

The Impact of Supply Chain Agility on Operational Performance in Jordanian Engineering Companies

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Abstract: The study investigates the impact of supply chain agility on the performance of operations of Jordanian Engineering Companies. The research employed a descriptive- analytical methodology having five companies in the study sample where (275) electronic questionnaires were sent to the managers and (235) valid responses were retrieved and analyzed using SPSS. The results also show that supply chain agility plays an important role in determining the operational performance within the Jordanian Engineering Companies and the roles of speed, flexibility, and response. Some of the recommendations were the enhancement of response to changes in demand by using Enterprise Resource Planning (ERP) system and improvement of inventory through measures such as Just-in-time (JIT) to give the company more flexibility and operational efficiency.

Keywords: Supply Chain Agility, Operational Performance, Jordanian Engineering Companies.

INTRODUCTION

Supply chain management (SCM) is an important strategic activity that can help organizations to improve efficiency, competitiveness, and sustainability in the fast evolving business environments. It entails the amalgamation of procurement, production, logistics and distribution operations so that material, information and financial flow through the whole value chain is smooth. Best supply chain practices enable the organizations to lower the operational expenses, raise the service quality, and raise the flexibility that ultimately leads to improved operational performance. It is stated by [1] that those organizations that embrace an integrated supply chain strategies have greater potential of realizing operational excellence due to their ability to align the supply chain processes to organizational goals.

Operation performance is the capability of an organization to provide products or services in an effective manner yet of high quality, with little wastage and high delivery speed. The past literature highlights that supply chain integration, supplier cooperation, and efficient information exchange are very effective in improving operational performance, productivity, responsiveness, and efficiency of operations [2-3]. Additionally, the supply chain coordination allows taking decisions and making companies to react to uncertainties in the market fast thus increasing the level of reliability in operations and their general performance [3-4].

Over the last several years, the connection between the supply chain management and operation performance has become more resilient due to digital change and technological innovation. Use of modern technologies including data analytics, automation and intelligent logistics systems can enhance visibility and coordination within the supply chain networks which results in improved operational efficiency and minimized disruptions [5-6]. It is also suggested by empirical studies that higher supply chain integration levels result in superior performance of organizations based on their operations, whereas fragmented processes result in disjointed operations [7-8].

Therefore, understanding the role of supply chain management in enhancing operational performance has become essential for organizations seeking sustainable growth and long-term competitive advantage.

Problem Statement

Engineering firms work within complex and project oriented setting which demand accurate planning, ensure material acquisition at the right time and efficient communication between the suppliers, contractors and project teams. The management of the supply chain is key in facilitating the operational performance within the engineering firms in that supply chain management, materials availability, cost control, and project schedule are maintained. Nevertheless, most engineering firms suffer supply chain problems including material supply delays, poor supplier coordination and poor integration of information systems which may cause cost overruns, project delays and operational dysfunction.

Although the role of supply chain practices in engineering projects is immense, majority of the past researches have been centered to manufacturing or service industries, whilst few studies were carried out to engineering companies. The incompatibility of supply chain management with the operations in engineering companies can have adverse impacts on productivity, resource use, and quality of projects. Thus, the central issue of the research is to investigate the connection between supply chain management and operational performance of

engineering companies, to determine how supply chain practices can be used to increase efficiency, minimize project delays, as well as improve the overall operational efficiency.

Literature review

Supply Chain Agility:

Supply Chain Agility refers to the ability of organizations to respond quickly and effectively to changes in market demand, customer preferences, and unexpected disruptions within the supply network. The business environment is becoming more dynamic today and businesses are experiencing more uncertainty due to globalization, technological changes and changes in consumer expectations. As such, agile supply chains have become a necessity in the need to maintain operational flexibility, as well as to guarantee improvement in performance. As [1] explains, supply chain agility allows companies to detect the presence of changes in the market environment and react rapidly with the help of flexible processes, relationship of collaboration, and logistics strategies that are adaptable.

