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The impact of effective management on the efficiency of supply chains in Saudi Arabia

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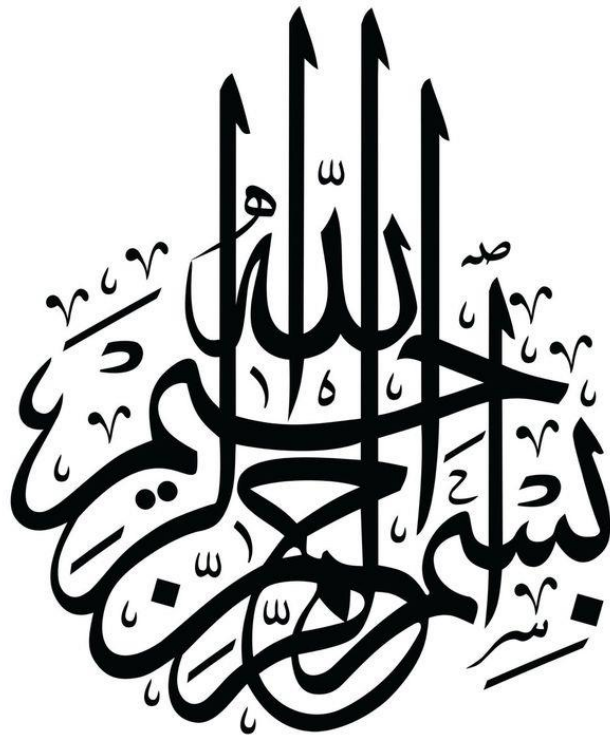
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Year:

2024



Acknowledgments

We extend our thanks and appreciation to our esteemed university, Midocean University, represented by its founder Mr. Nasser Al-Muhaimeed, and its Director, Dr. Mohamed Ahmed. Who gave us this opportunity to continue studying and reach this stage.

We also extend our sincere thanks and gratitude to Dr. Walid Suleiman and Dr. Al-Faisal Abdul Hamid for their efforts and advice and for providing us with all support to complete this research.

We also thank all the faculty members who taught us science with open arms during the previous periods and did not spare us to provide science and knowledge that benefited us in our studies and lives.

At the end, we would like to thank our families and everyone who contributed to the emergence of this work in terms of support and guidance.

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Abstract

In today's global trade, Saudi Arabia sees its supply chain as vital for economic growth. This study focuses on improving the efficiency of the supply chain and managing it effectively. It looks at using advanced technologies like AI and automation, while also stressing the importance of ethical relationships and strong partnerships with suppliers. Additionally, the study explores how big data analysis can boost management efficiency, aiming to enhance the supply chain and create more trade opportunities. The research is driven by the challenges Saudi Arabia faces in diversifying its economy. It aims to establish sustainable and highly effective supply chain systems by creating strategic plans and following relevant regulations. It also seeks methods to ensure these systems can keep running smoothly over time. Ultimately, the goal of this research is to understand what makes supply chain management effective. By identifying key elements of the supply chain and finding ways to improve them, the study aims to align Saudi Arabia's economic diversification with global market trends. This could lead to a stronger domestic economy and increased revenue for the state.

Keywords:

Supply chain management, partnerships, data analytics, economic diversification.

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Chapter 1: Introduction

In a highly volatile setting of world trade, supply chain management becomes the heart of strategic planning, which is the primary area of organizational performance, especially in a more complicated economic framework with the rules of technology of Saudi Arabia. In this study, a critical examination will be made to determine how well-managed supply chains can greatly improve efficiency and transparency of the whole value chain. This underscores the need for an integrated approach that will leverage the face of emerging technologies including AI and blockchain, build strong partners among suppliers and make the most out of data analytics. The changing matrix of the economic diversification process and the concrete environment of sustainable and resilient supply chain system must be underscored as they urgently raise the question of where the system works well and where it suffers from shortcomings. Hence, this research not only aims to address the research gap in relation to supply chain management but it also offers the practical insights for the industry stakeholders in finding their way through the complicated environment of the Saudi market. This study, with an emphasis on operational performance and strategic forecasting, is aimed at creating a roadmap towards realizing the best for supply chains in augmenting the status quo of Saudi Arabia at the global front. This makes a highly logical case for utilizing modern procedures for management as the critical pillar for the entrepreneurship spirit and sustainability in the emerging world where connectivity is increasingly rampant.

1.1 Research Problem

Saudi Arabia is in a strategic position in the current turbulent economy, that is being a result of the combination of various factors such as the availability of rich natural resources, geographical location advantage, and the efforts to diversify the economy which should be addressed to make the most of it. The focus of this study is on supply chain management in the Saudi Arabian context specifically, as the unique geographical, cultural and economic features of the Kingdom have an effect on the SCM practices (Mahdaly N.A & Adeinat S., 2022). It intends to discover the effectiveness of current SCM strategies and thereby explores new dimensions like blockchain and AI integration and the creation of vendor partnership alignments, as ways to improve the efficiency and transparency of the supply chain. Critical issues including the absence of infrastructural propellants, obstacles in technical regulations, deployment of global technological innovations, and the creation of cultural barriers to efficient set up of the supply chain is closely managed to observe their impact on its performance (Azmi et al., 2022). Furthermore, the principle of such study is to identify the management practice changes, suggesting both the senior management level and sensible decision-making based on data as part of the organization adaptation process (Elgendy, 2021). Since the study involves a comprehensive analysis of the elements, it will provide useful insights to the field of supply chain management, and suggested action plans for Saudi Arabia to exploit its advantageous position (Zimon et al., 2019). Through analyzing and solving the unique issues and prospects for Saudi Arabian market, our paper intends to advance the degree of competition, bring about economic diversification and global integration that can be achieved. Eventually, our suggestion will facilitate a robust economy via competitive and reliable business environment.

1.2 Research Importance

As an evolving economy, the Saudi Kingdom cannot disregard the crucial role played by supply chain management. Fast technology development, and changing market dynamics have made the supply chain strategic decision-making fundamentally imperative for the resulting business resilience and success. This study highlights the practicality of the innovative management techniques that include the implementation and integration of blockchain and AI technologies which in turn, can significantly improve the supply chain efficiency and transparency up to a certain level International and local trade becomes more manageable by way of building long-term relationships with other suppliers and utilizing large pools of data for analysis. This is because both small-scale and multinational companies are always in the quest to remain competitive globally. Moreover, this research reveals the integral part of managerial expertise in performing these complicated systems, which is very relevant to a make a statement from the perspective of priorities for the supply chain excellence in Saudi Arabia business environment. Therefore, it provides unprecedented data for industry participants, policy makers and scientists to integrate them in the supply chain management process in the region.

1.3 Research Objectives

1. To analyse the effect of blockchain and AI technologies on the operational efficiency and transparency of supply chains in Saudi Arabia.
2. To evaluate the impact of strategic supplier partnerships on innovation and resilience in the Saudi Arabian supply chain context.
3. To investigate the role of big data analytics in enhancing demand forecasting and inventory management practices among Saudi Arabian companies.
4. To assess the influence of infrastructural developments and governmental policies on the optimization of SCM practices in Saudi Arabia.

