



## Impact of Supply Chain Integration and Operational Flexibility on Service Quality

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### ABSTRACT

The pharmaceutical industry operates in a highly complex and competitive environment, demanding efficient supply chain management and operational flexibility to ensure service quality and customer satisfaction. This study examines the impact of supply chain integration and operational flexibility on service quality in a pharmaceutical distribution company. Using a mixed-method research design, data were collected from a pharmaceutical distribution company in terms of its supply chain integration practices, operational flexibility measures, and service quality performance. Quantitative data were obtained through surveys administered to employees involved in supply chain operations and customers, while qualitative data were gathered through interviews with key stakeholders. The qualitative analysis shed light on the mechanisms through which supply chain integration and operational flexibility affected service quality. Enhanced coordination and information sharing among supply chain partners were identified as critical aspects of successful integration, leading to improved order processing and timely deliveries. Similarly, operational flexibility enabled the distribution company to promptly respond to fluctuations in demand, optimizing inventory management, and meeting customer expectations.

### 1. INTRODUCTION

The pharmaceutical industry is a critical sector in the United Arab Emirates (UAE), playing a pivotal role in safeguarding public health and ensuring access to essential medications. In this highly regulated and dynamic environment, pharmaceutical distribution companies in the UAE face substantial challenges in maintaining high service quality standards while efficiently managing their supply chains (Cheung et al., 2021). To address these challenges, the impact of supply chain integration and operational flexibility on service quality has become a subject of significant interest and importance.

Supply chain integration and operational flexibility are two interrelated concepts that hold the

potential to transform the pharmaceutical distribution landscape in the UAE. Supply chain integration involves the seamless coordination and collaboration among different stakeholders within the pharmaceutical supply chain, including manufacturers, distributors, wholesalers, and retailers (Liu and Chiu, 2021). Through effective integration, companies can optimize the flow of goods, reduce lead times, and enhance communication and visibility across the supply chain.

Operational flexibility, on the other hand, refers to the ability of pharmaceutical distribution companies to adapt swiftly and effectively to changing market conditions, customer demands,

and unexpected disruptions (Alolayyan et al., 2022b). In a dynamic industry such as pharmaceuticals, the capacity to respond promptly to fluctuations in demand, supply chain disruptions, and emergencies is crucial to ensuring continuous service provision and maintaining customer satisfaction.

The UAE pharmaceutical distribution sector operates within a highly competitive landscape, where service quality is a key differentiator in gaining a competitive edge (Pulevska-Ivanovska and Kaleshovska, 2013). Service quality encompasses various dimensions, including order accuracy, delivery reliability, response time, and customer service, all of which are deeply influenced by the integration of supply chain operations and the degree of operational flexibility within pharmaceutical distribution companies (Taher M. Ghazal et al., 2023; Kitsiou et al., 2007). Understanding the impact of supply chain integration and operational flexibility on service quality is of paramount importance to the stakeholders in the UAE pharmaceutical industry. Through comprehensive research and analysis, this study aims to provide valuable insights into the correlation between these critical factors and service quality metrics. By identifying the key drivers that enhance service quality, pharmaceutical distribution companies can devise effective strategies to optimize their supply chain processes, meet customer expectations, and navigate the complexities of the industry.

In this context, this research aims to contribute to the body of knowledge surrounding supply chain management and operational practices in the UAE pharmaceutical distribution sector. The findings of this study can serve as a roadmap for companies to align their supply chain integration efforts and cultivate operational flexibility to elevate service quality levels, thus ultimately advancing the industry's contribution to public health and well-being in the UAE.

### 1.1. Problem Statement

The absence of a comprehensive understanding of the relationship between supply chain integration, operational flexibility, and service quality in the pharmaceutical distribution sector in the UAE poses a critical challenge (El Khatib et al., 2022). Companies may struggle to identify the most effective strategies for optimizing their supply

chain operations and achieving high service quality levels. Furthermore, the dynamic nature of the pharmaceutical industry demands adaptable and resilient supply chain practices, making operational flexibility a critical determinant of long-term success and competitiveness.

Therefore, this research aims to address the problem by investigating the impact of supply chain integration and operational flexibility on service quality in pharmaceutical distribution companies in the UAE. By exploring the relationship between these factors, the research endeavors to provide valuable insights that can guide pharmaceutical distribution companies in the UAE towards effective strategies for enhancing service quality and optimizing their supply chain operations. Understanding and addressing this problem can contribute to improved healthcare services, patient outcomes, and overall public health in the UAE.