Agile supply chains are oriented on the speed, responsiveness, and real-time information dissemination to foster the decision-making and operational efficiency. Agile companies tend to use advanced digital technologies, combined information system, and well-established connections with suppliers and partners to minimize lead times and enhance the level of services [5]. Moreover, empirical evidence shows that supply chain agility has a positive effect on performance in the operations of increasing the speed of product delivery, lowering inventory costs, and increasing customer satisfaction [9]. Consequently, supply chain agility has emerged as a strategic competency that is extremely important in helping organizations to attain resilience, adaptability, as well as sustainable competitive advantage in fast-evolving markets. The dimensions of Supply Chain Agility categorized in three main parts:

Speed:

Supply chain speed is a rate of movement of products or materials through the supply chain beginning with the origin of the product or material (i.e., initial production phase) up to the final consumer and encompasses numerous processes namely manufacturing, transportation, distribution, and delivery. Shortening the supply chain speed tends to lead to shortening of lead times and decreasing inventory levels. To enhance customer satisfaction, and augment market competitive-ness, companies tend to optimize their supply chain to enhance greater efficiency and flexibility in a bid to respond to the shifting customer demands and remain competitive against other firms [10]. Supply chain agility is defined as capacity of supply chain to react to the changes in customer demands and market circumstances swiftly, in contrast to supply chain agility, rapid reaction to customer clients, resulting in higher inventory performance and better supply sales performance [11].

Agility in service supply chain is the action capacity to be responsive to perform needed logistics activities, in ordering to delivery of necessary supplies and services.

Flexibility:

Relevant studies consider SCF to be the capability of a system i.e. a manufacturing corporation to react to unwanted system alterations including equipment failures, inventory management, uneven task durations, and rework [12]. It is the capability of the firm to change or react to uncertainty. A number of studies have studied flexibility and SCF within the manufacturing companies. To give an example, SCF was defined by [13] as the ability of a firm to receive, process and transfer information to facilitate effective and successful SC activities. The ability of a firm to modify SC process-es to suit the environmental changes to enhance the performance can hence be termed as the SCF [14]. SCF has enabled many firms to develop capabilities and adjust changes to suit the demands of the market in order to enjoy a competitive edge and high levels of business performance [15]. The objective of SCF according to [16] is to enhance mass production besides coming up with products the right way, first-time, and error-free. SCF is able to achieve cost reduction, a higher turnover in inventory, a lower lead time and a low level of defects since all these benefits prompt companies to enhance their SC [17].

The literature bases a wide array of classification of SCF, such as flexibility in SC activities between upstream and downstream [18], volume flexibility, and process flexibility. Upstream flexibility is a manufacturing and operational flexibility, which contains a process, scale, diversity, and involvement of workers and suppliers [19]. Volume flexibility is the capacity of a company to adjust the capacity depending on consumer demand [20]. Downstream flexibility refers to logistics operations that control inventory distribution of the ready-made goods, and management of the warehouse as well as transportation to meet the needs of customers [21]. The extent in which the firms can cooperate with the major SC partners influences their SCF. As an illustration, the suppliers can be engaged in finalizing the product development through additional capabilities and quality resources. Meanwhile, customers in other streams can give good feedbacks about product features, prices, quality problems and other feedbacks. Thus, SCF enables a firm to change in the risky environment; it is a type of SCR that provides the power to act quickly in changing environments and restore normalcy during an already existing disruption [22].

Response:

Response can be defined as the capability of an organization to respond to the customer demands within smaller and smaller time periods. This does not only present the need to cut down lead times but also offer flexibility and better solutions to the needs of each customer. Responsive supplier should be in a position to respond to customer requirements in a more timely way than ever before, responsiveness is closely related to agility, comprising the responsiveness to change swiftly and meet customer demand instantly in an ever-evolving market. There is also responsiveness which implies that the organization is highly sensitive to the needs of customers, is a good listener and reacts to customer feedback, and is an expert at reading the market signals to deliver an appropriate and timely customer response [1]. Responding implies feeling, identifying, and predicting change, changing instantly by incorporating change into the system, and healing the change [23]. At the service sector, supply chain responsiveness can be defined as being able to respond promptly and efficiently to emergent demands and change.