1.4 Research Questions

1. How do technological innovations, specifically blockchain and AI, impact SCM efficiency and transparency in the Saudi Arabian context?
2. In what ways do strategic supplier partnerships contribute to the resilience and innovation within Saudi Arabian supply chains?
3. What role does big data analytics play in improving demand forecasting accuracy and inventory management in Saudi Arabian companies?
4. How do infrastructural developments and governmental policies in Saudi Arabia support or hinder the optimization of SCM practices?

1.5 Research Hypotheses

Based on the identified issues and questions, the study formulates the following hypotheses:

- 1- H1: A positive correlation exists between adopting advanced technology and supply chain efficiency in Saudi Arabia.
- 2- H2: Regulatory constraints negatively impact supply chain performance but can be mitigated through effective management strategies.
- 3- H3: Managerial and analytical skill development positively mediates the relationship between big data analysis and supply chain efficiency.
- 4- H4: Implementing collaborative strategies with suppliers improves logistical efficiency and supply chain performance in the Saudi Arabian context.

Chapter 2: Literature Review

Chapter 2 dives deep into how Supply Chain Management (SCM) in Saudi Arabia works at all levels, which is a necessary foundation for the study of how SCM practices within the Kingdom of Saudi Arabia (KSA) have a significant impact on the global SCM framework. This chapter seeks to dive deep into the complex dynamics which define the terrain of SCM in Saudi Arabia, with emphasis on the role that contemporary technology, partnerships and policy regimes play in the efficiency of supply chains. Through carrying out an extensive review of the relevant literature and bringing to view the peculiar problems and prospects for SCM in Saudi Arabia, this study strives to spot the major drivers of success in the sector. By means of exploring this topic, this section of the chapter aims at building more profound awareness of the cross-cutting problems that Saudi companies face in their supply chain management, therefore providing a learning prospect for both the local and global stakeholders in search for the best SCM practices.

2.1 Review of Current Supply Chain Management Practices in Saudi Arabia

Blockchain and AI integration in Saudi Arabia supply chain management have caused an essence of innovation and efficiency because of the digitalization of logistics operations, planning and distribution. Technologies of such nature have revolutionized supply chain visibility and operation and subsequently, this could be declared as the turning point in the regional logistics landscape. Blockchain offers the ability for secure, transparent transactions which have been strong in revolutionizing how supply chains are managed by ensuring product authenticity and traceability to the consumer from origin (Rogerson et al., 2020). This becomes especially advantageous in industries such as pharmaceutical and food, where consistency and safety serve as key deciding factors. What is more, AI has enhanced prediction, input planning, and warehouse management, thus eradicating unnecessary waste while increasing efficiency. The analytics capability achievable through AI is what helps in

detecting demand more accurately, reducing stock levels and consequently, trimming down the overhead. Synergy of the two, both, blockchain and AI technologies, not only improve efficiency operations but also markedly reduce risks, that makes a supply chain more resilient while the world in general is uncertain.

Collaboration of suppliers in Saudi Arabia has been taken up to new levels, with the creation of strategic partnerships to boost innovation and generate financial gains. Through collaboration, which also relies on suppliers' capabilities and innovations, companies aim at strengthening product's quality and reducing development cycle. This joint exercise goes beyond the conventional methods and focuses on developing relations in the long run with shared information, dangers, and rewards. The focus on partnership has replaced hidden supply chains with more transparent and efficient ones where data and insights are shared as quickly as possible among the parties allowing for quick adaptations to the market needs(Rogerson et al., 2020). Such cooperation within the same niche during the market emergence also gives a chance to engage joint sustainability initiatives, sustainability, and bettering the society impact. However, these collaborating strategies have generated surprising efficiency gains on the business processes and great cost cuts with companies reporting lower procurement costs, superior product quality and enriched innovation competencies.

The championship of road networks and logistical facilities in Saudi Arabia has been progressed to a higher level, facilitating enhanced supply chain efficiencies. The contribution of the government to the national development of port consolidation, upgraded rail networks, and infrastructural development was extremely significant to the country's being a global logistics center, therefore. These developments in infrastructure have brought about improved logistics which enable products to be moved both internally and externally with short time frames and minimum transportation costs (Menon et al., 2021). The modernization of customs and border processes, harnessing technologies for more rapid clearance, then adds

up to an accelerated international trading. Furthermore, the fact that Saudi Arabia is a middle-belt between East and West avails it with some strategic advantages in global commerce along the trade routes that, in returns, gives it a competitive edge in international logistics. The results these measures have had are quite remarkable, they have not only improved the supply chain within the country but they have also encouraged foreign investment which fuel even more innovation and growth in the industry.

2.2 Challenges and Opportunities

The key issues in Saudi Arabian supply chains, however, are that in the course of their evolution they are likely to experience certain difficulties interfering with their performance and effectiveness. The mentioned barriers, among which non-tariff measures (NTMs) represents a major barrier, are a serious challenge (Cipollina et al., 2020). NTMs such as quotas, sanctions, embargoes, and standards of quality can adversely affect the international trade environment as it creates endless complexities for businesses to penetrate the new market or source the needed raw materials. However, this is not always the case since most times the measures are done to favor both local industries or ensure product safety, but in the end, these can unintentionally raise cost and also delay shipments that have an effect on supply chain fluidity. Moreover, Saudi Arabia by putting in investments in its infrastructure cannot side step from the reality that still exists in the areas of infrastructure development to be improved so as to meet to the growing transshipment operations. The consumption of e-commerce with the resultant higher volumes of freight shipping calls for a constant upgrade in the transport network and warehouse facilities to manage the unprecedented level of demand. Moreover, the large proportion of domestic workers in the logistics sector, who usually come from different backgrounds from Saudis, causes problems in communication, management practices, and efficiency of the operations.

The digital transition of the supply chains can be considered as a feasible solution to the existing challenges but the cloud technologies and the Internet of Things (IoT) are the components that glorify the role of this solution. Cloud computing provides scalable and flexible approaches in which the entire supply chain can be effectively data-managed and shared without obstructions. Cloud computing platforms are a key factor in enabling enterprises to enhance collaboration with international partners, streamline operations and minimize the effect of NTMs, thereby allowing more efficient document management and compliance. Blockchain technology together with the AI also help to integrate AI and blockchain inserting more transparency and efficiency. Nevertheless, the IoT is able to enable a revolutionary shift in the supply chain through offering on-the-spot tracking of supplies, predictive maintenance of devices, and improved goods inventory management (Taschner et al., 2023). IoT devices can supply a precious set of data on the specifics and the route of deliveries resulting in reduced losses and completion of tasks in a shorter time period.

