

Analysis The Effect of Service Quality Supply Chain Management Healthcare Product Towards Hospital and Clinical Laboratories Satisfaction

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Abstract

Supply chain management (SCM) is one of the critical things in healthcare sector because it has a direct effect on the quality of services provided. The aim of this study is to analyse the effect of service quality on supply chain management of healthcare products in hospital and clinical laboratories satisfaction. The study adapted six dimensions of service quality namely assurance, communication, empathy, reliability, responsiveness, and tangibles. Survey data was analysed using Structural Equation Modelling-Partial Least Square (SEM-PLS). A total of 67 hospitals and clinical laboratories were the research sample. The results show that service quality on supply chain management of healthcare product has a positive effect on hospital and clinical laboratories satisfaction. Reliability is the most prominent dimension that determines hospital and clinical laboratory satisfaction. Items that contribute to reliability include complaint handling, product authenticity guarantee, order processing, on time delivery, providing product information updated and routine visitation.

Keywords: Healthcare industry, Supply Chain Management (SCM), Customer Satisfaction, Service Quality (SERVQUAL), PLS-SEM.

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1. Introduction

The cost of healthcare is consistently on the rise due to increasing supply chain expenses (Kumar et al., 2008; Lee et al., 2011). As the cost of medication and associated services rises, patients face restrictions in accessing healthcare of a satisfactory standard (Khorasani, Cross, & Maghazei, 2020). To provide patients with excellent medication while avoiding additional financial strain, healthcare institutions need to prioritize the improvement of their supply chain management (SCM) system (Khorasani et al., 2020). An effective SCM can assist healthcare organizations in optimizing their operations and reducing inventory costs, ultimately leading to more affordable healthcare for patients. Consequently, this can improve accessibility to care and enhance overall service quality. Therefore, the improvement of SCM in the healthcare sector has gained significant importance in recent years (Khorasani et al., 2020). To achieve an effective SCM, healthcare organizations should streamline their processes, efficiently manage inventory, and leverage technology to enhance efficiency (Pal, Baral, Mukherjee, Venkataiah, & Jana, 2022). By doing so, they can improve their cost structure and decrease operational expenses while simultaneously providing improved care to patients.

In the Asia-Pacific region, the healthcare industry has been growing at a faster pace compared to the overall economy, resulting in a greater share of the economy being allocated to healthcare. Between 2010 and 2019, the real per capita health spending experienced an average annual growth rate of 4.7%, surpassing the 3.6% growth observed in the gross domestic product (GDP) (OECD WHO, 2022). In Indonesia specifically, health expenditure has significantly increased from 4.2% to 10.1% during the period of 2005-2022 (OECD WHO, 2022).

Consequently, reducing healthcare costs in general requires minimizing inventory costs, waste reduction, maximizing supply chain collaboration, and generating value in healthcare supply chain management (SCM) (Nollet & Beaulieu,

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2003). Additionally, hospitals face challenges related to long wait times resulting from an imbalance between supply and the number of patients in the system (Setijono, Naraghi, & Ravipati, 2010). Meeting customer expectations and price demands while maintaining high service quality presents a significant challenge for SCM in the healthcare sector (Pal et al., 2022). The key to resolving this issue and enhancing service quality lies in innovation and gaining a competitive advantage (Kim et al., 2016).

Numerous studies have emphasized the significance of effective supply chain management (SCM) in the healthcare sector (Gjellebæk, Svensson, Bjørkquist, Fladeby, & Grundén, 2020; Kumar et al., 2008; Sang M. Lee et al., 2011). Healthcare organizations aim to ensure efficient operations by focusing on cost reduction, enhancing value-added processes, maintaining benchmark quality for goods and services, and fostering strong vendor cooperation to provide the highest quality services to patients (Gjellebæk et al., 2020; Kim et al., 2016). In recent times, the pharmaceutical industry has shifted its attention towards optimizing the supply chain to deliver added value, going beyond the sole focus on drug development (Shah, 2004). The measurement of hospital supply chain performance is essential to identify and address logistical deficiencies, serving as valuable input for managerial decision-making (Moons, Waeyenbergh, & Pintelon, 2019). Service quality within the pharmaceutical supply chain holds significant importance as it directly impacts people's health (Parmata, Sankara Rao, & Rajashekhar, 2016).