## 2. THEORETICAL FRAMEWORK

In the health care sector, the model of the operational flexibility dimension consists of the primary two dimensions (M. El Khatib et al., 2022). The dimension applies to the supply chain integration to enhance the services provided in the healthcare sector (Al-Dmour et al., 2023). In healthcare supply chain integration is complex as the aspect to consider are crucial to the health of the human (Gaytan et al., 2023). Standardization is the aspect applied in promoting the operational and supply chain integration in the healthcare sector. The two work together for information synchronization to provide quality services to all consumers and stakeholders (Bawaneh et al., 2023; Kassem and Martinez, 2022). The improvement of the supply chain in healthcare promotes operational flexibility. The services which are rendered by supplies are well required for enhancing the performance of the healthcare through operational flexibility (Aziz et al., 2023). The relationship between operational flexibility and the service quality in healthcare is that operational flexibility is a variable that is independent and has a positive impact on the service quality in the healthcare sector (Akour et al., 2023; El Khatib et al., 2021). The healthcare performance in terms of service quality is directly proportional to operational flexibility, which influences the performance of healthcare

(Abudaqa et al., 2021; H. M. Alzoubi et al., 2022g). The high performance in operational flexibility increases the production of healthcare, which is generally the quality of the service provided is improved (I. Akour et al., 2022). The overall healthcare achievement depends on the practice of the operational flexibility (Aljumah et al., 2023; Blooshi et al., 2023; El Khatib and Ahmed, 2020). In the service quality, the measurement is determined by the operation flexibility practiced in healthcare concerning the consumer or the customer (Al-Kassem et al., 2022; Muhammad Alshurideh et al., 2023; Khan et al., 2022). The change in service quality is due to a change in operational flexibility, which will also change the operational performance of healthcare. To improve service quality, operational flexibility have to be developed (Aityassine et al., 2022; Gulseven and Ahmed, 2022).

Supply chain integration determines the service quality provided by the healthcare sector (Ahmad Ibrahim Aljumah et al., 2022a; H. M. Alzoubi et al., 2022c). Supply chain integration also contributes to the overall operational flexibility of healthcare, which is the essential aspect of the performance (AlDhaheri et al., 2023; El Khatib, 2015; Louzi et al., 2022a). For the healthcare strive to improve the service quality, they have been working hard to improve the hospital supply chain integration, which provides essentialities for the performance (M T Alshurideh et al., 2022; Hani Al-Kassem, 2021). Supply chain integration is enhanced as it is the central point that enhances the healthcare facilities to perform more efficiently without problems (H. Alzoubi et al., 2022). The service quality depends on the operational flexibility performance, and the operational flexibility performance depends on the supply chain integration directly (Abudaqa et al., 2022; Louzi et al., 2022b).

Consequently, considering the chain, in case of the failure in supply chain integration, then every aspect of healthcare will fail (Nadzri et al., 2023). Improving supply chain integration, it's automatic that the healthcare system will improve performance hence enhancing the quality of services (Al-Awamleh et al., 2022; Mohammed T. Nuseir et al., 2022). Therefore, the supply chain integration is a crucial aspect in the healthcare sector.

## 2.1. Operational Definitions

### 2.1.1. Supply Chain Integration

Generally, supply chain the resources that are required to deliver services or goods. However, in the healthcare sector supply chain is complicated as it is a fragmented process (T M Ghazal et al., 2023b). In healthcare, the supply chain involves managing supplies, obtaining resources, and delivering services and good to the providers and patients (Al-Kassem, 2017; El Khatib and Opulencia, 2015). The method of the supply chain integration in healthcare has to pass through different stages for the include stakeholders such as manufacturers, insurance organizations, purchasing group organizations, hospitals, and regulatory agencies (A I Aljumah et al., 2022a). Independent stakeholders, including manufacturers, insurance companies, hospitals, providers, group purchasing organizations, and several regulatory agencies (Almasaeid et al., 2022; Mat Som and Kassem, 2013). The supply chain is essential to healthcare for performance.