Operational Performance

First of all, the operational performance is evaluated based on the cost, quality, and delivery [24 -25 -26 -27]. Operation performance also helps in showing the competitive advantage of a business against other firms within the SC and to increase operational performance, every firm within the SC needs to increase its overall efficiency in operating [25]. Once again as it was explained in the article, operation performance is what can be accomplished by an individual or group of individuals in an organization in order to accomplish the organizational goals in related authority and responsibility. Operational performance concept is preoccupied with a quantification of how successful an organization is in its utilization of the available resources and it is based on a number of key factors, which include quality, cost, and time (delivery) [28]. Operational performance can be defined as the capability of organizations to handle operational goals or operation services regarding the operational nature like on-time delivery, short lead times and short cycle times among other nutrients that enhance resource utilization and cost minimization. Due to the critical role of the operational function in creating and sustaining competitiveness, manufacturing companies need to design operational plans that can help them to execute their corporate competitive strategies. This is because such plans must be uniform to the SC members and must be the most cooperative in a resilient SC [24]. Operation performance dimensions that are grouped in three major sections:

Quality:

refers to the extent to which a product or service consistently meets or exceeds customer expectations and conforms to established standards. It involves delivering reliable performance, reducing defects, and continuously improving processes to enhance customer satisfaction and organizational efficiency. Quality is also essential for improving competitiveness and reducing operational costs, and it is often supported by international standards such as those developed by ISO, including ISO 9001 [3].

W.E. Deming defined quality as "the degree of excellence that can be predicted through the use of more appropriate and less expensive standards, and these standards are derived from the consumer, and that principle applies to the production process and the final product at the same time [30].

Quality is defined as the organization designing and delivering the service correctly from the first time and performing better the next time achieving customer satisfaction at the same time, and that it is done with competitive advantages compared to the service provided by competitors [31].

Cost:

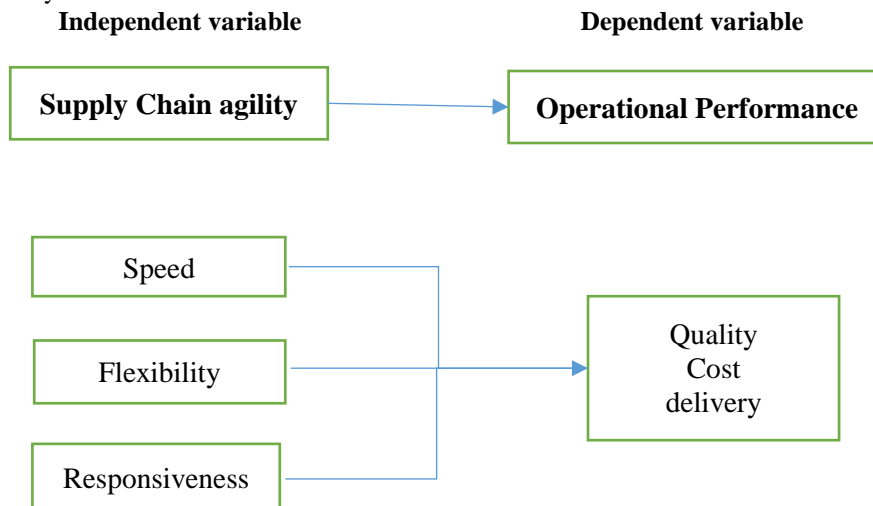
[32], defined it as the organization's ability to save time so that the organization produces products at a lower cost than its competitors and has a direct link to the speed of product delivery.

All companies seek continuity and permanence in the market as long as possible, and to achieve these goals, they must focus on reducing their costs in all available ways, so that they can sell their products at low prices compared to the prices of their competitors, because it is the strongest competitive option that allows competitors to sell their products. At competitive prices and in large quantities, it also allows them to exploit the amounts of unwanted costs to expand their investments in the future [33].

Delivery:

Proper delivery is one of the basic rules between companies in markets that are interested in designing products quickly in a short period of time and presenting them to customers with the highest quality in the shortest time, and companies use time as a competitive weapon by offering products to customers faster and better as customers prefer, as they want companies that respond to their requests faster [34]. [32], defined it as the organization's ability to deliver customer orders on time, or faster than competitors, and after entertaining is the end value that generates the organization's revenue. This dimension refers to the extent to which the organization is able to provide the good or service permanently, and in proportion to the time specified by customers, meaning that the speed and reliability of delivery is one of the most important ways to attract, increase their number and maintain customers [31].