Research has demonstrated that service quality and patient satisfaction play a significant role in influencing behavioural intentions within the healthcare services context (Murti, Deshpande, & Srivastava, 2013). Customer satisfaction serves as a crucial parameter for evaluating the quality of service provided by service providers to their customers (Gupta & Rokade, 2016). The SERVQUAL (Service Quality) scale is commonly employed for assessing healthcare service quality (Pekkaya, Pulat İmamoğlu, & Koca, 2019). A previous study by (Ahmad, Awan, Raouf, & Sparks, 2009) examined the service quality of the pharmaceutical supply chain from the retailer's perspective using SERVQUAL. The study concluded that service quality measurement should be customized to suit the specific context. Another study conducted by (Parmata et al., 2016) analysed the service quality of the pharmaceutical supply chain from the distributor's perspective, utilizing the four dimensions of SERVQUAL: communication, reliability, assurance, and responsiveness. The findings indicated that the perceived service quality by the distributor had an impact on satisfaction. However, those above-mentioned studies have not investigated the impact of SERVQUAL toward satisfaction from the perspective of corporate customer. Therefore, the aim of this study is to examine the service quality of supply chain management towards satisfaction from healthcare facilities perspective. This study will be operational by structural equation model that widely used to examine the service quality toward satisfaction. This study contributes to the current literature by presenting how supply chain service quality can improve the satisfaction of corporate customers in the healthcare industry, as well as healthcare companies can make efforts to manage the quality of supply chain services in healthcare sector.

2. Literature Review

Operations management and Supply Chain Management (SCM) are interrelated in creating value and transforming inputs into outputs that provide added value to customers (Heizer, Render, & Munson, 2017). SCM is an integrated process that covers a wide range of activities from suppliers to customers, involving the management of materials, information and financial flows (Mathur, Gupta, Meena, & Dangayach, 2018).

In the context of the healthcare sector, implementing SCM practices can help improve business performance and increase customer satisfaction. Improved business performance can be achieved through reducing operational costs, increasing efficiency, and increasing productivity (Yanamandra, 2018). Meanwhile, customer satisfaction can be increased through the provision of high quality, effective and efficient services. However, the implementation of SCM in the healthcare sector is still in its infancy worldwide. One of the challenges faced is the complexity of the health supply chain which involves many stakeholders and strict regulatory aspects (Mathur et al., 2018). Therefore, the development of an appropriate and adaptive SCM strategy is essential to achieve effectiveness and efficiency in the healthcare supply chain.

Healthcare Supply Chain (HSC) encompasses the flow of information, supplies, and finances involved in the acquisition and distribution of goods and services from suppliers to end users, with the aim of enhancing clinical outcomes while managing costs (Mustaffa & Potter, 2009). The central entity in the HSC is the hospital. The HSC consists of four key stakeholders: producers, distributors, health service providers, and payers. Figure 1 provides an illustration of these components.

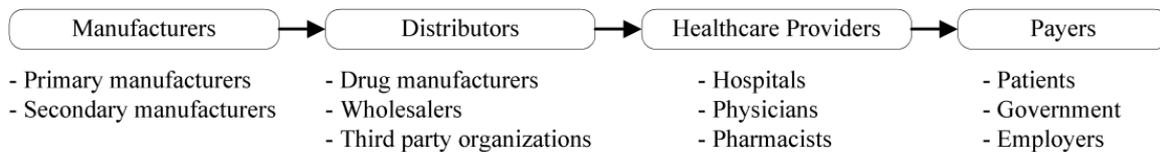


Figure 1. Healthcare Supply Chain

Source (Kritchanchai, 2014)