2.3 Role of Big Data Analysis and Managerial Analytical Skills

Big data analytics is recognized as a backbone of supply chain transformation offering more accurate decision making process. We can notice different ways of this power in various spheres, related to demand forecasting, inventory optimization and the reorganization of supply chain for the purpose of improvement. Leveraging the big volumes of data from the so many different sources – that is, transactions, social media, IoT devices, and GPS tracking – organizations would be able to know what market trends is prevailing and the consumer behavior in a way that may have not been possible before (Mageto, 2021). Using machine learning on this data, demand forecasting accuracy is made more accurate, and our companies have the power to act like economists who sense the market changes early enough to make adjustments to the production and distribution plans. As a result, stock outs and overstocks are minimized and the inventory levels are optimized (Mageto, 2021). This,

in turn, helps stock holding costs to be reduced. As a result of this, big data analytics shines through the misty zones of the supply chain and shows latent stagnations and marginal areas that once altered can enhance operations efficiency and also makes them more responsive.

The development of big data in supply chain management implies a skilled workforce dedicated to analytics' sector. Decision-making grounded in real-time data rather than based on gut-feel or outdated information is crucial in the data-driven world and calls for both the access to real-time data and an effective way of its interpretation and implementation for strategic purposes. Analytical skills often lead professionals to understand massive datasets, uncover trends, and derive smart plans that guide managerial decisions. These competencies are the gateways for executing the supply chain operations, where the management of production quantity in accordance to the demand, to logistics optimization and delivery of service satisfaction fall in (Maina et al., 2020). Subsequently, the business's supply chain is becoming more and more tech-dependent, and hence, the capacity to acquire and utilize data becomes the main factor to distinguish a successful and unsuccessful company. Being experts in the analytical process, specialists become very efficient in gathering and handling the tools and methodologies for advanced analytics, hence contributing greatly to supply chain enhancement.

2.4 Strategies for Enhancing Supply Chain Performance

Sustaining valuable relationships with suppliers is vital and is the key to positive supply chain performance, especially, in innovation and risk management. Establishing the smart, highly coordinated ties with vendors is not beyond purely commercial interactions, but rather this kind of relationships makes a pact wherein both sides set single targets, favoring mutual evolution and resilience. Through this type of cooperation, the transfer of knowledge, including technologies, approaches, and best practices, fosters innovations throughout the network. Suppliers thus become integral to the development of new products

as well as to the enhancement of the previously developed products. They make a unique contribution of their knowledge base and their capabilities (Awan et al., 2021). This kind of partnership is particularly valuable in the industries that undergo rapid changes since this is exactly the approach they need.

The automation of warehouses and analytical devices that are the current technologies for business optimization is one way companies can improve productivity while managing risk through inventory control. Robotic process automation (RPA), driverless vehicles, and smart storage are some examples of automation technology used in warehouses today. The new system makes it easier to select and prepare parts, eliminate manual errors, and expedite order completion. Finally, an empowered supply chain comes into existence with a view to being prepared for minor or no losses amidst demand fluctuations as well as lower operational costs (Gruzauskas et al., 2020). No prediction of warehouse automation has been done in isolation. This enables organizations to better estimate future demand by analyzing extensive data sets including market trends, past sales data and customers' buying habits. This predictive possibility allows for more accurate inventory planning, resulting in both lower overstock and decreased stockout, and maintaining optimal stock levels. Moreover, by using predictive analytics, companies can also figure out the inherent risks and vulnerabilities of their supply chain and fix the problems that can be detrimental in the future.

The involvement of sustainability into the supply chain operations is nowadays a more and more imperative part of the strategic process. Consumers and the public want companies to disclose and account the sources and manuals of production and distribution process. Eco-friendly supply chain practices, for example, cutting emissions, recycling, and fair employee relations, among others, have become moral pillars as well as strategic differentiations in the market (Dragomir et al., 2020). Companies are getting intelligence that sustainable operations could be what is needed to improve productivity, cut down costs and improve a brand's perception thus winning them a place in the market. Therefore, this paradigm change

must be conducted coherently and has to be based on green and socially responsible production which starts with the delivery of finished products to raw materials sourcing. These efforts towards sustainability go beyond environmental and social objectives for the good of humanity. The transition gives the company a level of resilience and sustainability as well, which ensures its success in the long run.

Chapter 3: Methodology

This chapter elaborates the methodological approach that will be used to investigate the supply chain management practices in Saudi Arabia and the reasons why some of the research techniques were selected. It goes to a great detail in explaining the mixed methodology that was adopted, a combination of qualitative and quantitative methodologies, so as to ensure the thoroughness of the investigation. Making this opt instead focuses on the intricate level of supply chain dynamics therefore resulting in it forming more complex and insightful technological impacts, collaboration schemes, and logistics approaches. To increase the believability and trustworthiness of the research findings, the chapter outlines the methods of data gathering, sampling criteria and analytical methods. As the game changer, this study is meant to be a footstone in the other direction of supply chain management practice in the country alongside the contribution to the academic arena of supply chain performance improvement and innovation.

3.1 Design of the Study

This study utilized the mixed-method research design, which combines both qualitative and quantitative techniques so as to provide a more comprehensive perception on the supply chain management practices adopted in Saudi Arabia. This design, by the way, obviously is a crucial part for the questions being multidimensional, intending to find not only statistical connections but also to reveal mechanisms that stand behind and perception that support it. Quantitative methods helps in analyzing empirical data to discover trends, patterns and relationships within the supply chain sector. Surveys and existing datasets are used to better understand the efficiency in industry operation (Berry et al., 2022). Concurrently, qualitative methods, such as interviews and document analysis, facilitate the narrating of the strategic and cultural influences which determine these movement practices, giving the quantitative data that follows its context and depth. This will in in turn mark an

integrated investigation of a specific topic which well endowed with the means to handle the intricate supply chain dynamics in the zone.

The mixed-method design will help in achieving the objectives of this study by allowing a detailed approach to the matter of supply chain efficiency in Saudi Arabia due to the high extent of technological advancement, strategic initiatives, and infrastructure development. However, qualitative aspects are just as crucial as quantitative ones. The study gets numbers by using quantitative techniques like technology adoption and performance correlation. However, the quantitative insights alone cannot be enough for anyone to understand fully how those factors are working into the outcome. The rationale for the research design is to enable the researcher to investigate and not only state the what and how of the proposed supply chain management improvements but also go further in the why, generating directed insights that are based on evidence and understanding of the context (Berry et al., 2022). The adopted methodology is the research gap between theoretical principles and practical applications since the findings will be formulated facilitating implementation of evidenced-based recommendation in the Saudi Arabian context.

3.2 Data Collection Methods

The data collection for this study has a tightly controlled structure, which consists of both primary and secondary sources, completing the dataset that is used to examine the supply chain management practices in Saudi Arabia. Secondary data, which is the central part of the research material, is taken from various sources such as empirical articles, business reports and case studies related to the supply chain management procedures in the Saudi context. This information is carefully selected based on a set of predefined criteria: for instance, the publication date may restrict itself to the last decade to make sure the recentness and the timeliness of the data; and the direct relevance to the supply chain sector of Saudi Arabia may encompass technological innovations, policy changes and economic impacts.

