

The Impact of Supply Chain Agility on Operational Performance in Dairy Companies in Jordan

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Abstract

The study focused on examining how various dimensions of supply chain agility—speed, responsiveness, flexibility, and efficiency—influence operational performance factors such as quality, cost, and delivery in Jordanian dairy manufacturing companies. Utilizing a descriptive-analytical approach, the research encompassed five companies, with (285) electronic questionnaires distributed to managers and (245) valid responses retrieved for analysis through SPSS software. The results showed significant statistical support for the agility-performance model, with an F value of (241.06) and a p-value of (0.000), indicating that (57.3%) of operational performance variance could be attributed to agility factors. Correlation and determination coefficients were (0.757) and (0.573), respectively. Recommendations included improving response times to demand fluctuations through Enterprise Resource Planning (ERP) systems and enhancing inventory management with strategies like Just-In-Time (JIT) to increase flexibility and operational efficiency.

Keywords: Dynamic Capabilities, Supply Chains, Jordanian Pharmaceutical Industry.

Introduction

In recent years, organizations have witnessed a major transformation in the fields of supply chains, as they have become more complex and organizations need to be highly flexible and adaptable to the surrounding environment due to the environment characterized by significant changes and increased competition, due to a variety of factors, the most important of which are globalization, economic conditions, and unstable political conditions, which leads to an increase in the need for agility of supply chains and accelerate the automation of supply chains in order to increase the efficiency of operational performance to avoid falling into the effects of external environmental factors and an example The Corona pandemic and the wars that exist at the present time, which led to the obstruction of the passage of ships on the Bab al-Mandab road.

The agility of supply chains refers to an organization's ability to speed and respond smoothly to environmental changes surrounding it, and these changes are broad and intertwined and

include everything from changes in customer preferences to economic fluctuations, market volatility, and competitor turmoil (Hsieh et al., 2023).

Improving the agility of industrial supply chains will change internal and external processes, and this in most cases means the adoption of new technology, information integration and service agreements with suppliers, the goal is to maintain responsive, smooth and enlightened supply chains that can easily deal with any changes that may come their way, whether positive or negative, and the competitive, complex, dynamic and uncertain business environment requires a quick response to market changes and customer needs (Aslam et al., 2020).

Operational performance is one of the levels of strategic performance that aims to maximize production efficiency, and at the same time it is a set of internal activities that the company seeks to achieve and reduce waste in operations in order to provide products that satisfy the customer with high quality and deliver them on time, in addition to working to improve its internal processes in order to reduce costs and add value to the products it provides to customers, and the company's ability to adapt to the changes that occur in the environment with their capabilities (long and Jassim, 2019, 99). Accordingly, this study came to identify the impact of the agility of the supply chains in its dimensions (speed, response, flexibility, and efficiency) on the operational performance in its dimensions (quality, cost, and delivery) in dairy companies in Jordan.

Study Problem and Questions

In light of the increasing economic and competitive challenges facing the dairy industry in Jordan, improving operational performance has become vital to achieving sustainability and market excellence. The dairy industry is under many pressures such as fluctuating raw material prices, increasing variable demand, cost pressures, and intense competition, which makes it necessary for companies in this sector to adopt effective strategies to improve their operational performance.

Supply chain agility is one of the key strategies that can significantly impact operational performance, as supply chain agility includes speed, responsiveness, flexibility, and efficiency, as these elements play a key role in improving how logistics operations are managed, reducing cycle times, and improving operational efficiency, contributing to meeting customer requirements more effectively. However, despite the great importance of supply chain agility in improving operational performance, the actual impact of this agility on the operational performance of dairy companies in Jordan has not been adequately studied. While there are multiple world-class studies on this topic, the challenges and opportunities specific to the Jordanian market have yet to be analyzed in depth. From the above, the study problem can be expressed through the following main question:

What is the impact of supply chain agility on the operational performance of dairy companies in Jordan?

The following sub-questions emerge from the main question:

1. What is the level of relative importance of the agility of supply chains in their dimensions (speed, responsiveness, flexibility, efficiency) in the dairy companies in Jordan?

2. What is the level of relative importance of operational performance in its dimensions (quality, cost, delivery) in the dairy companies in Jordan?
3. What is the impact of the agility of supply chains in their dimensions (speed, responsiveness, flexibility, and efficiency) on the operational performance in its dimensions (quality, cost, delivery) in the dairy companies in Jordan?

Study Importance

The importance of the study comes in the following:

Scientific Importance

This study holds significant scientific value due to its focus on crucial variables such as supply chain agility (encompassing speed, response, flexibility, and efficiency) and operational performance (involving quality, cost, and delivery). These concepts are vital for the effective functioning and goal achievement of business organizations, as they directly influence operational and financial performance. By delving into these fundamental pillars, the research aims to guide necessary development processes in industrial companies. Furthermore, the researchers aim to explore the impact of supply chain agility on operational performance by reviewing contemporary literature and engaging with the latest academic discussions. This endeavor is not only expected to contribute to the academic community by addressing gaps in Arabic literature on these topics but also to serve as a valuable resource for researchers and practitioners in the fields of supply chains and operational performance. Through their efforts, the researchers aspire to enrich the Arabic academic library with new insights and comprehensive analyses.

Recognizing the importance of the study topic, it seeks to address the research gap on the impact of supply chain agility on operational performance in the dairy sector in Jordan. Given the increasing competition and economic pressures, companies urgently need strategies to survive and adapt. By analyzing how supply chain agility can enhance operational capabilities and sustainability, this study will provide insights to help dairy companies improve performance and overcome challenges.