Fig. 1. Study Model



Source: Prepared and designed by the researcher based on previous studies:

Previous Studies

[35], examine the mediation of the effect of supply chain digitization on the relationship between the agility of supply chains in its dimensions (sensor, flexibility, and speed) and the operational performance in its dimensions (quality, cost, speed and credibility) and to accomplish the objectives of the study, the hypothesis of the study was tested, and a survey questionnaire was administered to (320) people in various management positions in the pharmaceutical sectors in the Jordan, and only (268) questionnaires were collected, which could be analyzed, and with the use of the PLS-SE The paper highlights the significance of supply chain agility towards improving the operational performance and digitization of supply chains among pharmaceutical firms in Jordan.

[36], investigate the impact of the agility of supply chains in their dimensions (speed, responsiveness, efficiency, and flexibility) in measuring operational performance in its dimensions (cost, quality, reliability) of steel manufacturing companies, in addition to researching the role of cost efficiency in enhancing operational processes, where data was collected from the study sample of (398) key officials in steel manufacturing companies in India, and analyzes were conducted to explore this modern concept with the help of version 3.3.2 of Partial Smart Least Squares SEM PLS software was used to analyze the data, and the study found that there is an impact of the agility of supply chains directly on the operational performance of the company, and it also represents cost efficiencies that have partial mediation between the factor of agility of supply chains and operational policy, as the impact of cost efficiency in operational processes is of great importance compared to the impact of the factor of supply chain agility on cost efficiency. The study recommended that the management team in the manufacturing industry emphasize the role of supply chain agility as a comprehensive concept in responding to market needs in a volatile environment, in addition to that managers must know well the implications of flexibility by working to develop a mechanism to define procedures.

[37], examine the role of lean manufacturing and digitization on the performance of operations in its dimensions (quality, cost, delivery, and flexibility), based on the data collected by cross-sectional survey of manufacturing companies, and the research on the relationships between the use of lean manufacturing, plant digitization and operational performance in Norway, data were collected by (212) Norwegian manufacturers, valid responses to the analysis were (75) responses, and it was done with the help of multiple hierarchical regression analysis, and the study concluded that both lean manufacturing and digitization of factories have an individual effect on.

Methodology and analyses

Study Methodology

This section defines the methodology, methods, and procedures that are to be used in the study elaborating the type, nature, purpose and the strategy that is adopted in the study. It defines study population, sample and unit of analysis. Besides, the study tool, its elements, the way it was developed, and its validity and reliability are outlined. The part also takes into consideration the statistical techniques that are expected to be used in analysis of data. The methodology has been constructed by the researcher mainly using two important sources of information.

Secondary Data Sources

A comprehensive review of both Arabic and international literature has been conducted, encompassing books, university theses, and scientific research pertinent to the research topic. Additionally, online search engines will be utilized to gather further information that will enhance the study with necessary data. The researchers will adhere to the American Psychological Association (APA, 2020) guidelines for documenting all data and references.

Primary Data Sources

The study utilized questionnaires as the primary tool for collecting data, focusing on analyzing key aspects of the research topic.

Second: Study Population

(275) questionnaires were distributed, and (235) questionnaires were retrieved from them valid for analysis, the recovery rate was (86.2%)

Study Tool and Variables

The researchers developed a questionnaire to collect data as a tool and measure the opinions of the study sample members working in engineering companies in Jordan.

Part I: Paragraphs related to the demographic characteristics of the study sample (gender, age, experience, and academic qualification) of workers in engineering companies in Jordan. Part II: 30 paragraphs on the variables of the study.

Measuring Variables

For dynamic capabilities and supply chain agility, a Likert scale was used. The Likert scale consists of rating options ranging from 1 to 5 (5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, 1 = strongly disagree).

Analysis of Study Questions.

The study variables were analyzed descriptive statistics were used, where the mean and standard deviation of all data were calculated for all items of the study questionnaire.