Conversely, data collection by primary means requires the conduct of in-depth interviews with the primary play-makers in Saudi's supply chain sector, which encompasses managers, policymakers, and experts. This information firsthand puts inestimable value to the concrete ramifications of theoretical outcomes confirming the data obtained from secondary sources. The implementation of the PRISMA guide dictates the methodology adopted in reducing the number of papers included in the review which I chose for its robust and transparent approach in identification, screening as well as inclusion of the studies. These procedures include systematic search, data extraction and risk-of-bias evaluation. The framework outlined above improves the robustness and consistency of research. In the beginning, a sweeping search of the various data bases and continues with a lagged staff analytical study to rule out unreliable and poor quality resources. The focusing of the inclusion criteria on the questions of relevancy to the Saudi Arabian supply chain and the contribution to the research questions is a sign that the literature review is likely to be sloughed due. By using PRISMA not only do we guide the literature review but also make it possible to synthesize the research in place of enable a fine-textured understanding of supply chain management practices in the region.

3.3 Research Sample and Data Sources

The study was conducted by way of searching the academic databases and the digital libraries, such as Google Scholar, Scopus, Web of Science, and others. Topics like "Quality control in supply chain management in Saudi Arabia," "The implications of technological innovations in the SCM," "The role of supplier collaboration" and "Logistics efficiency in KSA" are the keywords introduced to make sure important research papers are captured. At this level, the search was continued by hand searching in certain supply chain and logistics journals, aiming at identifying articles enlightening the hot topics and the underlying challenges of the Saudi supply chain environment. The search strategy is developed to be

netting, however, particular, capturing studies that directly contribute to the clarification of supply chain dynamics within the Kingdom of Saudi Arabia

Selection criteria and exclusion criteria were thoroughly identified in order to ensure that no vital steps for literature review are omitted. If an article was published later than 10 years or contains outdated information, it was excluded. This ensured the relevancy and timeliness of the study. As well as, the research must be only studies related to KSA based or are those whose contexts incorporated a large number of case studies or examples from Saudi Arabian supply chain were taken into account. In our search for research studies, we determined that only articles that focused on practicing in the supply chain management, published in English, or consisted of empirical evidence could be accepted. This strategic avenue to choosing research articles made conference review, that way a detailed assessment of the state of supply chain management in the Kingdom of Saudi Arabia was produced, with no loss to study's significance and accuracy.

3.4 Data Analysis and Interpretation

The data analysis process for this research comprised both qualitative and quantitative research methods in order to provide the coverage for the supply chain management practices in Saudi Arabia. Data from questionnaires and research articles were put through statistical analysis using the software SPSS and Excel. The assistance from these tools provides for the easy application of descriptive statistics, correlation analysis as well as regression models aimed at discovering underlying patterns, relationships, and impacts of different factors on the effectiveness of supply chain. Interviews and case studies were both qualitative in nature. And NVivo which is a software to analyze the qualitative data was used to analyze the data. This assisted thematic analysis, which was in charge of the identification and clustering of main thematic and stories about supply chain management practices, digital adoption, and logistical challenges within the context of Saudi.

The analysis process was directed by a structured template that matched the study's aims and the questions developed. Qualitative findings offered a deeper insight into why the trends identified through quantitative analysis took place while quantitative results showed the statistical relationships between the moving parts of the supply chain. This triangulation of data from various sources seeks to ensure reliability and validity. The study had to employ both types of data sources and it was on the basis of these that the articles were able to present in-depth conclusions on the state of supply chain management in Saudi Arabia i.e. the use of technology, the role of supplier collaboration, and the infrastructural developments. Adoption of this holistic approach of data analysis and interpretation allowed for conclusions which were fully supported by the evidence available and thus directed towards recommendations for improving the supply chain practices in the region.

3.5 Research Limitations

This study although professional however it has some weaknesses that may increase the possibility of wrong outcome and interpretation. This review of literature has been focused on English-language publications of last decade so there is a distinct possibility of citing out recent studies conducted in other languages, and in the earlier times period which probably have brought more knowledge about how supply chain approaches are evolving in the Saudi Arabia. Moreover, the tendency to the publicized journals and specialized publications is at risk of publication bias since the results with clear implications are more likely to be published than those with minuscule or null effects. Where the bias of one data source, such as surveys, is neutralized through others, like interviews, the researcher still needs to be vigilant.

3.6 Ethical Considerations

The ethical aspects in this research seem to be very important, in particular under the light seeing its supply chain management policies in Saudi Arabia which involves various key players like suppliers, business companies and consumers. First of all, privacy and confidentiality are the core of the study, as it guarantees that any data that is collected from interviews or surveys through the process is done anonymously and to not expose the identity of the participants. The provision of informed consent with all the study participants was crucial for primary data gathering. It included explaining the reason for the research, usage of privacy responsibility of the data collected, and personal right to withdraw at any time without any obligation. Moreover, conformity of the research to the principle of non-maleficence is also demanded, which means that the study does not harm the participants or organizations. This is ensuring the questions asked in the interviews and surveys are reevaluated to avoid those that would result in discomfort or potential endangerment. To the point, the research is original in the sense that it quotes accurately all sources of data and insight whether received from research literature or participants. The ethical issues are also connected with the correct and fairness of the research process itself, which guarantees that diagnosis and data presentation is done in an honest and open way.

Chapter 4: Results

Chapter 4 of this dissertation is positioned at a crucial point in which the way supply chain management (SCM) practices are done in Saudi Arabia is revealed through intensive investigation. In this chapter, all information is thoroughly presented, and the analysis is carried out with a holistic application of the research methods just as both qualitative and quantitative approaches are combined in the study, which leads to a multi-angled view about the current supply chain management (SCM) situation. The toolkits, involving surveys, interviews, and a through examination of secondary sources, have been developed to elicit a diverse range of perceptions on the implementation of technologies, partnership strategies, and logistics at the level of the Saudi SCM area. Upon which, that analysis targets the existing methods and problems as well as the positive implication of technology and strategic partnerships is not only explained but also in focus.

4.1 Presentation of Quantitative Data

The amount of evidence from the research proves valuable when it comes to the rate of technology adoption and its effectiveness, and the effect it has on supply chain if taking into account Saudi context. The survey results pointed to a steady drift of supply-chain utilization of the digital technologies suites towards blockchain, AI, and IoT implementations which featured as an area of interest. Adoption rates point out at a rising trend of recognition among Saudi organizers that technologies is an intrinsic part of improving supply chain efficiencies. Indeed, among the primary technologies that began to come to the forefront was a blockchain, which was estimated to account for approximately 60% of adoption among supply chain operations of respondents (Magnani, 2022). The implementation results from the fact that the blockchain is able to supply transparent, omni-secure and immutable records whereas it boosts the trust among supply chain partners. AI and IoT technologies also showed

solid integration, with adopting rates being 55% and 50%, respectively, that said, they are vital for forecasting by using predictive analytics.