Practical Importance

The importance of the study comes from helping to understand how dairy companies can improve their operational efficiency by quickly adapting to changes in demand and supply, thus reducing waste and improving the use of resources, and this research also enhances the competitiveness of these companies by developing strategies that enable them to deal effectively with risks and logistical challenges, which contributes to the sustainability of operational processes and improve product quality. In addition, the research supports strategic decision-making with the information needed to enhance performance and effectiveness at all levels within companies, benefiting the Jordanian economy as a whole. The importance of the study comes from an applied point of view in the extent to which departments in dairy companies benefit in Jordan from the results they will find, and from the recommendations they will provide, and with regard to the awareness of the concepts of the study represented in the agility of supply chains in their dimensions, and operational performance in its dimensions.

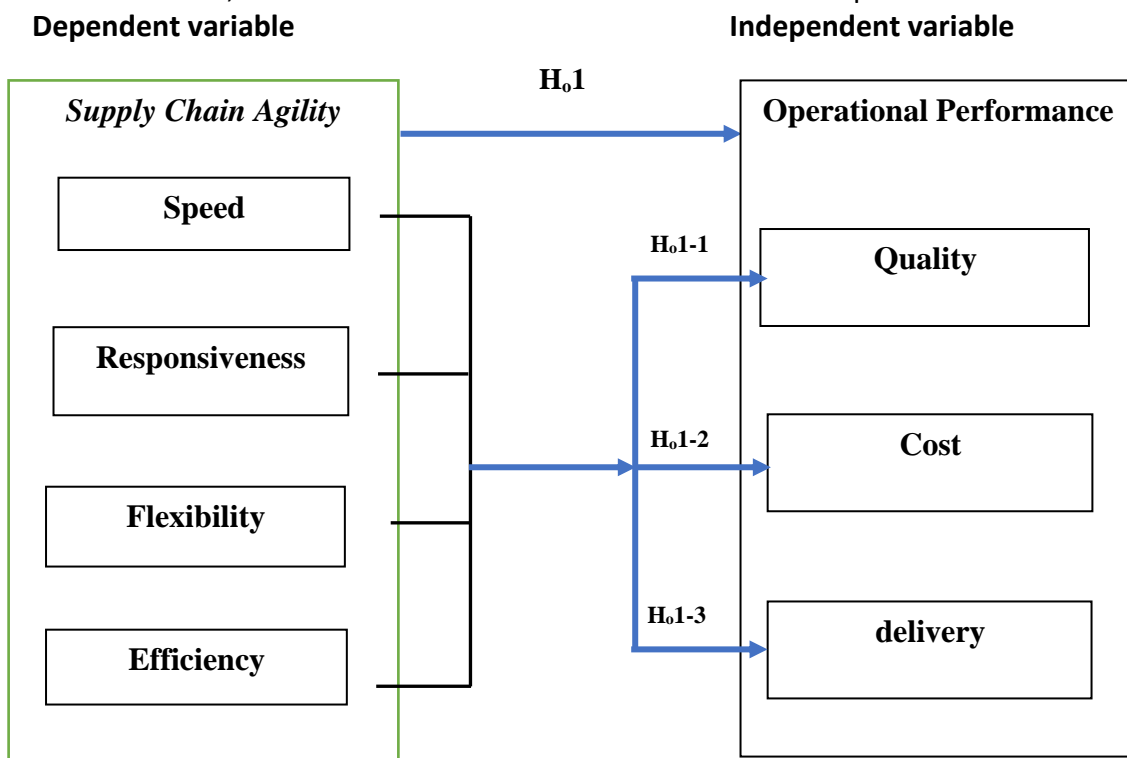
Study Objectives

This study mainly aims to identify the impact of the agility of supply chains in their dimensions (speed, responsiveness, flexibility, and efficiency) on the operational performance in its dimensions (quality, cost, and delivery) in the dairy companies in the Jordan, as well as achieving a set of the following sub-objectives:

1. Identify the level of relative importance of the agility of supply chains in their dimensions (speed, responsiveness, flexibility, and efficiency) in the dairy companies in the Jordan.
2. Identify the level of relative importance of operational performance in its dimensions (quality, cost, delivery) in dairy companies in Jordan.
3. Identify the impact of the agility of supply chains in their dimensions (speed, responsiveness, flexibility, and efficiency) on the operational performance in its dimensions (quality, cost, and delivery) in the dairy companies in the Jordan.

Study Form

The following figure indicates the study model, including its variables and the dimensions of these variables, in addition to the references that were relied upon



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

Literature Review

Supply Chain Agility

The Concept of Supply Chain Agility

Supply chains are networks that participate through initial and final links from design to product delivery and include all parties extending from suppliers to end customers, and supply chains are not linear chains, but rather a complex network that includes more than two organizations that embody indirect relationships and links between different organizations, industries and economies, and aim to produce value for customers who use products and services Organizations should not look at their operations in isolation from other

supply chain parties, as they need to Links that support them to succeed (Sadikoglu & Demirkesen, 2022).

The agility of supply chains is the ability to use resources to respond quickly and flexibly to change, and the sense and response are two elements of the agility of supply chains, and focus on the adequacy, accuracy, accessibility and timing of information, and the response focuses on the timing, cost and quality of the plan, and sensing market changes depends on collecting high-quality and reliable information about changes in the market, as the quality of this information has a significant impact on the decision-making process at all stages of supply chains (Masudin et al., 2018, 193).