### 2.1.2. Operational flexibility

Operational flexibility is the process in which healthcare services are provided with more comfortable and without difficulties and struggles (Ahmed and Nabeel Al Amiri, 2022). The operational flexibility depends on the supply chain integration, which gives the healthcare stakeholders more ease to deliver the services require from their clients (M. Alshurideh et al., 2022; H. M. Alzoubi et al., 2022f; El Khatib et al., 2019). Moreover, operational flexibility is the flow of the work and services in the healthcare sector, considering the services and the products provided (Al-Kassem, 2014; Arshad et al., 2023). Operational flexibility is the crucial aspect in healthcare setup that influences the quality of the services rendered to the clients. It is enhanced by supply chain integration.

### 2.1.3. Service quality

In healthcare, the quality of the service is defined as the feature that shapes the care experience beyond the competence in technicality (Sakkthivel et al., 2022). The service rendered to the clients and the patient in the healthcare sector is referred to as service quality (Alshawabkeh et al., 2021; Lee et al., 2023). The quality of the service can be determined by the perception of the client receiving the

services (Al-Kassem et al., 2013; Al-Marroof et al., 2022b; Khatib et al., 2016). The quality of the service can be either low, moderate, or high based on the perceived performance and knowledge of the customers or the clients (Varma et al., 2023). The service quality depends on the operational flexibility and the supply chain integration in the healthcare setup.

Supply chain sector. Only a few researchers have tried to determine the model of quality service in the context of the supply chain (Muhammad Turki Alshurideh et al., 2022b). The Res have mostly considered the consumers on their service quality (Al-Kassem et al., 2012; Nuseir and Aljumah, 2020). It indicates clearly that there is no much done on the supply chain context on service quality (Ahmed et al., 2022; Muhammad Turki Alshurideh et al., 2022a; T M Ghazal et al., 2023c). However, the operational flexibility scale has been applied in the supply chain in different occasion considering the perception of the services (Al-Marroof et al., 2022a; Farrukh et al., 2023). In the supply chain context, the five dimensions may be applicable in some situations of the quality of the service (El Khatib and Ahmed, 2019).

The PSCs is widely applied in the pharmaceutical industries as it uses a different process (I. A. Akour et al., 2022; Nuseira and Aljumahb, 2020). The processes include management and operational methods mostly applied in discoveries, manufacture of medications and drugs, and development (Amiri et al., 2020). The pharm is distributed to consumers through the PSCs, which are an essential path for the right time, right quality, and righty place for the consumers (R. S. Al-Marroof et al., 2021b; Nuseir, 2021). For ensuring delivery of the medicine to the patient under the right circumstance and right time, to alleviate suffering or cure diseases, the PCs are very complex and responsive (Aljumah et al., 2020; E. Khatib et al., 2021).

The type of supply chain is very sensitive as it provides services that deal with human life. Hence the errors are not acceptable in this sector as it's between the life and health of the humans (Muhammad Turki Alshurideh et al., 2023c; M. Alzoubi et al., 2021). Currently, the industry is facing many challenges concerning the services it provides (H. M. Alzoubi et al., 2022d). Competition is highly faced in these industries as there are emerging generic industries as there is a need to

reduce the time to market period.

### 3. LITERATURE REVIEW

#### 3.1. *Service quality definition*

Quality is the measure of the service or product ability to perform the task or fulfill the needs required. The service assessment involves the evaluation of the quality, which includes functionality and technical quality. The product is only evaluated on the technical quality, which is the outcome. According to (Abudaqa et al., 2021; A. Al-Marroof et al., 2021), the various definition of services have been developed, and multiple scales of measurements evaluated (Yasir et al., 2022). The primary description of the service quality is the difference between the perceived performance of the service and the expectations of the customers (A I Aljumah et al., 2022b; Muhammad Turki Alshurideh et al., 2023a). The quality offered entirely depends on the performance when service quality provided is not sufficient, then customers are not satisfied (AlHamad et al., 2021). However, high-performance expectation leads to the satisfaction of the customer's expectation (El Khatib et al., 2020b).

(H. M. Alzoubi et al., 2022a), reveals that expectations are beliefs which are pre-trial about the service or the product. The universal judgment or attitude about the service level is service quality (H. M. Alzoubi et al., 2022b). The res in the quality sector is used to measure the quality of the services provided. (Aljumah et al., 2021a; Khatib et al., 2022) reveals the industry of measuring the services. They further researched and concluded that the product sector and services sector nature is different from each other.it was applied by (Alkitbi et al., 2021; H. M. Alzoubi et al., 2022e; Nuseir and Elrefae, 2022) in the evaluation of the services in health care sectors and summarized that the perception of the customer determines the nature of the service quality provided to them. Other researchers like (Aljumah et al., 2021b) also reveals that the service outcome is directly proportioned to the service quality. In conclusion, the measurement and identification of the service quality are not easy considering different perceptions of the individuals receiving the services.