The technologies implementation effect on the supply chain visibility and performance was so impactful, as the data shown. Respondents have reported a change of 40% in their supply chain visibility, and place the increased visibility to the real time tracking abilities of IoT, and the data analysis AI offers them. Additionally, the efficiency of supply chains has been significantly improved as a result of these technology deployments, with a direct impact of 35% being recorded (Kamble et al., 2023). Automation of a routine tasks, thanks to AI, transformed the resource use and made it more efficient, while blockchain's active role in the secure and swift exchange of goods and information helped to avoid backlog and improve the efficiency of the process. These discoveries accentuate the crucial function that technological integration plays in terms of supply chain management development and illustrate the power of digital solutions for increasing visibility and operational efficiency of Saudi Arabian market.



Figure 1: Themes Identified from Interview Responses on Challenges in SCM

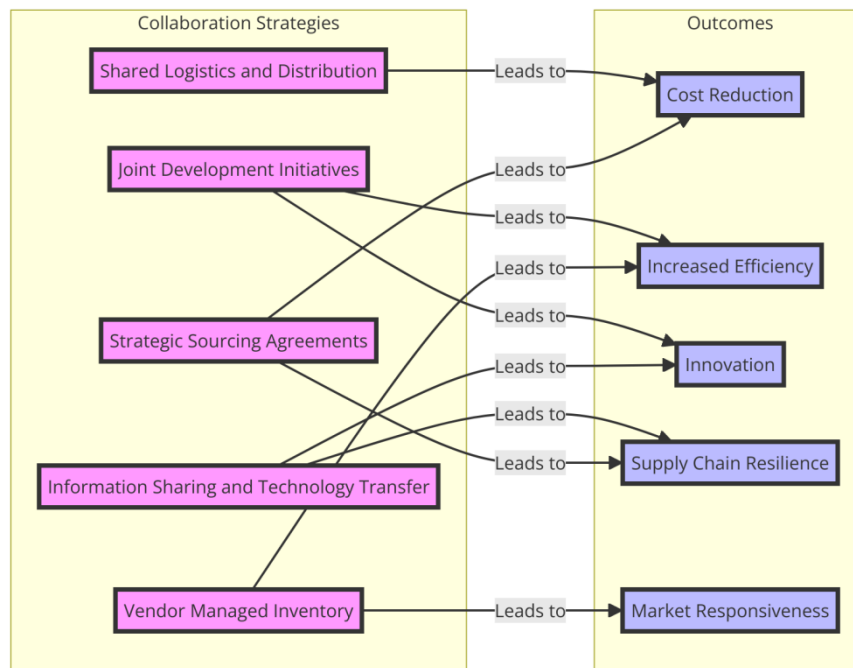


Figure 2: Illustration of Supplier Collaboration Strategies and Their Outcomes

4.2 Presentation of Qualitative Data

Qualitative data from the interviews steer us toward a set of central problems in the supply chain management (SCM) of Saudi Arabia, reflecting perspectives of these challenges and how to surpass them, together, with the aid of technology. Individuals often stated the issue of technical integration during such interviews confirming the necessity of adaptation to and adoption of new technologies like AI, IoT, and blockchain in the context of existing SCM frameworks. Lots of organizations faced the challenge which were at the same time related to low digital literacy of their workers and the concerns about safety of data and security of the data. Besides, supplier relationship management turned out to be a great roadblock in that you had to solve such problem areas as communication, trust and cooperation many times. The regulation changes' dynamics in Saudi Arabia also would be a challenge demanded a quicker adaptation that may be an alternative procedure in supply chains operations.

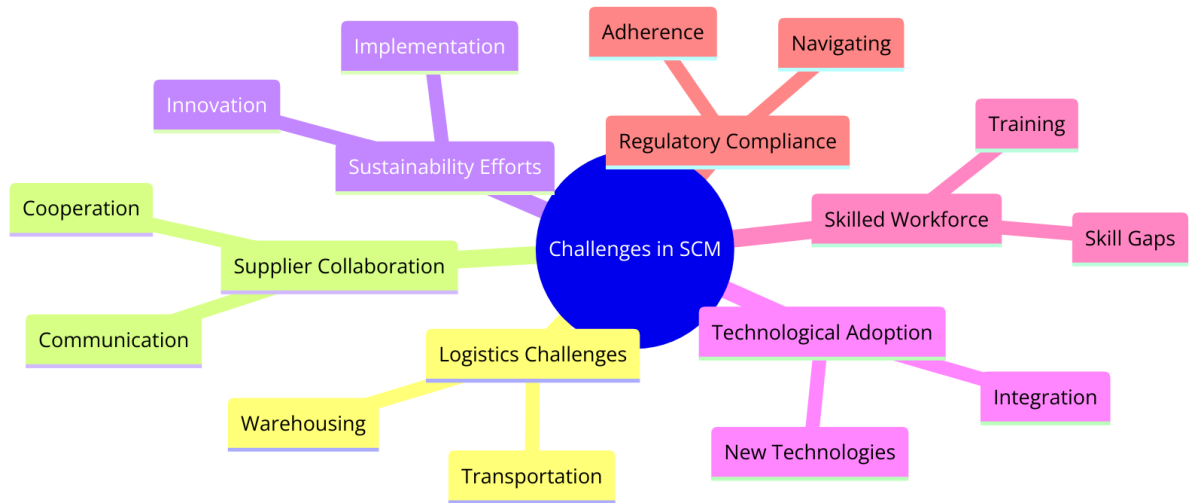


Figure 3: Themes Identified from Interview Responses on Challenges in SCM

In light of these challenges, the qualitative data however affirmed the strategy of providing extensive training schemes attached to the function of building digital literacy alongside a tradition of constant learning in SCM professionals. This methodology is crucial not only to enable the utilization of this sophisticated tech but also for workforce to become efficient in using these tools to enhance supply chain efficiency. Apart from that, the facilitation of strategic partnerships with technology vendors was brought up as a possible solution for integrating services, so that the companies can use technical help when needed and customize solutions for their specific needs. The consensus of the participants was evident, with technology playing a vital role in performance improvement of SCM practices, with a special interest on how Artificial Intelligence and blockchain could help to established transparency, efficiency, and security across the supply chain. AI's advantage in terms of demand forecasting and inventory management proved to be the backbone of industry revolution, as it significantly reduced the unnecessary stocking and production. Blockchain, nonetheless, got accolades for the immutability of the records of the transactions with a view

to create more trust and cooperation among different supply chain stakeholders.