Table 1: Mean and standard deviation of supply chain agility variable

#	Dimensions	No. of itemes	Mean	Std. Dev.	Rank	Importance
1	Speed	5	3.98	.715	1	High
2	Flexibility	5	3.49	.646	3	medium
3	Response	5	3.52	.679	2	medium
	Average		3.57	.681		medium

The table shows the means and standard deviation of the "Supply Chain Agility" variable. It was found that the mean (3.57) and standard deviation (0.681), which reflects the extent of the importance of "Supply Chain Agility" and its application in engineering companies in Jordan. The highest mean was for the "Speed" dimension (3.98) and a standard deviation (0.715), in second was the "Response" dimension (3.52) and a standard deviation (0.679), and in third and last was the "Flexibility" dimension (3.49) and a standard deviation (0.679).

Table 2: Mean and standard deviation of agility of supply chains variable

#	Dimensions	No. of itemes	Mean	Std. Dev	Rank	Importance
1	Quality	5	3.51	.729	3	medium
2	Cost	5	3.63	.653	2	medium
3	Deliverable	5	3.74	.594	1	medium
	Average		3.62	.658		medium

The table shows the means and standard deviation of the "Operational performance" variable. It was found that the mean (3.62) and standard deviation (0.648), which reflects the extent of the importance of "Operational performance" and its application in engineering companies in Jordan. The highest mean was for the "deliverable" dimension (3.74) and a standard deviation (0.594), in second was the "cost" dimension (3.63) and a standard deviation (0.653), and in third and last was the "Quality" dimension (3.51) and a standard deviation (0.729).

Multicollinearity Test

It shows the existence of a linear correlation between several variables or variables, and shows the value of the coefficient of determination r^2 , to make it higher than its actual value. Therefore, the value of the coefficient between the independent variables in the model was calculated, and the results were found as follows:

Table 3: Correlation Level between Variables

Variables	Speed	Flexibility	Response
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Speed	1		
Flexibility	.458**	1	
Response	.531**	.497**	1

(**) At the significance level (0.01).

The table shows the correlation coefficient between the variables (speed, flexibility and response) and it reached (0.646) at the level of significance (0.01), which is less than (0.80) and indicates that there is no multiple linear correlation between the variables, and the value of the correlation coefficient is (0.80), and this means that there is a problem of multiple and high linear correlation between variables (Gujarati, 2004). The variance inflation coefficient was calculated to confirm the results of the independent variables in order to show the existence of multiple linear correlations and the results were as follows:

Table 4: Multiple correlations for independent variables

Variables	Tolerance	
Speed	.645	1.745
Flexibility	.713	1.489
Response	.625	1.846

The table shows the value of the variance inflation coefficient, showing that all of them are higher than 1 and less than 10. The value of (tolerance) varies between the numbers (1-0.1), and this shows that there are no problems in the correlations between all the variables of the study.

Hypotheses Test

H01: There is no statistically significant effect at the significance level ($\alpha \leq 0.05$) of supply chain agility represented by speed, flexibility, and responsiveness on operational performance represented by quality, cost, and delivery in engineering companies in Jordan.

To examine the main hypothesis, simple linear regression analysis was conducted to assess the impact of supply chain agility through its dimensions of speed, flexibility, and responsiveness on operational performance, represented by quality, cost, and delivery, in engineering companies in Jordan, as shown in the following table.

Table 5: Main hypothesis test results table

Dependent variable	Model Summary		ANOVA			Coefficients Type		Relationship	
	R	R2	F	Sig	B	Std. Error	t	Sig	R.T
Agility of Supply Chains	.768	.538	243.13	.000	.95	.063	16.62	.000	Positive

The results in Table 5 indicate a strong and statistically significant positive effect of supply chain agility on operational performance in engineering companies in Jordan. The model summary shows a high correlation coefficient (R = 0.768) and a coefficient of determination (R² = 0.538), meaning that supply chain agility explains 53.8% of the variance in operational performance dimensions (quality, cost, and delivery). The ANOVA results are also significant (F = 243.13, p = 0.000), confirming that the regression model is valid and suitable for interpretation.

At the coefficient level, supply chain agility has a strong positive and statistically significant effect on operational performance (B = 0.95, t = 16.62, p = 0.000), indicating that improvements in agility through speed, flexibility, and responsiveness lead to notable improvements in operational outcomes. Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted, confirming that supply chain agility plays a crucial role in enhancing operational performance in engineering companies in Jordan.