#### 3.2. *The measurement of service quality*

The central aspect of improving and developing the

service quality is measurement and analysis of the service quality as revealed by (R. S. Al-Maroof et al., 2021a; Nuseir et al., 2021) in their studies. The instrument of measuring and identifying the quality is required for the effective operation of the system (Mubeen et al., 2022). The characteristics of the services include incongruity, perishability, inseparability, and intangibility contribute to difficulties in measurements. According to (El Khatib and Ahmed, 2018), the difference between customers' perceptions and their expectations is the best definition of service quality (Alshamsi et al., 2021; H. Alzoubi et al., 2022). It involves questions; why they want and why they receive the services (T M Ghazal et al., 2023a). The operational flexibility scale has been implemented accordingly for the measurement of the service quality (Akour et al., 2021; M T Nuseir et al., 2022a). In the history of the services quality services evaluation, the operational flexibility scale has been a point of turning.

### 3.3. Service quality models

The variety of dimensions is the perception of service quality. However, the general number of the dimension has not been specified accordingly. The proposed name of the dimension is two, three, five, and ten. The service quality evaluation is a highly complicated task and involves different abstraction levels of assessment (H. M. Alzoubi et al., 2020; M. El Khatib et al., 2021). The models of service quality have been proposed by various researchers.

In this section, the top five of

The models of the service quality are described as follows;

The Nordic Model

- The model focuses on the paradigm of disconfirmation. It draws the comparison between expected service and the performance perceived. According to (M Alshurideh et al., 2023a), the function of the gap between the perception of the quality of the service delivered and the expectation. The framework for the operational flexibility has been issued by service quality conceptualization (M T Nuseir et al., 2022b).

### 3.4. Operational flexibility.

According to (Nuseir and Aljumah, 2022), the

model is based on the paradigm of disconfirmation of the measurement of the service quality (Alzoubi and Ahmed, 2019). The new measure was determined to overcome the Nordic model weakness of the measurement (Emad Tariq et al., 2022). It was a new way of identifying and measuring service quality (Muhammad Turki Alshurideh et al., 2022c). The existing gap between delivered services and expected is applied by operational flexibility to measure the service quality (Nuseir, 2020). The model has three components, which include the service product, the service environment, and service delivery (Muhammad Turki Alshurideh et al., 2023b; E. Khatib et al., 2022).

*The Multilevel Model:* To improve operational flexibility and eliminate its weakness, the multilevel model was developed. The model is grouped into three stages, which include sub-dimension, primary dimension, and overall perception of the services (Ahmad Ibrahim Aljumah et al., 2022b; E Tariq et al., 2022). It is designed for specific retail stores evaluation. It involves five dimensions, which include policy, problem-solving, personal interaction, reliability, and physical aspect (H. Alzoubi et al., 2020).

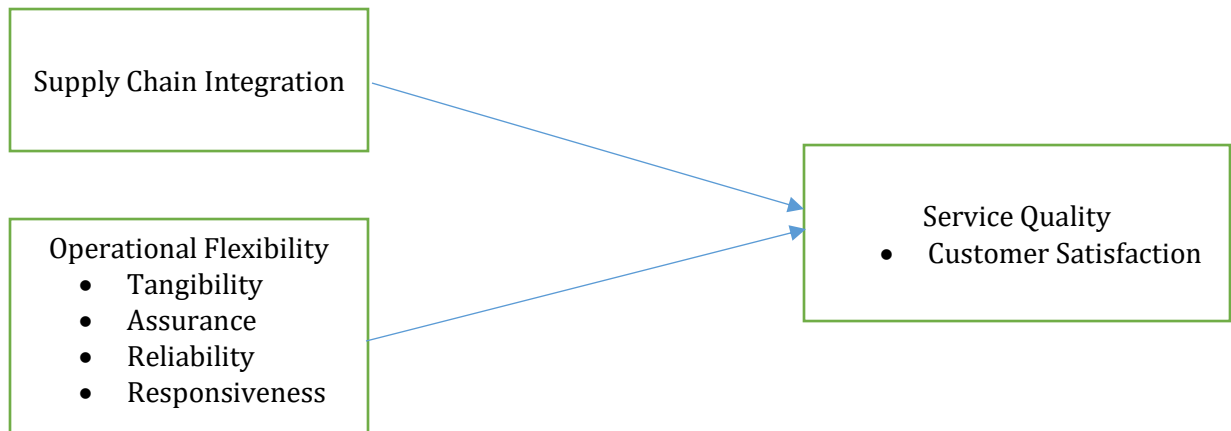
The operational flexibility scale has provided services to res on service quality; it has been applied in determining various aspects related to service quality (Nuseir et al., 2020). According to (El Khatib et al., 2020a), the ten dimensions were embedded on the 34-item service quality scale with the following; tangibles, customer's knowledge, security, credibility, communication, access, competence, responsiveness, and reliability (Alzoubi et al., 2019).