Producers within the healthcare supply chain can be categorized into primary and secondary producers. Primary producers are involved in the manufacturing of active ingredients found in drugs. They serve as suppliers to secondary manufacturers. On the other hand, secondary producers receive the active ingredients from primary manufacturers and are responsible for transforming them into different pharmaceutical dosage forms, including capsules, tablets, and solutions (Kritchanchai, 2014). Gupta & Singh (2012) defines service quality in the supply chain as how well an organization meets or exceeds customer expectations in one direction or two directions for each element of the supply chain, namely suppliers, manufacturers, distributors, retailers and customers or final consumers. Smith et al., (2011), they have identified several key factors that significantly impact the quality of supply chain management (SCM) in health services such as product availability, data standards and high volume of transactions. In other study conducted by Kim & Lee (2021) there are three significant indicators of supply chain performance, they are order processing time, order delivery cycle and speed of new product launches.

Service Quality (SERVQUAL) is indeed a widely used model for measuring service quality, as outlined by (Parasuraman et al., 1994). This model examines the performance of services in relation to customer expectations. In a broad sense, SERVQUAL is widely acknowledged as a dependable tool for assessing the quality of services in diverse service sectors (Butt & de Run, 2010). To measure service quality in a specific industry, it is necessary to conduct an evaluation and modification of scale items to meet the specific needs of that industry (Ramsaran-Fowdar, 2005). Studies examining service quality in the healthcare sector through the SERVQUAL model have produced diverse outcomes. While some research affirms the reliability of SERVQUAL, others point out dimensions of healthcare service quality that are not addressed in the original SERVQUAL scale (Babakus & Mangold, 1992; Bowers et al., 1994).

Customer satisfaction is a multifaceted and extensive concept, involving various factors that directly influence customer satisfaction and loyalty across the customer's journey (brand reputation, product/service quality, post-sales service, etc.) (Jap, 2001). To achieve customer satisfaction, companies must deliver additional value to customers and consistently assess and enhance service activities, including handling customer queries and complaints, meeting customer expectations, and seeking input from customers (Sivadas & Baker-Prewitt, 2000). Offering the highest value to customers is a crucial aspect in attaining customer satisfaction and is indispensable for achieving a competitive edge (Murali, Pugazhendhi, & Muralidharan, 2016).

The relationship between service quality and customer satisfaction is mutually influential (Butt & de Run, 2010). Therefore, this study also examines the impact of service quality on customer satisfaction. There have been numerous studies on service quality in the healthcare sector using the SERVQUAL model. Some of these studies focus on the quality of services provided by hospitals to patients, while others concentrate on the service quality of the supply chain in the pharmaceutical industry. Several research endeavors have employed the SERVQUAL model to examine the quality of services delivered by hospitals to patients (Al-Neyadi et al., 2018; Butt & de Run, 2010; Lee & Kim, 2017; Lonial et al., 2010; Mendes et al., 2018). These studies indicate that the SERVQUAL model can assess the quality of services provided by hospitals to patients and its impact on patient satisfaction.

In the research conducted by Butt & de Run (2010); Mendes et al. (2018); Tripathi & Siddiqui (2020), the five dimensions of the SERVQUAL model—assurance, reliability, responsiveness, empathy, and tangibles—are utilized to measure expectations and perceptions of the quality of services provided. Meanwhile, studies by Al-Neyadi et al. (2018); Kitapci et al. (2014); Lee & Kim (2017) demonstrate that the SERVQUAL dimensions of assurance, reliability, responsiveness, empathy, and tangibles can gauge the quality of services and also influence customer satisfaction. Additionally, research conducted by Lahap et al. (2016); Park et al. (2012); Parmata et al. (2016) suggests that communication is one of the crucial dimensions to measure service quality and its impact on customer satisfaction.