The sub-study hypotheses were tested through simple regression analysis, and the following is an explanation of the testing of these hypotheses.

Sub-First Hypothesis Test (H1.1): There is a statistical effect on the level of importance ($\alpha \leq 0.05$) for the agility of supply chains on the operational performance in engineering companies in Jordan.

Table 6: Simple Regression to Sub-First Hypothesis Test

Dependent variable	Model Summary	ANOVA	Coefficients Type	Relationship
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	R	R ²	F	Sig	B	Std. Error	t	Sig	R.T
Speed	.667	.513	39.31	.000*	.031	.062	0.594	.30	Positive
Flexibility	.667	.513	39.31	.000*	.16	.081	3.27	.031*	Positive
Response	.667	.513	39.31	.000*	.29	.086	2.28	.002*	Positive

The results shown in Table 6 indicate a statistically significant overall relationship between supply chain agility dimensions and quality performance. The model summary shows a correlation coefficient of $R = 0.667$ and a coefficient of determination $R^2 = 0.513$, which means that 51.3% of the variation in quality can be explained by supply chain agility. The ANOVA results were also significant ($F = 39.31$, $p = 0.000$), confirming the validity of the regression model.

At the individual level, speed had a positive but statistically insignificant effect on quality ($B = 0.031$, $t = 0.594$, $p = 0.30$), indicating that increasing supply chain speed alone does not necessarily improve product or service quality. In contrast, flexibility had a positive and significant effect on quality ($B = 0.16$, $t = 3.27$, $p = 0.031$), suggesting that the ability to adapt production and supply processes to changing requirements helps improve quality outcomes. Similarly, responsiveness showed a positive and significant impact on quality ($B = 0.29$, $t = 2.28$, $p = 0.002$), meaning that responding quickly to customer feedback and market changes contributes to better quality performance.

Overall, these findings highlight that flexibility and responsiveness are key drivers of quality improvement, while speed alone may not be sufficient unless it is supported by effective quality control practices.

Sub-Second Hypothesis Test (H1.2): There is a statistical effect on the level of importance ($\alpha \leq 0.05$) for the agility of supply chains on the operational performance in engineering companies in Jordan.

Table 7: Simple Regression to Sub-Second Hypothesis Test

Dependent variable	Model Summary		ANOVA			Coefficients Type			Relationship
	R	R ²	F	Sig	B	Std. Error	t	Sig	
Speed	.720	.529	51.25	.000*	.18	.081	2.15	.031*	Positive
Flexibility	.720	.529	51.25	.000*	.28	.24	2.91	.001*	Positive
Response	.720	.529	51.25	.000*	.33	.26	2.98	.003*	Positive

The results presented in Table 7 demonstrate a positive and statistically significant relationship between supply chain agility dimensions and cost performance. The model showed a strong correlation coefficient ($R = 0.720$) and a coefficient of determination ($R^2 = 0.529$), indicating that 52.9% of the variation in cost can be explained by supply chain agility. The ANOVA results were also statistically significant ($F = 51.25$, $p = 0.000$), confirming the overall validity of the regression model.

At the individual level, speed had a positive and significant effect on cost performance ($B = 0.18$, $t = 2.15$, $p = 0.031$), suggesting that improving the speed of supply chain processes contributes to better cost control through reduced delays and inefficiencies. Flexibility also showed a significant positive impact ($B = 0.28$, $t = 2.91$, $p = 0.001$), indicating that the ability to adapt to changes in demand or supply conditions helps organizations minimize additional expenses. Likewise, responsiveness had the strongest positive and significant effect ($B = 0.33$, $t = 2.98$, $p = 0.003$), meaning that quick reaction to customer needs and market changes can lower operational costs and improve resource utilization.

Overall, these findings confirm that enhancing speed, flexibility, and responsiveness within the supply chain

plays a crucial role in improving cost efficiency and operational performance.

Sub-Third Hypothesis Test (Ho1.3): There is a statistical effect on the level of importance ($\alpha \leq 0.05$) for the agility of supply chains on the operational performance in engineering companies in Jordan.