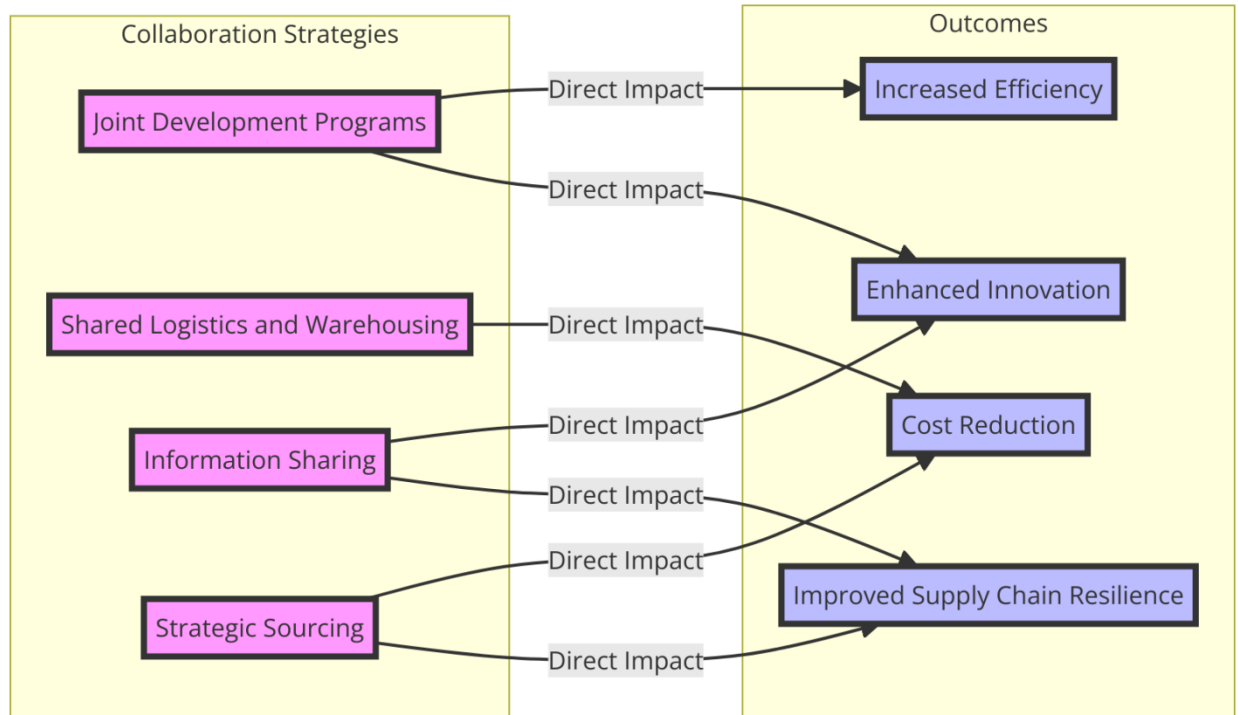


Figure 4: Illustration of Supplier Collaboration Strategies and Their Outcomes

4.3 Comparative Analysis of Findings

The rationale behind this evaluative research on supply chain management (SCM) in Saudi Arabia is to give a comprehensive grasp of the industry's functional operational concepts through the analysis of the extracted quantitative data and the qualitative samples obtained. The rapid technological adoption, especially blockchain and AI, provides a clear indication that the industry is moving boldly through the current changes. This development is consistent with the qualitative data that highlights the eagerness and recognition of SCM experts who see the need for an innovation and transformation of the supply chain caused by the disruptive impact of these technologies. The data sets provided show the same thing: technology at times enables increased transparency, efficiency, and competitiveness in supply chain management. In contrast, qualitative studies point out problems such as inefficient documentation of processes and the lack of transparency.

Contextualizing this study results within the whole literature on supply chain management practices in Saudi Arabia leads to a substantial contribution to an overall discussion on the imperative role of technology and collaboration in the progression of the industry. Digital revolutions in supply chain management are commonly highlighted as having a life-transforming influence, which is actually reflected by the figures. Contrarily, the case studies contributing to this storyline demonstrate the practical problems and strategic aspects that organizations are compelled to tackle in the process of yielding this outcome. Also, the focus on supplier joint strategies coincides with the discussion about the power of building networks of strong supply chains. The statistical and qualitative results not only add to the existing body of knowledge regarding adoption of technology and ways of collaboration in SCM but also contribute effectively to the discussion with specific details pertaining to the Saudi Arabian perspective.

4.4 Implications of Findings

The results of such study provide a very beneficial information for the supply chain managers and officials in Saudi Arabia who should use that as a basis by which they can adopt innovation technology and partnerships for their SCM practices. It suggests management adopt fully the advantages of technologies like machine learning and blockchain, which are the great drivers of process optimization and transparency of operations. It also calls for not only expenses on technology but the use of building a workforce that is digitally intellectual and can apply these processes correctly.

The findings for the policymakers indicate that to create a supportive regulatory environment that provides favorable conditions for the sector that concerns SCM innovation and collaboration is possible. Programs that focus on facilitating the adoption of technology, like subsidies and tax credits of digital investments as well as initiatives aiming at enhancing digital literacy, will most probably affect the competitiveness and efficiency of the sector

significantly. In this regard also physical investments, especially digital infrastructure and logistics tools, gain notable importance in making of operations become uniting and commuting.

4.5 Results of Field Survey and Analyses

In the second part of the survey, we aimed to gather insights from employees who have experience in the supply chain field in Jeddah City in the Kingdom of Saudi Arabia. We asked specific questions to understand their perspectives on the supply chain in Saudi Arabia. Additionally, we obtained their input on potential improvements and how their expertise could contribute to achieving more efficient outcomes.

Variables	Categories	Number
Gender	Male	27
	Female	13
Age	From 20 - 29	13
	From 30 - 39	25
	40 years and more	2
Working Experience(years)	Less than 5	4
	From 5 – 10	34
	More than 10	2

Table 1: Demographic Characteristics

Below are the questions accompanied by corresponding charts illustrating the feedback received:

1. How would you rate the current efficiency of your supply chain management?

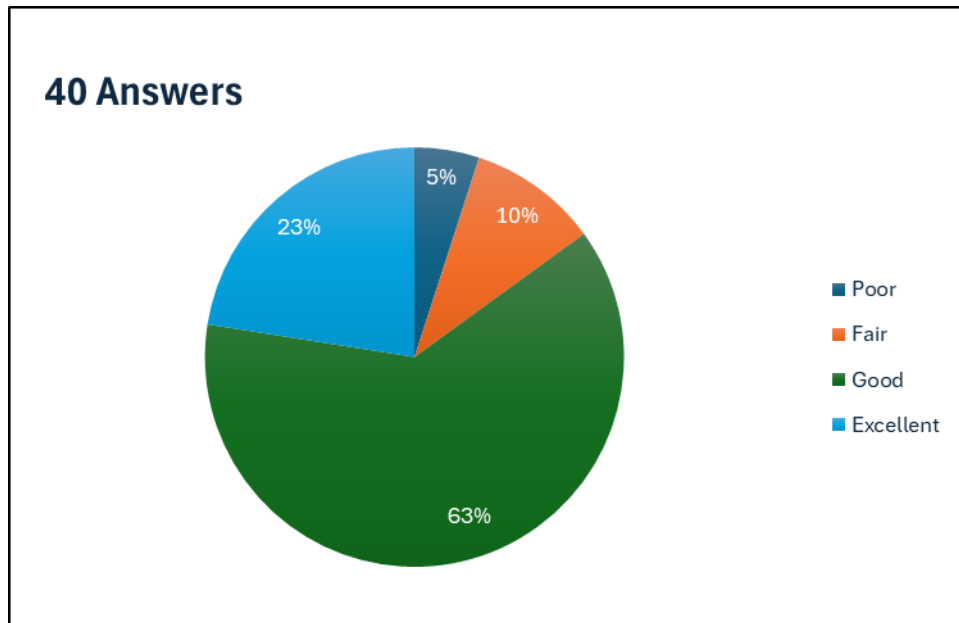


Figure 5: Rate the current efficiency of supply chain management

The chart indicates that the majority of responses were positive, with 63% of the total forty answers falling into the "good" category.