Table 1. Previous studies

Author	Title	Method	HSC Focus
(Parmata et al., 2016)	Measuring service quality in pharmaceutical supply chain – distributor’s perspective	SEM	Distributor
(Ahmad et al., 2009)	Development of a service quality scale for pharmaceutical supply chains	SEM	Distributor
(Butt & de Run, 2010)	Private healthcare quality: applying a SERVQUAL model	SEM	Hospital
(Malathi & Jasim, 2022)	Validating the relationship between service quality, patient sensitivity and experience towards medical applications using SERVQUAL	SEM	Patient
(Mendes et al., 2018)	Expectations and perceptions of clients concerning the quality of care provided at a Brazilian hospital facility	SEM	Patient
(Lee & Kim, 2017)	The Effects of Korean Medical Service Quality and Satisfaction on Revisit Intention of the United Arab Emirates Government Sponsored Patients	Regresi	Patient
(Kitapci et al., 2014)	The Impact of Service Quality Dimensions on Patient Satisfaction, Repurchase Intentions and Word-of-Mouth Communication in the Public Healthcare Industry	SEM	Patient
(Pekkaya et al., 2019)	Evaluation of healthcare service quality via Servqual scale: An application on a hospital	ANOVA	Patient
(Al-Neyadi et al., 2018)	Measuring patient’s satisfaction of healthcare services in the UAE hospitals: Using SERVQUAL	Regresi	Patient
(Tripathi & Siddiqui, 2020)	Assessing the quality of healthcare services: A SERVQUAL approach	AHP	Healthcare Professional
(Lonial et al., 2010)	An evaluation of SERVQUAL and patient loyalty in an emerging country context	SEM	Patient
(Mandal, 2017)	The influence of dynamic capabilities on hospital-supplier collaboration and hospital supply chain performance.	SEM	Doctors
(Nartey et al., 2020).	Nartey, E., Aboagye-Otchere, F. K., & Yaw Simpson, S. N. (2020). The contingency effects of supply chain integration on management control system design and operational performance of hospitals in Ghana.	SEM	Doctors

3. Methods

3.1. Data Collection

This study employs a descriptive cross-sectional research design to assess the quality dimensions of the healthcare supply chain using a SERVQUAL scale-based questionnaire. The data collection method utilized a survey approach, with questionnaires distributed through Online Forms. Purposive sampling was adapted to select the respondents, who were healthcare workers (doctors, pharmacists, laboratory analysts) and logistics/purchasing employees with a minimum one year of work experience in hospitals or clinical laboratories. The questionnaire consisted of 29 questions that represented six dimensions used to measure service quality. The data for this study was collected from 67 hospitals and clinical laboratories located in Indonesia. Table 2 show the profile of respondent that contribute to this study.

3.2. Measurements

A 6-scale rating questionnaire were used in data collection to find the critical opinions of respondents. Twenty-nine questions of modified version of SERVQUAL (Service Quality), was used as a healthcare supply chain service quality measurement instrument. This question is in Indonesian version. A 29-question on a 6-point Likert scale model ranges from 1 as ‘strongly disagree’ to 6 as ‘strongly agree’ and the higher the score, the better the supply chain service quality. The 29 questions include six dimensions were entitled assurance, communication, reliability, responsiveness, tangibles, and empathy.

3.3. Factor analysis assessment

Prior analysis the data, factor analysis was assessed using *Kaiser-Meyer-Olkin Measure of Sampling Adequacy* (KMO-MSA) and Bartlett's Test of Sphericity. All these testing are confirmed meet the criteria as KMO value more than 0.5 and *Bartlett's value smaller than 0,05* (Mehta, 2011).

Table 2. Profile Respondent

Category	Group	Total	Percentage
Profession	Doctor	7	10,4 %
	Pharmacist	6	9,0 %
	Laboratory Analyst	45	67,2 %
	Logistic/Purchasing	9	13,4 %
Workplace	Hospital	39	58,2 %
	Clinical Laboratory	28	41,8 %
Experience	1-5 year	15	22,4 %
	5-10 year	8	11,9 %
	10-15 year	19	28,4 %
	More than 15 years	25	37,3 %

Table 3. KMO-MSA & Bartlett's Results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,905
	Approx. Chi-Square	3035,290
Bartlett's Test of Sphericity	df	406
	Sig.	0,000

3.4. Path Model

Validity and reliability assessment the study utilized the six dimensions of assurance, reliability, responsiveness, empathy, communication, and tangibles to measure the service quality of the healthcare supply chain and examine its impact on customer satisfaction. The path model, representing the relationships and connections between the measured variables, is show in Figure 2. This model illustrates how the service quality dimensions of the healthcare supply chain is influence the customer satisfaction. The path model provides a visual representation of the proposed relationships and serves as a guide for understanding the hypothesized associations between the different variables in the study.

