all relevant stakeholders (Khan et al., 2024). Additionally, collaboration and teamwork are critical in ensuring that information is shared effectively across the entire supply chain network. A culture of collaboration, supported by strong leadership and communication, can help overcome barriers to information sharing and ensure that all parties are aligned in their response to disruptions (Asamoah et al., 2020). Research has also highlighted the role of social networks in facilitating communication and information sharing during supply chain disruptions. Social networks, both formal and informal, can provide valuable channels for sharing information,

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particularly in times of crisis (Alvarenga et al., 2023). Informal networks, such as industry groups, online forums, and personal relationships between supply chain partners, can be particularly useful for gathering insights and solutions that may not be available through official communication channels. In fact, during major disruptions such as the COVID-19 pandemic, many companies relied on informal networks to share critical information about supply chain issues, such as transportation delays or supplier capacity changes (Aldrighetti et al., 2023). These networks can help fill in the gaps in official communication, allowing for more complete and timely information exchange. While communication and information sharing are critical for responding to disruptions, they also play a vital role in proactive risk management and preparedness strategies. According to Alikhani et al. (2023), a resilient supply chain is one that continuously monitors and assesses potential risks, shares this information with partners, and develops strategies to mitigate the impact of disruptions before they occur. This proactive approach requires organizations to invest in risk management tools and techniques, such as scenario planning, predictive analytics, and risk assessments, that enable them to identify and address vulnerabilities in their supply chains (Al-Zuheri & Vlachos, 2023). Information sharing is crucial in this context, as it allows organizations to collaborate on risk mitigation strategies and ensure that all supply chain partners are aligned in their approach to managing risks. In the context of global supply chains, where firms rely on suppliers, manufacturers, and distributors from different regions and countries, cross-cultural communication is another important consideration. Cultural differences can impact the way information is shared and interpreted, which can affect the overall resilience of the supply chain (Aman & Seuring, 2023). For example, different countries may have varying levels of transparency in their supply chain operations, leading to challenges in sharing accurate and timely information (Arabsheybani & Arshadi Khasmeh, 2021). As organizations continue to operate in a globalized environment, it is essential to understand the cultural dynamics that influence communication and information sharing and to develop strategies that overcome these challenges (Ali et al., 2023). Furthermore, the COVID-19 pandemic has underscored the need for supply chains to be agile and adaptable in the face of unexpected disruptions. Studies show that companies with strong communication and information-sharing practices were able to respond more effectively to the pandemic, as they could quickly gather and share data on supply chain disruptions, demand shifts, and inventory shortages (Ashraf et al., 2024). The pandemic also highlighted the importance of real-time information sharing, as companies needed to make rapid adjustments to their operations and supply chain strategies. This has led to greater emphasis on the use of digital tools, cloud computing, and data analytics to improve information sharing and decision-making in supply chains (Khan et al., 2025). As the global business environment continues to evolve, the role of communication and information sharing in strengthening supply chain resilience will only become more critical. Organizations that can effectively integrate communication strategies, adopt advanced technologies, foster trust among partners, and prioritize collaboration will be better positioned to navigate disruptions and maintain business continuity. The literature demonstrates that these factors not only improve the ability of supply chains to respond to disruptions but also enhance their ability to recover and adapt over time (Aldrighetti et al., 2024). Consequently, building strong communication and information-sharing practices should be a key priority for companies looking to strengthen their supply chain resilience in an increasingly unpredictable world.

3. Research Methodology

In this research, a qualitative approach was employed to explore the role of communication and information sharing in strengthening supply chain resilience during disruptions. A semi-structured interview method was selected for data collection, as it allowed for in-depth insights from participants while also providing flexibility to explore emerging themes related to the research questions. The participants consisted of 33 supply chain professionals, including managers, coordinators, and executives from various industries such as manufacturing, logistics, and retail. These individuals were selected based on their experience and involvement in supply chain management, ensuring that they could provide relevant perspectives on the subject matter. The