They work as the with the following as delivered Reliability- is the accurately and dependably performing the promised task.

- Assurance-the ability of employees to inspire confidence and trust with their courtesy and knowledge.
- Tangibility-appearance of the personnel, equipment, and physical facilities.
- Responsiveness- providing services and helping customers willingly.

Empathy- individual attention and caring supplied to customers by the company.

## 2.5. Research Model



**Figure (1)**

## 3. METHODOLOGY

The research seeks to work on ways of establishing the impact of supply chain integration and operational flexibility on service quality. The study will use the five dimensions of operational flexibility as well as other supply chain process in developing the best strategies for delivering high-quality services. The research uses the satisfaction of the customers as the measure for the service quality from the medical supply manufacturers. The study would compare the results from the two sets of variables as a way of ensuring there is a conclusion on the possible relationship between the variables.

### 3.1. Population and Sample

The research population is the people that would be useful in providing the information for the research. The research population for this research has more than 120 executives for the companies the supply chain in the United Arab Emirates. However, the research samples only twenty out of the 120 administer the questionnaire. The choice of twenty as the sample size is due to the ability to manage the sample size and lower the cost and time of carrying out the research.

### 3.2. Data Collection Method (Questionnaire)

A questionnaire was a useful instrument of research in this study. The researcher developed five traits of supply chain and operational to ask the

managers and supply chain experts on their impact on the quality of the services. The questionnaire is then presented to a sample of twenty experts involved in the supply chain. The administration of the question is done through an email, and the responses received after one week.

### 3.3. Data Collection

The researcher administers questionnaires to 20 pharmaceutical distributors in the United Arab Emirates. The pharmaceutical distributors work directly with the manufacturing companies in the medical sector. Also, the companies work directly with the medical service providers, including hospitals and other pharmacies, making the companies appropriate for the research study. The questionnaire is designed to highlight the significance of the distributional challenges in getting the medical providers to offer quality services. The researcher distributed 200 questionnaires to the managers in pharmaceutical companies. There was a 100% return rate of the responses. The sample number was appropriate for further analysis.

## 4. DATA ANALYSIS

The research uses statistical analysis in establishing the relationship between the variables in the study. The results of the mean and Cronbach's alpha are instrumental in establishing the relationship between the variables in the research. The respondents were asked leading

questions on the dimensions of the operational flexibility and supply chain integration. The results

of the statistical analysis are as in the table 1 below:

Table 1: Model Reliability Analysis

Dimension	Mean	No. of deleted items	KMO	Average variance extracted (AVE) %	Factor Loadings	Cronbach's coefficient ( $\alpha$ )
Reliability	4.5	3	0.791	50	0.601-0.766	0.739
Tangible	4.2	1	0.736	52	0.683- 0.768	0.695
Assurance	4.3	3	0.653	51	0.658-0.788	0.680
Empathy	4.4	1	0.685	54	0.663-0.861	0.711
Responsiveness	4.5	0	0.694	70	0.808-0.868	0.782

The results of the respondents on reliability presents a mean of 4.5. The Cronbach's alpha is also at the 0.739, which is relatively high, showing the reliability of the results. At the average variance of the items measured at 50%, the results show a strong link between the reliability and the service quality in the supply of the medicine manufacture industry.

The second aspect tested was the tangibility of the supply chain system. The results show a mean of 4.2 with a reliability test of 0.69. The average variance is also higher than the average at 52%. The results also indicate a direct relationship between the need to have a tangible supply chain and the provision of high-quality services in the medical manufacturing industry.