Supply chain agility is the responsiveness and efficiency with which customers are served when they have changing needs Improvements in supply chain agility enable an organization to reduce material inventory and excess inventory that leads to disposal, and improvement in supply agility will: Increase the speed and accuracy of delivery of information about planned changes that will affect customer requirements, shorten lead times, and reduce demand waiting (Peltz et al., 2015, 53).

Supply Chain Agility Dimensions

The agility of supply chains is characterized by many characteristics, including: speed, responsiveness, flexibility, and efficiency, and thanks to these characteristics, agile organizations are able to sense and respond to environmental changes quickly, as they were relied upon in the current study as follows:

Speed

It is the ability of supply chains to quickly reduce production delays, the ability of supply chains to reduce product development cycle time, increase the pace of introducing new products, increase production according to customer demand and adjust the ability to deliver products to customers, improve the level of customer service, improve the degree of reliability in product delivery to customers, and quickly improve the degree of response to changes in market conditions (Sultan, 2020).

Responsiveness

A responsiveness in supply chain agility increases customer satisfaction because the occasional deployment of work in relation to supply chain agility increases the customer-organization relationship, and having better relationships with business partners such as suppliers and customers plays an important role in ensuring supply chain success (Naqvi et al., 2020).

It is defined as the speed at which supply chains provide products to the customer, and can be measured by determining the time period in the completion of the product or service, which is defined as the time it takes to receive the customer's order until the customer receives the product or service provided (Asfa et al., 2022).

Flexibility

Resilience is defined as a dynamic, context-specific and powerful change that embraces and seeks growth, success, profits, market share and customers (Aljawazneh, 2024).

It is defined as the ability of an organization to respond quickly to changes in production levels, and to develop new products frequently, to save unnecessary costs and meet customer needs (Khalifa, 2023).

Flexibility is seen as a manifestation of continuous improvement, continuous delivery, communication, and maturity of the team and individuals, and an agile organization is represented by teams working together, motivated, talented, self-disciplined, organized, and displayed (Al Nuaimi et al., 2022).

Efficiency

Efficiency refers to the relationship between resources and results, and is measured by calculating the ratio of outputs to independent inputs to achieve the goals of the organization, efficiency is related to the question of what amount of inputs (resources, funds, people) is required to achieve a certain level of results or a specific goal, efficiency means achieving the greatest benefit against costs, and the organization is effective when it achieves the highest possible goal it seeks to achieve, which is the largest profit and the highest quality (Shehada et al., 2020).

The efficiency of internal operational processes includes internal digitization of solutions for digital information and communication technology, such as video conferencing and email, in addition to digital training and business mission support, and external digitization emphasizes reliance on digital technology to enhance interactions with stakeholders, not only can external digitization reduce business-to-business communication costs and facilitate partnerships with suppliers and other partners, but can also accurately anticipate customer needs and increase customer loyalty (Zhao et al., 2023).

Operational Performance

The Concept of Operational Performance

This area is considered the middle link for business performance in institutions, where operational indicators are relied on in addition to financial indicators, the introduction of new products, product quality, public service, productivity, in addition to many measures that are related to the level of performance of the institution's operations, and some believe that relying on financial indicators does not give an integrated vision about the institution, so it was necessary to strengthen this method of measurement with non-financial performance measures, and therefore reliance on measuring the performance of operations was in addition to measuring financial performance (Abu Madi, 2018, 32).

Researchers differ in the definition of operational performance depending on the approaches through which they look: some see it as a set of goals and fundamentals, others see it according to the financial approach, and others see it as a set of fundamentals and policies that they adopt to achieve outstanding performance at the lowest cost.

The concept of operational performance includes a set of rules and standards used by organizations, through demand and supply, or market share of the products or services of these organizations, and these standards are considered an integration process between the strategic goals and objectives of the organization and its operational goals and objectives, and operational performance is also a description of the stages and functions of the organization's

strategic plan and the mechanisms of its success and harmony between it and the organization's strategic plan, because the strategic plan is an integrated plan that clarifies the human and financial resources needed by the organization To carry out its specific activities and tasks, it also works to determine production schedules and quantities and determine the necessary budget (Hussein et al., 2023).

Operational performance is defined as the main indicator that reflects the organization's ability and the duration of success it works to achieve in investing its available technical, human, information and material resources, as well as a set of competitive dimensions represented in quality, flexibility, speed of product delivery, design and low cost that allow organizations to achieve the results they want and increase their ability to set, set and implement goals (Lewis, 2023).

Operational Performance Dimensions

The dimensions of operational performance varied and were distributed separately from each other according to specialization, and most of them focused on two aspects: workers and productivity. Many researchers in management science in general and in operational performance in particular referred to many dimensions, but they did not agree on the same dimensions. Rather, there was a difference between them in terms of identifying these dimensions that their studies addressed. Based on previous studies and a number of books, researchers relied on the dimensions of operational performance as addressed by most studies and books that are consistent with the nature of the study, namely: quality, cost, and delivery:

Quality

To understand and understand the meaning of quality in the recent era, it is necessary to go back to the beginning of 1900 and the scientific school (Scientific Management) with the scientist Frederick Taylor and the scientist Lillian Gilberth (Frederick Taylor & Lillian Gilberth) and trace the growth of the concept of quality that occurred after 1920 by Walter Shewhart and the theory of monitoring statistical processes (Control) up to World War II (Abdallat, 2023, 15).