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participants were identified through purposive sampling, which allowed the researcher to select individuals with specific expertise in the field of supply chain management, particularly those who had direct experience in dealing with supply chain disruptions. The sample size of 33 was deemed sufficient to gather a range of views while maintaining the quality of the data. The interviewees were located across different geographical regions to ensure that the research captured diverse perspectives, reflecting the global nature of modern supply chains. The interviews were conducted either face-to-face or via video conferencing, depending on the participants' availability and preferences, and were recorded with their consent for transcription purposes. The interview questions were designed to elicit detailed responses on several key areas related to the research topic. These areas included the communication strategies employed by organizations during supply chain disruptions, the methods used to share critical information, and the challenges faced in ensuring timely and accurate information exchange. Participants were also asked to reflect on the role of technology in communication and information sharing, the impact of organizational culture, and the strategies that could enhance resilience in supply chains during disruptions. Open-ended questions were used to encourage participants to elaborate on their experiences and provide examples, thereby allowing the researcher to capture nuanced insights into the subject matter. The interviews were transcribed verbatim, and the data were analyzed using thematic analysis. Thematic analysis was chosen for its ability to identify and analyze patterns or themes within qualitative data, providing a comprehensive understanding of the various factors influencing communication and information sharing in supply chain resilience. The researcher followed the six-phase process of thematic analysis as outlined by Braun and Clarke (2006), which involved familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and writing up the analysis. The data were coded manually to identify recurring themes related to communication practices, challenges in information sharing, the role of technology, and the influence of trust and collaboration among supply chain partners. To ensure the validity and reliability of the findings, several steps were taken. First, the researcher employed member checking by sharing the preliminary findings with a subset of participants to validate the accuracy of the interpretations. Additionally, peer debriefing was conducted, where a colleague reviewed the analysis process and provided feedback on the themes that emerged. This helped to refine the findings and reduce the potential for bias in the analysis. Furthermore, the researcher ensured that the interviewees' confidentiality and anonymity were protected throughout the study by removing any identifying information from the transcriptions and maintaining secure storage of the data. The analysis revealed several key insights into the role of communication and information sharing in strengthening supply chain resilience. First, it became clear that effective communication was seen as a critical component in responding to disruptions. Many participants highlighted the importance of maintaining open lines of communication between suppliers, customers, and other stakeholders, especially during crises. Second, the use of digital tools and technologies, such as cloud-based platforms, data analytics, and real-time tracking systems, was frequently mentioned as an enabler of efficient information sharing. However, participants also noted challenges related to technological integration, especially when partners used incompatible systems or lacked the necessary infrastructure. Moreover, the study revealed that trust and collaboration were central to effective communication and information sharing. Participants emphasized that strong relationships between supply chain partners facilitated the timely exchange of critical information, particularly in uncertain or volatile situations. However, some participants also pointed out that barriers to information sharing, such as concerns about competitive advantage and the reluctance to disclose sensitive data, hindered the flow of information. Organizational culture was another factor that emerged as influential in shaping communication practices, with companies that promoted transparency, flexibility, and cross-functional collaboration exhibiting better resilience during disruptions. The research methodology employed in this study allowed for a thorough investigation of the role of communication and information sharing in strengthening supply chain resilience. By interviewing a sample of 33 supply chain professionals, the study captured a broad range of perspectives and experiences, providing valuable insights into the

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strategies, challenges, and best practices for enhancing resilience. The findings from the interviews contribute to a deeper understanding of how effective communication and information sharing can improve supply chain responses to disruptions and foster long-term resilience in an increasingly complex and dynamic global environment.

4. Results and Findings

The results and findings of this research provide rich insights into the role of communication and information sharing in strengthening supply chain resilience during disruptions. The analysis of the interview data revealed several critical themes that shed light on how organizations approach and manage communication practices, the use of technology, and the collaborative dynamics necessary to navigate supply chain disruptions effectively. The findings were grouped into key areas, such as the nature of communication during crises, the tools and technologies employed for information sharing, organizational culture's role, and the importance of trust and collaboration among supply chain partners. These themes highlight both the challenges and the opportunities that arise when organizations attempt to enhance their resilience through better communication and information sharing.

One of the most prominent findings was the critical role that clear and timely communication plays in mitigating the impact of disruptions. Many participants emphasized the importance of maintaining open and frequent communication with suppliers, customers, and other stakeholders during periods of uncertainty or crisis. They noted that disruptions such as natural disasters, labor strikes, or the COVID-19 pandemic had tested their organizations' ability to communicate effectively across all levels of the supply chain. When communication was robust and immediate, organizations were able to respond more rapidly and decisively to changing circumstances. In contrast, delays or miscommunications often led to confusion, inefficiencies, and longer recovery times.