4. Result and Discussions

4.1. Outer model assessment

Outer model assessment conducting by analysing the validity and reliability. Analysis of reliability using *Cronbach's alpha* (CA) and composite reliability (CR) however for validity represent by Average Variance Extracted (AVE).

The reliability test conducted to see the reliability of each variable using in this model and it revealed that the Cronbach's alpha value exceeded 0.708, which satisfies the reliability criteria (Joseph F. Hair, Risher, Sarstedt, & Ringle, 2019). Furthermore, the construct reliability (CR) values for all the latent dimensions ranged from 0.88 to 0.98, indicating strong internal consistency among the statements (as shown in Table 3). These CR values exceed the suggested level of 0.70 to 0.95 (Joseph F. Hair et al., 2019), it means confirming the reliability of the constructs.

In addition to reliability, the study also assessed the convergent validity using the Average Variance Extracted (AVE). AVE is considered a measure of convergent validity, and it is recommended to have a value greater than 0.5 (Joseph F. Hair et al., 2019). The results presented in Table 3 indicate that the AVE values for all the items exceeded 0.5, satisfying the established criteria for convergent validity.

Overall, the reliability and convergent validity analyses confirm the robustness and consistency of the data collection instrument used in the study, providing confidence in the reliability and validity of the measurements for the service quality dimensions in the healthcare supply chain.