2. Which of the following factors do you believe most significantly impact supply chain efficiency?

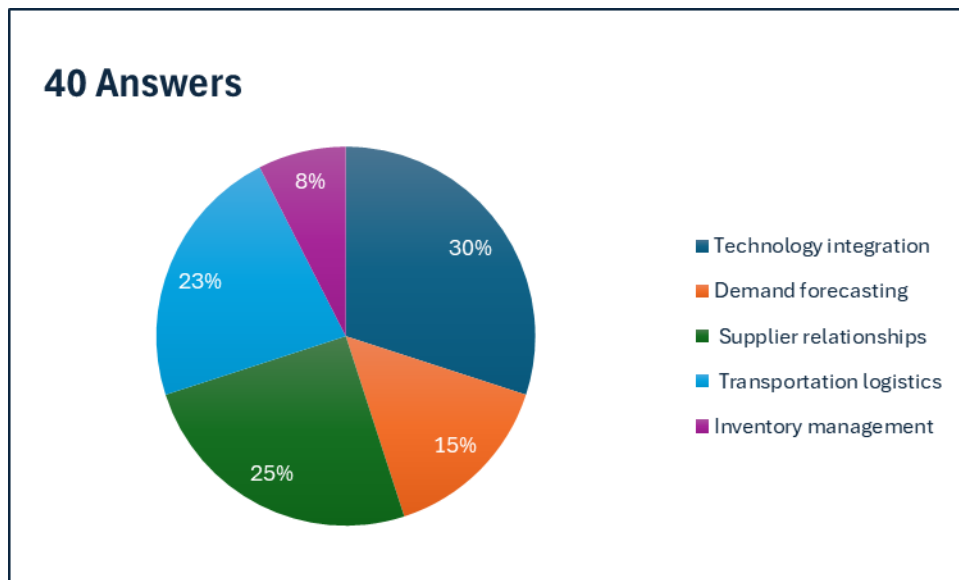


Figure 6: Most significantly impact supply chain efficiency

The chart illustrates that technology integration received the highest response among the forty answers, with 30% considering it the most significant impact on supply chain management, according to their beliefs.

3. What challenges do you face in managing supply chain efficiency?

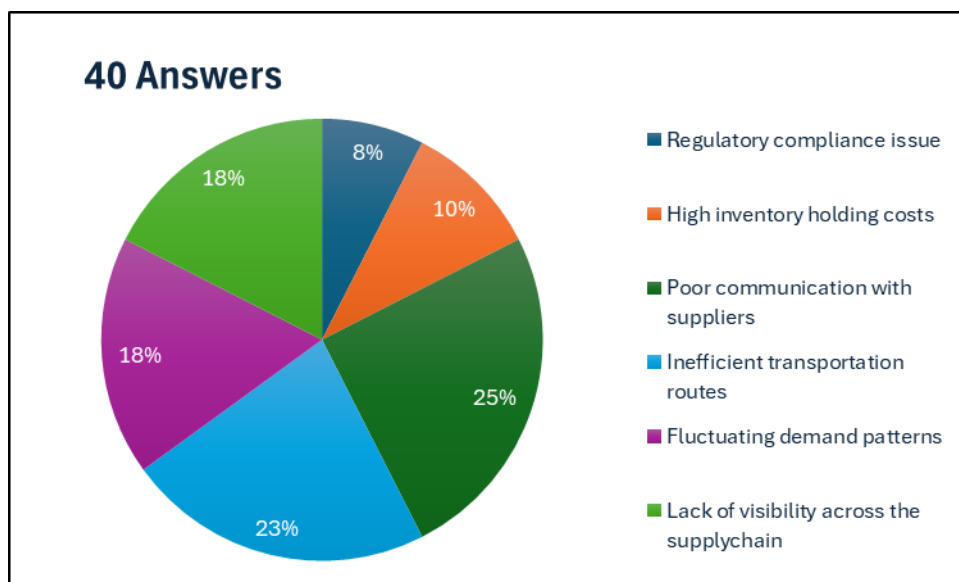


Figure 7: Challenges in managing supply chain efficiency

The survey findings reveal that the most challenges faced in managing the supply chain are poor communication with suppliers, noted by 25% of respondents, and inefficient transportation routes, identified by 23% of the forty answers received.

4. How do you measure the success of your supply chain efficiency improvement initiatives?

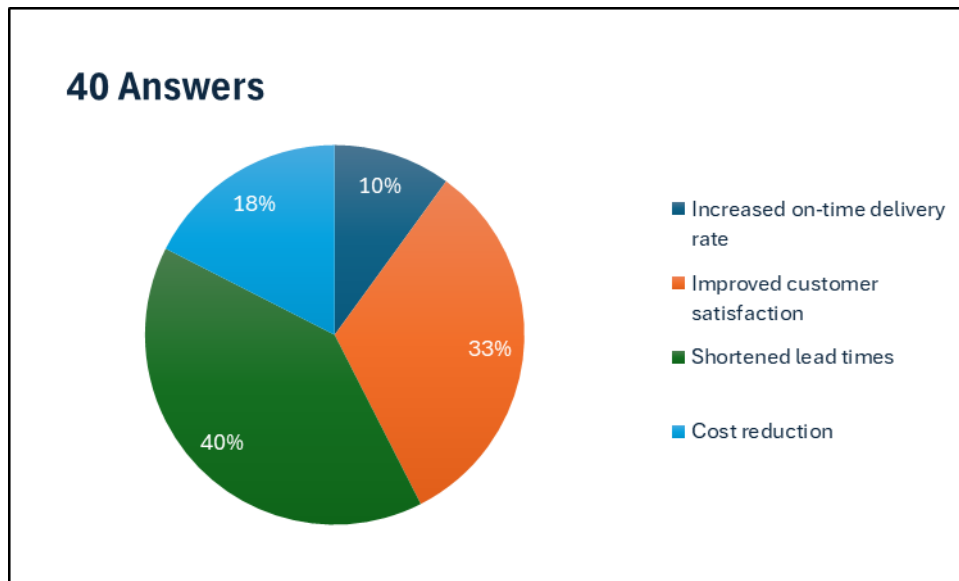


Figure 8: The success of supply chain efficiency improvement initiatives

The chart highlights that among the forty responses, the shortest lead times received the highest percentage of answers at 40%, surpassing the second highest response, which was improving customer satisfaction, with 33% of the total answers.