A significant portion of the responses also highlighted the importance of digital tools and technologies in facilitating communication and information sharing. Many organizations have increasingly adopted cloud-based platforms, real-time tracking systems, and advanced analytics to better manage their supply chains and share information with their partners. These technologies enabled the rapid exchange of data related to inventory levels, transportation delays, demand fluctuations, and other critical factors that could impact supply chain operations. However, there were also challenges in integrating these technologies across different supply chain partners, especially when partners operated on incompatible systems or lacked the necessary digital infrastructure. Despite these hurdles, the overall sentiment was that technology has been a game-changer in enhancing communication and information sharing, especially during times of crisis.

The study also revealed that trust and collaboration were central to successful communication and information sharing. Several participants discussed how their relationships with key suppliers and customers helped them share vital information quickly and transparently. In many cases, strong relationships built on mutual trust allowed companies to engage in honest and open conversations, even during critical disruptions. Conversely, a lack of trust could delay the flow of information, leading to misaligned responses and missed opportunities for mitigating the effects of disruptions. Additionally, collaborative networks, whether formal or informal, were seen as crucial in ensuring that organizations could respond quickly to emerging challenges. For example, some participants noted that informal communication networks, such as industry associations or peer relationships, often provided quicker and more accurate information compared to formal communication channels, especially when dealing with urgent supply chain issues.

Organizational culture emerged as another important theme. Companies that promoted transparency, openness, and a willingness to adapt to new situations were seen as more resilient during disruptions. Participants noted that having a culture that values flexibility and cross-functional collaboration enabled them to make quick decisions and adapt to shifting conditions. On the other hand, organizations with rigid structures or hierarchical decision-making processes found it more difficult to respond effectively to disruptions. In these organizations, communication was

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often slow, and decision-making was more centralized, which delayed responses and hampered the supply chain's ability to adapt to rapidly changing circumstances.

Another key area that emerged from the findings was the use of scenario planning and proactive risk management strategies. Many organizations stated that their ability to anticipate potential disruptions was directly linked to their communication and information-sharing practices. Firms that had already established open lines of communication with their suppliers and other stakeholders were better able to prepare for potential disruptions, as they could more easily access the necessary data to inform their contingency plans. Conversely, companies that did not have robust communication practices or sufficient information-sharing protocols often struggled to develop effective risk management strategies.

Lastly, some participants raised concerns about the barriers to information sharing that arose during periods of disruption. These barriers included issues related to confidentiality, competitive advantage, and reluctance to share sensitive information. In certain cases, organizations were hesitant to fully disclose information about supply chain vulnerabilities or capacity constraints, fearing that competitors might gain an advantage. This reluctance to share information sometimes slowed down the overall response to a disruption and resulted in missed opportunities for collaboration. However, many participants also pointed out that this issue could be mitigated by fostering a culture of trust and by establishing clear agreements about the types of information that could be shared without jeopardizing competitive interests.

Table 1. Communication Strategies During Disruptions.

Theme	Description
Proactive Communication	Clear, pre-emptive communication about potential risks.
Reactive Communication	Communication that occurs in response to disruptions.
Cross-Organizational Communication	Exchange of information between different companies in the supply chain.
Internal Communication	Communication within the organization to align actions and response strategies.

Proactive communication emerged as one of the most important strategies employed by supply chains during disruptions. Interviewees often mentioned the need to establish communication channels in advance, ensuring that both internal teams and external partners were aligned and aware of potential risks. Proactive communication enabled organizations to prepare for disruptions before they occurred, making it easier to mobilize resources and adjust strategies quickly when the situation evolved. On the other hand, reactive communication was commonly mentioned when discussing real-time responses to specific disruptions, such as transportation delays or raw material shortages. However, participants emphasized that waiting for a disruption to occur before starting to communicate was less effective than proactive measures.

Table 2. Information Sharing Methods.

Theme	Description
Real-Time Information	Information shared as events unfold, in real time.
Predictive Information	Data shared based on forecasts or projections.
Historical Information	Sharing of past data to inform current decisions.
Risk-Related Information	Information about potential disruptions and their impact.