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 (Lahbib, 2019, 9).

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 (Mohamed et al., 2021).

Cost

Khalifa (2023), 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 unwasted costs to expand their investments in the future (Al-Iraqi, 2024).

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 (Mousa et al., 2021). Khalifa (2023), 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 (Mohamed et al., 2021).

Previous Studies

Aljawazneh study (2024), The study aimed to investigate the mediating role of the digitization of supply chains in the relationship between the agility of supply chains in their dimensions (sensor, flexibility, and speed) and operational performance in its dimensions (quality, cost, speed, and credibility), and to achieve the objectives of the study, the hypothesis of the study was tested, and a survey questionnaire was distributed to (320) individuals occupying different management positions in pharmaceutical companies in the Jordan, and only (268) questionnaires were retrieved valid for statistical analysis, where the data was analyzed Using the PLS-SEM program, the study found a statistically significant relationship between supply chain flexibility and operational performance; the impact of supply chain agility on supply chain digitization; the impact of supply chain digitization on operational performance; and there is no significant intermediary role for supply chain digitization in the relationship between supply chain agility and operational performance. The study emphasizes the importance of supply chain agility in enhancing the operational performance and digitization of supply chains for pharmaceutical companies in Jordan.

Khalifa Study (2023), The study aimed to show the mediating role of organizational resource planning (ERP) systems and its impact on the relationship between the integration of supply chain performance in its dimensions (flexibility, integration, efficiency, response, innovation and enhancement) operational performance in its dimensions (quality, cost, flexibility, and delivery) by applying to private pharmaceutical production companies in Dakahlia Governorate, and the researcher relied on the descriptive approach of analysis and questionnaire to collect data, where the number of analyzeable questionnaires reached (245) questionnaires, and the data was analyzed Relying on (PLS-SEM), the study found that there is a significant impact of supply chain performance on organizational resource planning (ERP) systems, in addition to a significant impact of supply chain performance on operational performance, and the study recommended the need for the companies under study to adopt

the approach of integration with suppliers through cooperation, coordination and information sharing, to increase the efficiency and effectiveness of supply from suppliers, which is one of the important and main keys to the success of organizations in the long term. Study of Hussein et al (2023), The study aimed to reveal the role of innovation in improving operational performance, and the study was applied to Telecom Egypt, the researchers divided innovation into three basic dimensions: fluency, flexibility, and originality, and also divided operational performance into three basic dimensions quality, flexibility, and delivery, where the study followed the descriptive analytical approach, and the researchers distributed the study tool to a random sample of (382) employees, and the data was analyzed using the SPSS program. The study reached a set of results, the most important of which is the existence of a substantial impact of innovation in its dimensions (fluency, flexibility, and originality) on improving operational performance in its dimensions (quality, flexibility, and delivery) at the level of Telecom Egypt concerned, and the study recommended the adoption of innovation to manage operational performance, especially after flexibility.

Lewis Study (2023), The study aimed to show the role of the application of the ERP system in operational performance, and the researcher applied the study to pharmaceutical sector companies in Cairo, where ERP was divided into five basic dimensions: financial resource management system, human resources management system, supply chain management system, customer relationship management system, and project management system, and the researcher divided operational performance into five dimensions: Quality, cost, flexibility, speed of delivery, research and development, and the stratified random sample was used to determine the size of the study sample, and the sample size was (372) individuals, and the data was analyzed using the SPSS program, and the study found a significant impact of the application of the ERP system in its dimensions (financial resources management system, human resources management system, supply chain management system, customer relationship management system, project management system) in operational performance in its dimensions (quality, cost, flexibility, and speed Achievement, Research and Development) in pharmaceutical sector companies in Cairo, and the study recommended the need to apply the enterprise resource planning system in the companies under study within all work departments more effectively.

Bytyçi et al (2023), study aimed to measure the impact of total quality management in its dimensions (organizational leadership, customer relationship, human resources management, strategic planning development, and supplier management) on the operational performance in its dimensions (quality, cost, productivity, and delivery) of industrial facilities in Kosovo, and the study was conducted using the quantitative approach, where the number of managers reached (308) managers within the sample, and the results were obtained through the ordinary least squares model. The study found that organizational leadership and supplier management had the greatest impact on operational performance, while the development of strategic planning had the least impact, and it was found that there was a difference in the operational performance of industrial facilities in the samples distributed by classifying them according to the application of ISO standards, where the establishments that apply ISO standards were better in operational performance, and the study recommended to discover barriers to TQM for companies that are in the planning or early stages of TQM practices to improve awareness and understanding of their principles.

Bai study (2023), The study aimed to demonstrate the agility of supply chains by distancing them (flexibility, information integration) by predicting retail demand by combining literature reviews, the quantitative method of algorithm analysis was targeted, and the company's data was processed through matrix testing, and the study found that the dimensions of information technology to predict demand in the retail industry and distinguish the relationship between the flexibility of supply chains and demand forecasting from the point of view of IT capability, managers can derive a better understanding and measurement of operational activities that appropriately balance supply chain flexibility and IT capabilities and the practice of demand forecasting, demand forecasting should be integrated into the company's operations to determine the level of supply chain resilience in the market, and the study recommended adopting new theoretical foundations for research into the relationship between agility supply chains and demand forecasting provide a pilot assessment of the essential components of IT supply chain prioritization means.