5. How do you handle disruptions in the supply chain that affect efficiency?

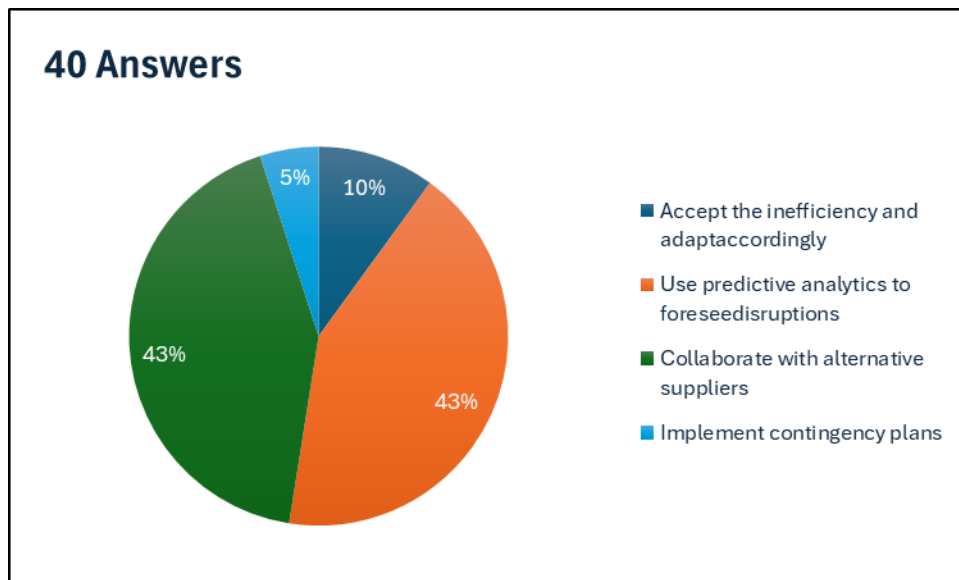


Figure 9: Handling the disruptions in the supply chain that affect efficiency

Among the forty responses, the highest number of answers, totaling 43%, were in favor of collaborating with alternative suppliers and utilizing predictive analytics to anticipate disruptions.

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أثر الإدارة الفعّالة على كفاءة سلاسل الإمداد في المملكة العربية السعودية

إعداد الطالب/ تركي القرني - الرقم الجامعي: 232001405 (قائد الفريق)

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إشراف/ د. وليد سليمان و د. الفيصل عبدالحميد

العام الدراسي:

2024

شكراً وتقديراً

الحمد لله حمداً كثيراً، والصلاة والسلام على أشرف الأنبياء والمرسلين سيدنا محمد عليه أفضل الصلاة وأتم التسليم وبعد:

أتقدم بالشكر والتقدير لجامعتنا الموقرة جامعة ميدأوشن ممثلة في مؤسسها معالي المستشار الأستاذ/ ناصر الحميميد، ومديرها الدكتور/ محمد أحمد . الذين اتاحوا لنا هذه الفرصة لمواصلة الدراسة والوصول لهذه المرحلة.

كما أتقدم بجزيل الشكر والعرفان للدكتور/ وليد سليمان والدكتور/ الفيصـل عبد الحميد على جهودهم ونصائحهم وتقديمهم لنا كل الدعم لاستكمال هذا البحث.

كما أشكر جميع أعضاء هيئة التدريس الذين علمونا العلم بكل صدر رحب خلال الفترات السابقة ولم يخلوا علينا بتقديم العلم والمعرفة الذي نفعا في دراستنا وحياتنا .

وختاماً أشكر عائلتنا وكل من ساهم في ظهور هذا العمل من دعم وتوجيه.

واسأل الله لي ولكم كل التوفيق ،،،

الباحثون

تركي القرني

رائد المدني

المخلص

في الوقت الراهن للتجارة العالمية الفعالة، تظهر إدارة سلسلة التوريد كجانب حاسم في التخطيط الاستراتيجي، خاصة في السياق الاقتصادي للمملكة العربية السعودية. وتقوم هذه الدراسة بالبحث في كيفية تحسين سلاسل التوريد وادارتها بشكل جيد ومؤثر على كفاءة وشفافية السلسلة بأكملها، من خلال التأكيد على الحاجة إلى نهج شامل يستفيد من التقنيات الناشئة مثل الذكاء الاصطناعي والسلسلة الذاتية المعتمدة على تكنولوجيا التحكم الالي، وتعزيز الشراكة القوية مع الموردين، والاستفادة من تحليل البيانات في تطور تعزيز الإدارة على إدارة سلسلة التوريد بشكل فعال. تهدف هذه الدراسة إلى معالجة التحديات التي تواجهها المملكة ضمن عملية التنويع الإقتصادي المتطورة وتأسيس أنظمة سلسلة توريد مستدامة و ذات فعالية عالية، من خلال وضع الخطط الإستراتيجية و الإلتزام بالقوانين من أجل الوصول إلى الأهداف المطلوبة مع البحث عن كيفية التطوير في استمراريتها.

وأخيرا نهدف في هذا البحث إلى الوصول لإيجاد أهم الأسباب والطرق في تكوين إدارة فعالة من خلال تعريف ما يخص سلسلة التوريد و طرق تطويرها لمواكبة السوق العالمية وتنويع الإقتصاد في المملكة مما له توابع إقتصادية عالية في تحسين الإقتصاد الداخلي وتعزيز سبل الدخل للدولة.

الكلمات المفتاحية:

إدارة سلسلة التوريد، الشراكات، تحليلات البيانات، التنويع الاقتصادي.

Appendix – Questionnaire

Demographic Questions

1- **Gender** Male ☐ Female ☐

2- **Age** From 20 – 29 ☐ From 30 – 39 ☐
40 and more ☐

3- **Working Experience(years)** Less Than 5 ☐ From 5 – 10 ☐
More than 10 ☐

4- **How would you rate the current efficiency of your supply chain management?**

- Poor
- Fair
- Good
- Excellent

5- **Which of the following factors do you believe most significantly impact supply chain efficiency?**

- Technology integration
- Demand forecasting
- Supplier relationships
- Transportation logistics
- Inventory management

6- **What challenges do you face in managing supply chain efficiency?**

- Regulatory compliance issue
- High inventory holding costs
- Poor communication with supplier
- Fluctuating demand patterns
- Lack of visibility across the supply chain

7- How do you measure the success of your supply chain efficiency improvement initiatives?

- Increased on-time delivery rate
- Improved customer satisfaction
- Shortened lead times
- Cost reduction

8- How do you handle disruptions in the supply chain that affect efficiency?

- Accept the inefficiency and adapt accordingly
- Use predictive analytics to foresee disruptions
- Collaborate with alternative suppliers
- Implement contingency plans