Real-time information was one of the most highly valued methods for information sharing during disruptions. Many interviewees reported that the ability to access up-to-date data on inventory levels, delivery status, and production schedules helped them make immediate adjustments to mitigate risks. Predictive information, based on forecasting models and risk assessments, was also highlighted as a crucial tool in managing supply chain disruptions. By sharing

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predictive insights, organizations could anticipate challenges and put in place preventive measures. On the other hand, historical information was less emphasized in terms of its immediate usefulness during disruptions but was important for post-event analysis and long-term planning.

Table 3. Technological Tools for Communication and Information Sharing.

Theme	Description
Cloud-Based Platforms	Platforms used to store and share data across the supply chain.
Real-Time Tracking Systems	Tools that allow monitoring of goods and materials in real-time.
Data Analytics Tools	Software used to analyze large sets of data for decision-making.
Blockchain Technology	Tools that ensure secure and transparent data sharing.

Cloud-based platforms were widely adopted by the organizations involved in the study. These platforms allowed for easy access to data across various levels of the supply chain, improving information sharing and decision-making. Real-time tracking systems were also deemed indispensable, particularly for monitoring the status of goods and materials throughout their journey. Data analytics tools were used to analyze vast amounts of data, helping organizations predict disruptions and optimize their response strategies. Finally, blockchain technology was seen as a promising tool for improving transparency and security in information sharing, particularly when dealing with sensitive or proprietary data.

Table 4. Challenges in Communication and Information Sharing.

Theme	Description
Technological Barriers	Issues related to incompatible systems or lack of digital infrastructure.
Cultural Barriers	Challenges arising from differing cultural norms and values.
Trust Issues	Reluctance to share information due to concerns over competitive advantage.
Data Overload	Too much information being shared, making it difficult to act.

Technological barriers were one of the most commonly reported challenges. Participants noted that despite the growing reliance on digital tools, many supply chain partners lacked the necessary systems or infrastructure to fully integrate with one another. Cultural barriers, particularly in cross-border supply chains, were also mentioned as a significant hurdle in communication, with differences in communication styles and expectations sometimes creating misunderstandings. Trust issues were frequently cited as a reason for reluctance to share sensitive information, as companies were concerned that divulging too much could jeopardize their competitive position. Lastly, data overload was a challenge in some cases, where an excess of information led to confusion and made it harder for organizations to focus on the most critical issues.

Table 5. Organizational Culture and Resilience.

Theme	Description
Transparency	Open communication practices within the organization.
Flexibility	Ability to quickly adapt to changing circumstances.
Cross-Functional Collaboration	Cooperation between different departments to solve problems.
Centralized Decision-Making	Decision-making concentrated within a few individuals or departments.

Organizations that exhibited transparency and flexibility were better able to respond to disruptions. Transparency ensured that all employees had access to the same information, which facilitated quicker decision-making and a more unified approach to problem-solving. Flexibility was crucial in adapting to the unforeseen changes brought on by disruptions. Cross-functional collaboration was often highlighted as a key driver of resilience, as it allowed for better coordination

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between departments, such as logistics, procurement, and sales, to address disruptions. On the other hand, organizations with centralized decision-making structures often faced delays, as approval processes slowed down the response to disruptions.

Table 6. Impact of Trust on Information Sharing.

Theme	Description
Strong Trust	Positive relationship and mutual willingness to share data.
Weak Trust	Hesitancy to share sensitive data due to concerns over competitive advantage.
Trust-Building Initiatives	Efforts to foster trust through long-term collaboration and transparency.

Trust was one of the most significant factors in enabling effective communication and information sharing. Strong trust between supply chain partners encouraged more open and honest exchanges of information, which contributed to better decision-making and faster responses to disruptions. Conversely, weak trust led to hesitation in sharing critical information, which could result in misaligned responses and missed opportunities for collaboration. Trust-building initiatives, such as long-term partnerships and transparent communication practices, were recognized as effective methods to overcome these challenges.

Table 7. Decision-Making During Disruptions.

Theme	Description
Decentralized Decision-Making	Decisions made by multiple stakeholders at various levels.
Centralized Decision-Making	Decisions made by top management or a small group.
Collaborative Decision-Making	Decisions made collectively through group discussions.