Table 8: Simple Regression to Sub-Third Hypothesis Test

Dependent variable	Model Summary		ANOVA		Coefficients Type			Relationship	
	R	R ²	F	Sig	B	Std. Error	t		Sig
Speed	.726	.547	52.51	.000*	.21	.062	1.87	.038*	Positive
Flexibility	.726	.547	52.51	.000*	.16	.072	3.11	.001*	Positive
Response	.726	.547	52.51	.000*	.15	.052	2.85	.006*	Positive

The results indicate a positive and statistically significant relationship between supply chain agility dimensions and delivery performance. The model showed a strong correlation ($R = 0.726$) and a coefficient of determination ($R^2 = 0.547$), meaning that 54.7% of the variation in delivery can be explained by supply chain agility. The ANOVA results were significant ($F = 52.51$, $p = 0.000$), confirming the validity of the model. At the individual level, speed had a positive and significant effect on delivery ($B = 0.21$, $t = 1.87$, $p = 0.038$), indicating that faster supply chain processes improve delivery efficiency. Flexibility also showed a positive and significant impact ($B = 0.16$, $t = 3.11$, $p = 0.001$), suggesting that the ability to adapt to changes in demand or supply conditions enhances delivery performance. Similarly, responsiveness had a positive and significant influence ($B = 0.15$, $t = 2.85$, $p = 0.006$), meaning that quicker reaction to customer needs and market changes contributes to more reliable delivery outcomes. Overall, these findings highlight that improving speed, flexibility, and responsiveness within supply chains can significantly enhance delivery performance and operational effectiveness.

Discussion of Findings and Recommendations

Discussion of Results

The findings of the present research point to a number of significant practical and administrative lessons. To begin with, the whole model was found to be statistically significant ($F = 243.13$, $p = 0.000$), with a correlation coefficient of 0.768 and a coefficient of determination of 0.538, which is why supply chain agility contributes to 53.8% of the variance in operational performance. This proves the null hypothesis is rejected and that the agility of the supply chain has a positive and statistically significant effect on operational performance. Second, the quality model also had a statistical significance ($F = 39.31$, $p = 0.000$) with the correlation coefficient of 0.667 and $R^2 = 0.514$ indicating that 51.4 per cent variation in quality could be attributed to supply chain agility. The positive and significant influence of flexibility and responsiveness on quality and the negative impact of speed were noted in the considered context. Third, the cost-related results were statistically acceptable ($F = 51.25$, $p = 0.000$) and the correlation coefficient of 0.720 and $R^2 = 0.529$ indicated that the dimensions of supply chain agility have a positive and statistically significant impact on cost and have explained 52.9% of its variation. Lastly, the model of delivery also played an important role ($F = 52.51$, $p = 0.000$) and the correlation coefficient was 0.726, $R^2 = 0.547$, which meant that supply chain agility explained a 54.7 percentage of the variance in delivery performance and that speed, flexibility, and responsiveness of delivery performance were positively and significantly correlated. These results highlight the importance of supply chain agility in enhancing various aspects of operations performance.

Recommendations

Recommendations were made based on the findings made after the statistical analysis undertaken alongside the discussion of the findings as follows:

- The necessity to pay attention to the time spent to implement the adjustments to the demand in order to implement the enterprise resource planning (ERP) systems and to predict the demand better. Moreover, it is possible to become more flexible through implementing flexible inventory management, i.e. just-in-time inventory (JIT) as a method of reducing the amount of excess inventory and fulfilling the orders fast enough and efficiently.
- The necessity to create training programs to refine the skills of the employees in the work organization and increase the efficiency of the daily work. Efficiency and reduction in human error can also be achieved through modern technology like automation and robotics which leads to better overall operation performance.
- Use quality improvement programs, to enhance processes and minimize defects. Moreover, TQMS

might be employed to encourage quality culture throughout all production and distribution processes and enhance the quality of the products and services delivered.

- Suggest the supply chain cost analysis, including the cost analysis, to highlight the most costly activities and target to optimize them. Better negotiation with the supplier to negotiate better prices and more flexible terms can also be enhanced and this minimizes the overall costs, thus enhancing profitability.

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