The study of Ahmad et al (2023), aimed to demonstrate the various enablers of the agility of supply chains in their dimensions (speed, response, and delivery) in the performance of Pakistani pharmaceutical companies, and data was collected from (204) senior executives working in various supply chain functions including planning, supply, operations and procurement in national and multinational pharmaceutical companies in Pakistan, and the data was analyzed using the statistical software SPSS, and The study found the power of different supply chain agility enablers, along with the intermediate roles of delivery reliability. The study recommended how different supply chain enablers and efficiencies can help organizations achieve supply chain speed and performance, especially in developing countries.

The study of Panigrahi et al (2022), The study aimed to show 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.

Yu et al (2022), study aimed to demonstrate the impact of digital transformation in its dimensions (sensing, organization, and restructuring) on operational performance in its dimensions (quality, cost, and delivery) in Chinese manufacturing companies, this study collected 162 sets of enterprise data through the survey, and investigated the relationships between the organization's strategic direction, digital transformation capability, and

operational performance using SPSS and SmartPLS3, and The study found that strategic direction has a positive impact on digital transformation and the ability to digital transformation has a positive impact on operational performance, in addition, the ability to digital transformation plays a mediating role between strategic direction and operational performance, and the study recommended that companies should focus on building their own capabilities in the field of digital transformation to create new corporate value. The ability to digitally transform will encourage companies to integrate their business processes and routines through digital technology to achieve an advantage Competitive.

Al-Zabidi et al (2021), The study aimed to assess the agility of supply chains in their dimensions (speed, responsiveness, flexibility, and efficiency) in the Saudi Dairy Industry, which covers the identification of supply chain capabilities and smart motors, and also provides a conceptual model and a framework to determine the level of agility and barriers within supply chains, and the researchers relied on the fuzzy logic approach due to its ability to integrate and address problems involving the phenomena of inaccuracy and ambiguity, and the result of the adopted approach indicates (21) features; Also as agility barriers, these are the barriers in their supply chains that affect the level of agility, for case regulation, the top priority is to enhance maintainability and serviceability to make them agile and inexpensive to create responsive supply chains, at the same time, should have a priority to focus on developing and integrating their core competencies to deal with issues common to jobs and enterprises in supply chains, the study found Case regulation should be a top priority in strategies to enhance maintainability and serviceability to make them flexible and inexpensive to create responsive supply chains, focus on their efficiency, and engage employees in the organization, and the study recommended conducting a study to understand and evaluate supply chain agility behavior to support decision-makers in order to develop a strategic solution to various organizational barriers.

The study of Buer et al (2021), The study aimed to show the impact of lean manufacturing and digitization on operational performance in its dimensions (quality, cost, delivery, and flexibility), based on data from a cross-sectional survey of manufacturing companies, and research on the relationships between the use of lean manufacturing, plant digitization and operational performance in Norway, data were collected from (212) Norwegian manufacturers, the number of valid responses for analysis was (75) responses, and multiple hierarchical regression analysis was used while simultaneously controlling the effects of repetition Production, company size, and length of implementation of lean manufacturing, and the data was analyzed using SPSS software, and the study found that both lean manufacturing and digitization of factories contribute individually to improving operational performance, moreover, it was found that when used together, they have a complementary (or synergistic) effect greater than their individual effects combined, and the study recommended the need to focus on lean manufacturing in order to reap the benefits of emerging technologies and translate them into performance Enhanced operational.

Rehman et al. (2020) The study aimed to assess the behavior of supply chain agility in the context of Saudi organizations, the effectiveness and importance of this model was explored through a case study conducted in a Saudi dairy processing company, and given the complexity and large number of calculations required to assess the agility of supply chains, the decision support system was proposed as a tool to assess supply chains through their

dimensions (speed, response, flexibility, efficiency, customer needs) and identify obstacles to a sustainable strategic solution to an organizational goal. The study found that to achieve and maintain local and global success, the organization sought to become a major local and global manufacturer to satisfy its customers, reduce the time required to reach the market, reduce total cost of ownership, and enhance its overall competitiveness by improving its flexibility across Supply chains are activities to promote sustainability for an existing industrialization organization in Saudi Arabia, and the study recommended that the ambiguous, open logical approach could be further enhanced through the use of the Internet of Things.

Study Hypotheses

Based on the main question of the study and the sub-questions, the hypotheses of the study can be determined as follows:

Main hypothesis Ho1: There was no statistically significant effect at a significant level ($\alpha \leq 0.05$) of the agility of supply chains in their dimensions (speed, responsiveness, flexibility, and efficiency) on the operational performance in its combined dimensions (quality, cost, and delivery) in the dairy companies in the Jordan.

1st Sub-Hypothesis: There was no statistically significant effect at a significant level ($\alpha \leq 0.05$) of the agility of supply chains in their combined dimensions (speed, responsiveness, flexibility, efficiency) on the quality of dairy companies in Jordan.

2nd Sub-Hypothesis: There was no statistically significant effect at a significant level ($\alpha \leq 0.05$) of the agility of supply chains in their combined dimensions (speed, responsiveness, flexibility, efficiency) on cost in dairy companies in Jordan.

3rd Sub-Hypothesis: There was no statistically significant effect at a significant level ($\alpha \leq 0.05$) of the agility of supply chains in their combined dimensions (speed, responsiveness, flexibility, and efficiency) in delivery in dairy companies in Jordan.