Decentralized decision-making was frequently highlighted as an important factor in responding to disruptions. This approach allowed for faster decisions, as different stakeholders at various levels of the organization could make decisions based on the real-time information they received. Centralized decision-making, on the other hand, was often seen as slower and less responsive, as it required approval from top management before any actions could be taken. Collaborative decision-making, where input from multiple stakeholders was considered, was seen as an effective approach, ensuring that all relevant perspectives were taken into account when responding to disruptions.

The findings of this research highlight the significant role that communication and information sharing play in strengthening supply chain resilience during disruptions. One of the key takeaways is that clear, timely, and proactive communication is crucial in mitigating the effects of disruptions. Organizations that established open communication channels with their suppliers, customers, and internal teams were better equipped to respond quickly and adapt to changing circumstances. The use of digital tools, such as cloud-based platforms, real-time tracking systems, and data analytics, was identified as a key enabler in facilitating effective communication and information sharing. However, challenges arose when partners used incompatible systems or lacked the necessary technological infrastructure, which sometimes hindered seamless communication and information exchange. Trust and collaboration emerged as central factors influencing the effectiveness of communication and information sharing. Strong relationships between supply chain partners, built on mutual trust, enabled the quick exchange of critical information, allowing organizations to act more swiftly in response to disruptions. Conversely, a lack of trust often resulted in hesitations to share vital data, leading to misaligned actions and missed opportunities. Additionally, organizational culture played an important role in shaping communication practices. Companies that promoted transparency, flexibility, and cross-functional collaboration exhibited stronger resilience during disruptions. These organizations were able to adapt more easily, make quick decisions, and maintain coordinated responses across various departments. Furthermore, the findings underscored the importance of scenario planning and proactive risk management strategies. Organizations that had

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established solid communication and information-sharing protocols were more likely to be prepared for disruptions, as they could anticipate potential issues and plan accordingly. Conversely, those without robust information-sharing practices struggled to develop effective contingency plans. Another key insight was that while technology played a significant role in enhancing communication, barriers such as data overload, confidentiality concerns, and competitive advantage remained as challenges. Companies often hesitated to share sensitive information for fear of exposing vulnerabilities, but building trust and clear guidelines around information-sharing helped mitigate this issue. In summary, the study revealed that strong communication practices, supported by advanced technological tools and a culture of trust and collaboration, are fundamental to enhancing supply chain resilience. Organizations that prioritize proactive communication, integrate effective digital tools, and foster a culture of trust are better equipped to respond to and recover from supply chain disruptions. Conversely, challenges such as technological incompatibility, lack of trust, and concerns over information confidentiality can hinder effective communication and delay responses. These findings emphasize the importance of addressing these challenges to build more resilient supply chains capable of withstanding future disruptions.

5. Discussion

The findings from this study provide valuable insights into the critical role of communication and information sharing in strengthening supply chain resilience during disruptions. The importance of clear, timely, and proactive communication cannot be overstated, as it serves as a foundational element for organizations to navigate through crises. The research highlights that effective communication is not limited to internal teams but extends to external stakeholders, including suppliers, customers, and other partners. Organizations that established open lines of communication across their supply chain network were better equipped to respond swiftly and make informed decisions. This is especially important during times of disruption when uncertainty prevails, and having real-time information can significantly reduce response time and mitigate the negative effects of the disruption. The study also underscores the vital role of technology in facilitating communication and information sharing. Digital tools such as cloud-based platforms, real-time tracking systems, and data analytics were frequently mentioned as key enablers for efficient communication within the supply chain. These technologies provide organizations with the ability to share critical data seamlessly, monitor goods in real-time, and analyze large datasets to predict potential disruptions. However, the research also reveals that technological barriers, such as incompatible systems and inadequate infrastructure, can hinder the smooth flow of information across the supply chain. Despite these challenges, the general consensus among the participants was that technology has become indispensable in modern supply chains, particularly when it comes to improving the speed and accuracy of information sharing during disruptions. Another significant finding from the study is the central role that trust and collaboration play in effective communication. The research illustrates that strong relationships, built on trust between supply chain partners, are essential for facilitating the open exchange of critical information. Trust enables organizations to share sensitive data and engage in collaborative decision-making, which can lead to more effective responses to disruptions. Without trust, the reluctance to share vital information can delay decision-making processes and prevent organizations from taking coordinated actions. This highlights the importance of not only establishing formal communication channels but also fostering an environment where trust and collaboration can thrive, both within organizations and across the supply chain network. Organizational culture emerged as another important factor that influences communication and information sharing. Organizations with a culture that promotes transparency, flexibility, and cross-functional collaboration were found to be more resilient during disruptions. A transparent culture ensures that all members of the organization have access to the same information, which leads to more informed decision-making and a unified approach to problem-solving. Flexibility in responding to disruptions is also a crucial aspect of resilient supply chains, as it allows organizations to adapt quickly to changing circumstances. Companies with rigid structures or