The third variable of the research is the assurance aspect. The assurance trait of the supply chain attracts an average score of 4.3, with a reliability

test of 0.68. The average of the variance is at 51%, showing an increased level of assurance quality and its impact on the service quality. The results show the strong significance between the assurance trait and service quality.

The fourth trait tested included empathy trait. The results of the empathy variable from the statistical variable were at 4.4 as the mean score. The reliability test included a score of 0.711 from the Cronbach's alpha. Similarly, the results are an indication of the high rate of responses to indicate the significance of the empathy traits in the service quality.

The last variable in the test involved the responsive nature of the supply chain. The respondents recorded a mean of 4.5 on the responsive dimension. Similarly, the dimension also had a reliability test of 0.782. Also, the responsiveness recorded a high average variance at 70%, showing



the significance of the responsiveness in the production of quality services in the medical manufacture industry.

## 5. RESULTS DISCUSSION

The results of the study conducted in the United States show a clear relationship between the supply chain integration and operational flexibility variables to the quality of the supply to be directly related. The research used Cronbach's alpha as a way of testing the reliability of the tests in the process. The variables in the supply chain integration and the operational flexibility are chosen as proposed by (Lotfi et al., 2013). These traits define the characteristics of the supply chain that would be needed in ensuring the distributors meet the needs of the consumers. The analysis of the data will help in creating an understanding between the variables and the quality of the services.

The results have established the impact of the reliability test on the quality of the services in the medical sector. The quality of the services is measured by the level of satisfaction in the process. The hospitals and the pharmacies getting supplies from the distributors believe in the distributors. There is trust in the supply chain. The deliveries are accurate and on time. The products requested arrive on time as orders showing the suppliers are reliable. The consequence of the reliability trait is the possibility that the consumers and the buyers are also possibly getting the products they need at the right time during treatment (Alolayyan et al., 2022a).

The study has also shown that assurance is directly related to the service quality in the medical manufacturing industry. The employees and the people taking care of the supplies are trained to be competent. They are motivated to carry out their work, making them be possibly driven by the need to satisfy the consumers (Aburayya et al., 2020). The working population in the supply sector creates a relationship with the buyers, such that there is effective communication during the supply process. The other factors that affect the quality of the supplies are the tangibility and the responsive nature of the supply chain. The type of equipment manufactured and supplied is tangible and, as such, can be compared to others. The comparison process should lead to an understanding that the equipment can be of better quality to the rest of the

materials. The results of the study have all been subjected to a reliability test and shown the results to be reliable.

## 6. CONCLUSION AND RECOMMENDATION

In conclusion, the research has established a direct relationship between the supply chain and operational flexibility to the quality of service in the study. This research sheds light on the significant impact of supply chain integration and operational flexibility on service quality in pharmaceutical distribution companies. Through an in-depth analysis of the interrelationships among these key factors, valuable insights have been gained, and several crucial findings have emerged.

The findings indicate that supply chain integration plays a pivotal role in optimizing pharmaceutical distribution processes. By fostering collaboration, information-sharing, and coordination among various stakeholders, supply chain integration streamlines operations, reduces lead times, and enhances overall efficiency. This, in turn, positively influences service quality by ensuring timely and accurate deliveries, minimizing stockouts, and meeting customer demands more effectively.

Moreover, with limited data, it becomes challenging to apply complex statistical analyses effectively. The lack of sufficient data points can reduce the reliability of statistical tests, making it difficult to establish significant relationships or draw accurate conclusions. Limited data analysis may not provide a comprehensive understanding of the research topic.

### 6.1. Practical implications

Practically, this research holds valuable implications for pharmaceutical distribution companies seeking to improve service quality and gain a competitive edge in the industry. Investing in supply chain integration and operational flexibility can be a strategic decision, leading to enhanced customer satisfaction, increased operational efficiency, and improved overall performance. Companies should prioritize adopting advanced technologies, flexible organizational structures, and collaborative approaches to achieve these objectives effectively. Additionally, the impact of supply chain integration and operational flexibility on service quality in pharmaceutical distribution companies is



undeniable. This research serves as a foundation for further exploration and underscores the importance of strategic investments in integrating supply chains and fostering operational flexibility. By continuously adapting to the ever-changing industry landscape, pharmaceutical distribution

companies can thrive, meet customer expectations, and maintain a strong position in the competitive market.

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