Method and procedure

Study Methodology

This section outlines the methodology, methods, and procedures to be employed in the study, detailing the study's type, nature, purpose, and the adopted strategy. It specifies the study population, sample, and unit of analysis. Additionally, the study tool, its components, its development process, and its validity and reliability are described. The section also covers the statistical methods anticipated for data analysis. The researchers have primarily relied on two main sources of information to construct this methodology.

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

(285) questionnaires were distributed, and (245) 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 dairy manufacturing companies in Jordan.

Part 1: Paragraphs related to the demographic characteristics of the study sample (gender, age, experience, and academic qualification) of workers in dairy industry companies in Jordan.

Part II: 35 paragraphs on the variables of the study.

Table (1)

Distribution of the Paragraphs of The Questionnaire

Number of paragraphs	Dimension	Variable
Supply chain agility	Speed	5
	Response	5
	Flexibility	5
	Efficiency	5
Operational performance	Quality	5
	Cost	5
	deliverable	5

To measure the " study variables ", the Likert five-point scale (I agree to a very large degree, I agree to a large degree, I agree to a moderate degree, I agree to a small degree, I agree to a very small degree) which numerically (1,2,3,4,5).

Analysis of Results and Hypothesis Testing

Descriptive statistics methods were used as measures of central tendency (arithmetic mean) and measures of dispersion (standard deviation)

Descriptive Analysis of Study Variables

Descriptive statistics of the dimensions of supply chain agility

Table (2)

Averages, deviations and rank for supply chain agility dimensions

Axis	Arithmetic mean	Standard deviation	Rank	Appreciation
Speed	3.63	0.827	2	medium
Response	3.63	0.789	3	medium
Flexibility	3.50	0.735	4	medium
Efficiency	3.98	0.657	1	High
Supply chain agility	3.68	0.752		medium

The table indicates the averages, deviations and rank of the dimensions of the agility of supply chains, and the table also indicates that there is an average grade with an arithmetic average of (3.68) for all its dimensions.

The table places efficiency in first place with an arithmetic mean (3.98) and standard deviation (0.657), after speed in second place with an arithmetic mean (3.63) and standard deviation (0.827), then after responding with an arithmetic mean (3.63) and standard deviation (0.789), and in last place after flexibility with an arithmetic mean (3.50) and a standard deviation (0.735).

Descriptive Statistics of the Dimensions of Operational Performance

Table (3)

averages, deviations and rank of operational performance dimensions

Axis	Arithmetic mean	Standard deviation	Rank	Appreciation
Quality	3.48	0.808	3	medium
Cost	3.56	0.764	2	medium
deliverable	3.65	0.621	1	medium
Operational performance	3.56	0.731	medium	

The table indicates the averages, deviations and rank of the dimensions of operational performance, and the table also indicates the existence of an average grade with an arithmetic average of (3.56) for all its dimensions. The table puts the post-delivery in first place with an arithmetic mean (3.65) and a standard deviation (0.621), after cost came in second place with an arithmetic mean (3.56) and a standard deviation (0.764), and finally after quality with an arithmetic mean (3.48) and standard deviation (0.808).

Hypothesis Testing

The study aims to examine the impact of the agility of supply chains in their dimensions (speed, response, flexibility, and efficiency) on the operational performance in its dimensions (quality, cost, delivery) in dairy companies in Jordan, and to achieve these goals, hypotheses will be analyzed using simple and multiple linear regression and according to the statistical literature, before testing hypotheses through linear regression, the data distribution must be verified naturally and then verified that the independent variables are free of high correlations, which may lead to problems in estimating the regression equation (Hair et al.,2010).

It was confirmed that this statistical condition was met in the study data by calculating the values of torsion coefficients and mutation coefficients for all independent and dependent variables, as shown in the following table:

Table of torsion and hypertension coefficients for study variables

Variable	Torsion coefficient	Hyperbole coefficient
Speed	-0.779	0.465
Response	-0.934	1.328
Flexibility	-0.422	0.455-
Efficiency	-0.512	0.266
Quality	-0.649	0.264
Cost	-0.756	0.452
deliverable	-0.261	0.195-

The table refers to the equinosity test (normal distribution) of the independent and dependent study variables, where according to (Sekaran and Bougie, 2016), the data of a variable can be considered a normal distribution if the absolute torsion coefficient values are less than 1 and the absolute mutation coefficient values are less than 3, and according to the results contained in the table above, it can be said that all variables are normally distributed, as these values were within the permissible range, and therefore parametric tests can be performed, including linear regression.

Testing the Main Hypothesis

H01: There is no statistically significant effect at the significance level ($\leq 0.05 \alpha$) of the agility of supply chains in their dimensions (speed, responsiveness, flexibility, and efficiency) on the operational performance in its dimensions (quality, cost, delivery) in dairy companies in Jordan.