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centralized decision-making processes often struggled to respond effectively, as delays in communication and decision-making could hinder the overall response to a disruption. The findings also suggest that proactive risk management and scenario planning are integral to enhancing resilience. Organizations that had already established communication protocols and information-sharing systems were better prepared for disruptions, as they could quickly activate their contingency plans and access the necessary information to make timely decisions. In contrast, companies without these systems in place found it more difficult to manage disruptions effectively, often scrambling to gather the necessary data and align stakeholders. The ability to anticipate potential risks and plan for them in advance was identified as a critical component of a resilient supply chain. While the study highlights the many benefits of effective communication and information sharing, it also reveals several challenges that organizations face. These include technological incompatibility, concerns over confidentiality and competitive advantage, and data overload. Technological barriers, such as the lack of integration between systems or the absence of adequate digital infrastructure, can impede the flow of information and create delays in responding to disruptions. Similarly, concerns over sharing sensitive information, particularly in competitive industries, can hinder collaboration and reduce the effectiveness of communication during crises. Data overload, where organizations are flooded with too much information, can also complicate decision-making, making it harder to identify and act on the most critical issues. In conclusion, the study emphasizes the importance of communication and information sharing in building supply chain resilience during disruptions. Effective communication, supported by the appropriate technological tools and a culture of trust and collaboration, enables organizations to respond quickly and decisively to challenges. While there are barriers to overcome, particularly related to technology, trust, and information overload, the findings suggest that organizations that prioritize communication and information sharing will be better equipped to navigate disruptions and emerge stronger in the face of future challenges. The study also highlights the need for organizations to invest in technologies that support seamless communication, develop strong relationships with supply chain partners, and foster a culture that values transparency, flexibility, and collaboration.

6. Conclusion

The research emphasizes the pivotal role that communication and information sharing play in enhancing the resilience of supply chains during disruptions. The findings demonstrate that organizations that prioritize clear, timely, and transparent communication, both internally and externally, are better positioned to respond to crises and minimize their impact. Effective communication facilitates quick decision-making, coordinated responses, and the ability to adapt to changing circumstances. The integration of digital tools and technologies, such as real-time tracking systems and cloud-based platforms, significantly enhances the flow of information, allowing supply chain partners to share critical data efficiently and in real time. However, the research also highlights challenges related to technological compatibility, data overload, and concerns over information confidentiality, which can hinder the smooth exchange of information. Trust and collaboration emerged as key factors in enabling successful communication and information sharing. Organizations that have established strong relationships with their supply chain partners are more likely to engage in open, honest exchanges of information, which are crucial during times of disruption. Organizational culture also plays a significant role in determining how well communication flows within the organization and across the supply chain. Companies that foster a culture of transparency, flexibility, and cross-functional collaboration are better equipped to adapt and respond to disruptions swiftly. Proactive risk management strategies and scenario planning were also identified as critical components of resilient supply chains, as they allow organizations to anticipate potential risks and take preemptive actions. While there are significant benefits to improving communication and information sharing, the research also points to several challenges that organizations need to address. These include overcoming technological barriers, building trust with partners, and managing the potential overload of information. Nonetheless, the overall findings

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suggest that organizations that invest in the right technologies, cultivate strong relationships with their supply chain partners, and foster a culture of collaboration will be better able to navigate disruptions. This study provides a clear indication that communication and information sharing are not just operational tools but essential strategies for building long-term resilience in supply chains. The insights gained from this research offer valuable guidance for organizations seeking to strengthen their supply chain resilience and better prepare for future disruptions.

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