In order to test the main hypothesis, a simple linear regression analysis was performed in order to test the impact of the agility of supply chains in their dimensions (speed, responsiveness, flexibility, and efficiency) on the operational performance in its dimensions (quality, cost, delivery) in dairy companies in Jordan as shown in the following table:

Main hypothesis test results table

Independent variable	F value	Significance level	Correlation coefficient	Coefficient of determination R ²	Beta	Standard error	Calculated T	Significance level	Judging the hypothesis of the study	Relationship Type
Supply chain agility	241.05	0.000	0.756	0.572	0.816	0.052	15.51	0.000	Acceptance of the alternative hypothesis	Positive
Dependent Variable: Operational Performance										

The table shows the results of the simple linear regression analysis in order to show the impact of the agility of supply chains in their dimensions (speed, response, flexibility, and efficiency) on the operational performance in its dimensions (quality, cost, delivery) in dairy companies in Jordan, as it was found that the statistical model is statistically significant, as the value of the F test was (241.06) at the level of significance (0.000), the value of the correlation coefficient was (0.757) and the value of the coefficient of determination was (0.573), and this indicates that the predictive power of the study model has reached (57.3%). The causal relationship between the agility of supply chains and operational performance was positive and statistically significant, as the beta value was (0.817) and the value of t (15.52) at the level of significance (0.000), i.e. less than (0.05), and this indicates the possibility of not accepting the null hypothesis, which indicates "There is a statistically significant effect at a significant level ($\alpha \leq 0.05$) of the agility of supply chains in their dimensions (speed, responsiveness, flexibility, and efficiency) in the operational performance in its combined dimensions (quality, cost, and delivery) in the dairy companies in Jordan".

Sub-Hypothesis Testing

The sub-hypotheses were tested through multiple linear regression analysis as shown in the following tables:

First: Testing the first sub-hypothesis

Ho1-1: There was no statistically significant effect at a significant level ($\alpha \leq 0.05$) of the agility of supply chains in their combined dimensions (speed, responsiveness, flexibility, efficiency) on the quality of dairy companies in Jordan.

Table of results of the first main study hypothesis test

Independent variable	F value	Significance level	Correlation coefficient	Coefficient of determination R ²	Beta	Standard error	Calculated T	Significance level	Judging the hypothesis of the study	Relationship Type
Speed	33.88	0.000	0.659	0.434	0.054	0.079	0.676	0.500	Acceptance of the null hypothesis	Positive
Response					0.292	0.090	3.327	0.001	Acceptance of the alternative hypothesis	Positive
Flexibility					0.191	0.094	2.029	0.044	Acceptance of the alternative hypothesis	Positive
Efficiency					0.336	0.085	3.930	0.000	Acceptance of the alternative hypothesis	Positive
Dependent Variable: Quality										

The table refers to the results of the multiple linear regression test to find out the effect of the agility of supply chains in their dimensions (speed, response, flexibility, and efficiency) combined on the quality dimension in dairy companies in Jordan, where it was found through the results of multiple linear regression that the statistical model is acceptable and statistically valid as the value of F was (33.88) and the value of the level of statistical significance was (0.000), meaning that it is less than the level of statistical significance at the level of (0.05) and the relationship between independent variables and quality was determined, where the value of the coefficient Correlation (0.659) To determine the predictive power of the independent variables combined on quality, the value of the coefficient of determination was calculated, which amounted to (0.434), which indicates the presence of predictive power by (43.4%).

Through multiple regression analysis, a positive effect of the response on quality was ($\beta = 0.292$, $t=3.327$ Sig=0.001) and this effect was statistically significant. The effect of flexibility on quality was positive as the test result was ($\beta = 0.191$, $t=2.029$, Sig= 0.044) and this effect was also statistically significant, and the effect of flexibility on quality was positive as the test

result was ($\beta = 0.336$, $t=3.930$, $Sig=0.000$) and this effect was statistically significant. While speed had no effect on quality ($\beta = 0.054$, $t=0.676$, $Sig=0.500$).

Second: Testing the Second Sub-Hypothesis

H01.2: There is no statistically significant effect at the significance level ($\leq 0.05 \alpha$) of the agility of supply chains in their dimensions (speed, responsiveness, flexibility, and efficiency) combined on the cost dimension of operational performance in dairy companies today in Jordan.

Table of results of the second sub-hypothesis test

Independent variable	F value	Significance level	Correlation coefficient	Coefficient of determination R ²	Beta	Standard error	Calculated T	Significance level	Judging the hypothesis of the study	Relationship Type
Speed	53.55	0.000	0.740	0.548	0.150	0.067	2.238	0.026	Acceptance of the alternative hypothesis	Positive
Response					0.222	0.076	2.914	0.004	Acceptance of the alternative hypothesis	Positive
Flexibility					0.281	0.080	3.523	0.001	Acceptance of the alternative hypothesis	Positive
Efficiency					0.264	0.072	3.653	0.000	Acceptance of the alternative hypothesis	Positive
Dependent variable: cost										

The table refers to the results of the multiple linear regression test to find out the effect of the agility of supply chains in their dimensions (speed, response, flexibility, and efficiency) combined on the cost dimension in dairy companies in Jordan, where it was shown through the results of multiple linear regression that the statistical model is acceptable and valid from a statistical point of view, as the value of F was (53.55) and the value of the level of statistical significance was (0.000), meaning that it is less than the level of statistical significance at the level of (0.05) and the relationship between independent variables and cost was determined where The value of the correlation coefficient was (0.740) and to determine the predictive power of the independent variables combined on the cost, the value of the coefficient of determination was calculated, which amounted to (0.548), which indicates the presence of predictive power by (54.8%).

Through multiple regression analysis, there was a positive effect of speed on cost, where the results were ($\beta = 0.150$, $t=2.238$, $Sig=0.026$) and this effect was statistically significant.

A positive effect of the response on the cost was ($\beta = 0.222$, $t=2.914$, $Sig=0.00$) and this effect was statistically significant. The effect of intellectual arousal on the cost was also positive, as

the test result was ($\beta = 0.281, t=3.523, Sig=0.001$) and this effect was also statistically significant, and the effect of efficiency on cost was positive as the test result was ($\beta = 0.264, t=3.653, Sig=0.000$) and this effect was statistically significant.

Third: Testing the Third Sub-Hypothesis

H01.3: There was no statistically significant effect at the significance level ($\leq 0.05 \alpha$) of transformational leadership in its dimensions (speed, responsiveness, flexibility, and efficiency) combined after delivery of the operational performance of dairy companies in Jordan.

Table of results of the third sub-hypothesis test

Independent variable	F value	Significance level	Correlation coefficient	Coefficient of determination R ²	Beta	Standard error	Calculated T	Significance level	Judging the hypothesis of the study	Relationship Type
Speed	51.72	0.000	0.734	0.539	0.109	0.055	1.980	0.049	Acceptance of the alternative hypothesis	Positive
Response					0.167	0.063	2.674	0.008	Acceptance of the alternative hypothesis	Positive
Flexibility					0.197	0.065	3.008	0.003	Acceptance of the alternative hypothesis	Positive
Efficiency					0.280	0.059	4.730	0.000	Acceptance of the alternative hypothesis	Positive
Dependent Variable: delivery										

The table shows the results of the multiple linear regression test to know the effect of the agility of supply chains in their dimensions (speed, response, flexibility, and efficiency) combined after delivery in dairy companies in Jordan, where it was found through the results of multiple linear regression that the statistical model is acceptable and statistically valid as the value of F (51.72) The value of the level of statistical significance was (0.000), meaning that it is less than the level of statistical significance at the level of (0.05) and the relationship between the independent variables and delivery was determined, where the value of the correlation coefficient was (0.734) and to determine the predictive power of the independent variables combined on delivery, the value of the coefficient of determination was calculated, which amounted to (0.539), which indicates the presence of predictive power of (53.9%). Multiple regression analysis showed a positive effect of speed on delivery where the results were ($\beta = 0.109, t=1.980, Sig=0.049$) and this effect was statistically significant.

A positive effect of response on delivery was found ($\beta = 0.167, t=2.674, Sig=0.008$) and this effect was statistically significant. The effect of flexibility on delivery was also positive as the

test result was ($\beta = 0.197$, $t=3.008$, $Sig=0.003$) and this effect was also statistically significant, and the effect of efficiency on delivery was positive as the test result was ($\beta = 0.280$, $t=4.730$, $Sig=0.000$) and this effect was statistically significant.

Discussion of Findings and Recommendations

Discussion of Results

This study has a set of important practical and administrative results, as it reached the following results:

1- The results showed a high statistical significance of the model, where the value of F was (241.06) and the level of significance (0.000). The value of the correlation coefficient was (0.757) and the coefficient of determination (0.573), indicating that 57.3% of the variation in operational performance can be explained by the agility of supply chains. Based on these results, the null hypothesis can be rejected, confirming a positive and statistically significant impact of supply chain agility on operational performance.

2- The results showed that the statistical model is acceptable with a value of F (33.88) and a level of significance (0.000), which means that the model is statistically significant. The correlation coefficient was (0.659) and the coefficient of determination (0.434), indicating that 43.4% of the variation in quality can be explained by the agility of supply chains. Responsiveness, flexibility and efficiency had a positive and statistically significant effect on quality, while speed had no statistically significant effect.

3- The results showed that the statistical model is acceptable with a value of F (53.55) and a level of significance (0.000). The value of the correlation coefficient was (0.740) and the coefficient of determination (0.548), indicating that 54.8% of the variance in cost could be explained by the agility of supply chains through speed, responsiveness, flexibility, and efficiency that had a positive and statistically significant impact on cost.

4- The results showed that the statistical model is acceptable with a value of F (51.72) and a level of significance (0.000). The value of the correlation coefficient was (0.734) and the coefficient of determination (0.539), indicating that 53.9% of the variation in delivery could be explained by the agility of supply chains. Speed, responsiveness, flexibility, and efficiency all had a positive and statistically significant effect on delivery.

Recommendations

Based on the results obtained through statistical analysis in addition to discussing the results, the following recommendations were made:

1- The need to focus on reducing the time required to respond to changes in demand by adopting enterprise resource planning (ERP) systems and forecasting demand more accurately. In addition, greater flexibility can be achieved by applying flexible inventory management strategies, such as just-in-time inventory (JIT), to reduce excess inventory and meet orders quickly and effectively.

2- The need to develop training programs to enhance the skills of employees in managing operations and improve efficiency in performing daily tasks. Modern technology, such as automation and robotics, can also be used to improve efficiency and reduce human error, resulting in improved overall operational performance.

3- Implement quality improvement programs, to improve processes and reduce defects. In addition, TQMS can be used to promote a culture of quality at all stages of production and distribution, improving the overall quality of the products and services provided.

4. Recommend the use of supply chain cost analysis, such as ABC analysis (cost analysis), to identify the most expensive activities and focus on optimizing them. Negotiation with suppliers for better prices and more flexible terms can also be improved, reducing overall costs and improving profitability.

5- Encourage cooperation and communication between various departments to improve coordination and harmony in work, which leads to improving the overall performance of the company. Integrated supply chain management systems can be used to enhance seamless collaboration and information exchange between all departments involved, enhancing operational efficiency and increasing the effectiveness of production processes.

6- Conduct future research focused on developing strategies and mechanisms to increase responsiveness and flexibility in supply chains. These strategies can include the application of modern technology such as artificial intelligence and the Internet of Things to improve responsiveness and speed of adaptation to changes.

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