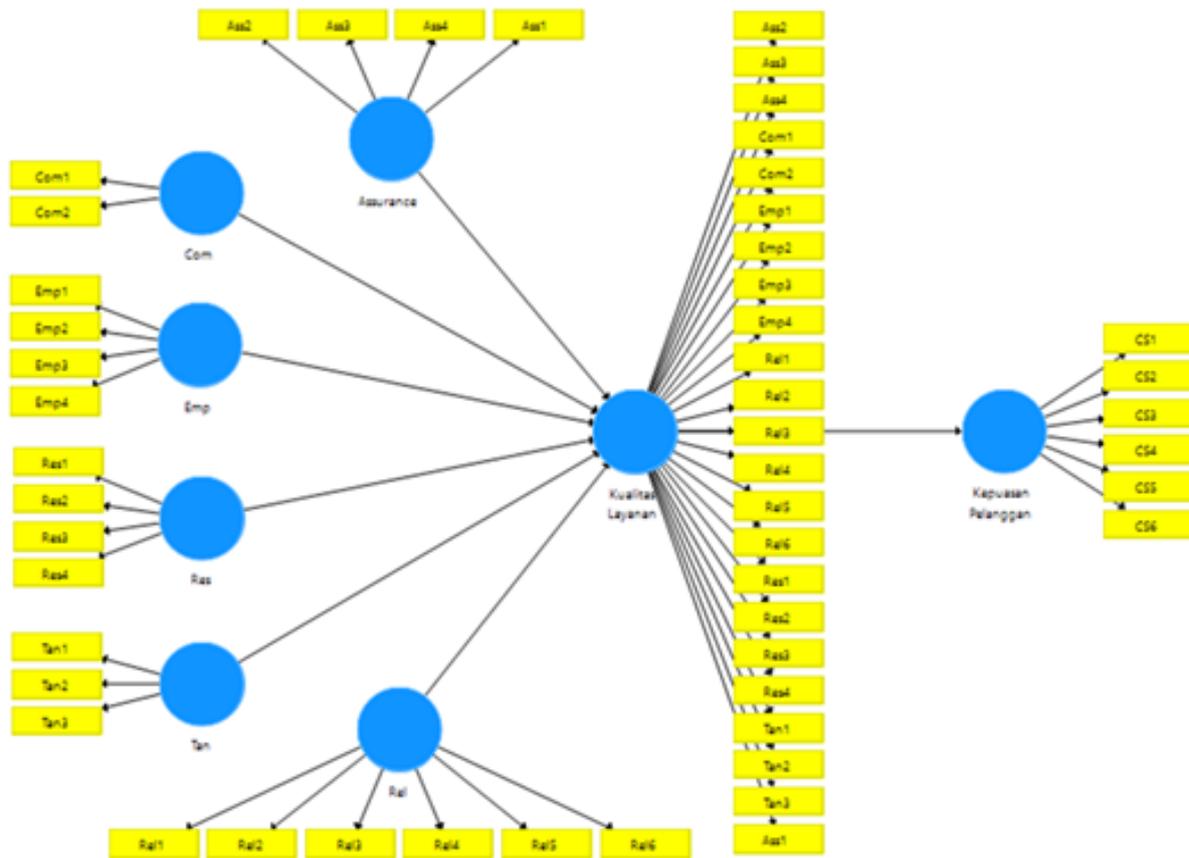


Figure 2. Path model

Table 4. SmartPLS3 Outer Model Assessment Result

Latent Variable	CA	CR	AVE
Assurance	0.945	0.960	0.858
Tangible	0.889	0.932	0.820
Communication	0.742	0.886	0.795
Empathy	0.893	0.926	0.759
Reliability	0.933	0.948	0.755
Responsiveness	0.910	0.937	0.788
Service Quality	0.981	0.983	0.711
Customer Satisfaction	0.986	0.989	0.935

Note: LV (Latent Variable) CA (Cronbach's Alpha); CR (Composite Reliability); AVE (Average Variance Extracted)

4.2. Structural model analysis

The structural model analysis used to test the correlation variables within the constructs. T-value indicate that independent variable has a significant effect to dependent variable if >1.645 and path coefficient show the strength of the correlation itself p value ≤ 0.05 (Hair et al., 2011). Table 5 is presenting the results of this analysis. The findings indicate that all six dimensions used in this study, namely assurance, communication, empathy, reliability, responsiveness, and tangibles, confirm have a significant impact on service quality. Additionally, the results reveal that service quality itself has a significant impact on customer satisfaction.

From the result of structural model analysis (Table 5), it concludes the positive impact of the service quality of Supply Chain Management in healthcare products on the satisfaction of hospitals and clinical laboratories is supported by statistically significant findings, with a t-value surpassing 1.645 and a p-value below 0.05. These outcomes signify that the positive influence of service quality, assessed through assurance, communication, empathy, reliability, responsiveness, and tangibles dimensions, extends to both hospital and clinical laboratory satisfaction.

Table 5. SmartPLS3 Result Structural Model

Construct Relationship	Path Coefficient	T Statistics	P Values
Ass -> Servqual	0,195	20,683	0,000
Com -> Servqual	0,089	15,464	0,000
Emp -> Servqual	0,173	17,532	0,000
Rel -> Servqual	0,276	13,851	0,000
Res -> Servqual	0,185	18,237	0,000
Tan -> Servqual	0,136	17,842	0,000
Servqual -> CS	0,943	36,487	0,000

These outcomes are consistent with prior research indicating that the quality of service in Supply Chain Management of Healthcare Products in the pharmaceutical sector has an impact on the satisfaction and loyalty of doctors, as reflected in their prescription behaviour (Parmata & Chetla, 2020). Similar results have been reported in other studies involving patients (Kitapci et al., 2014; Lee & Kim, 2017; Malathi & Jasim, 2022), distributors (Parmata et al., 2016), and hospitals (Mandal, 2017; Nartey et al., 2020).

Among the dimensions, the reliability dimension emerges as having the most significant impact on service quality, as evidenced by its highest path coefficient value. Based on these findings, it concluded that the dimension of reliability plays a crucial role in determining service quality within healthcare supply chain. Its impact on service quality is particularly notable, suggesting that ensuring reliability in the supply chain processes and operations is vital for delivering high-quality services.

Considering the factor loading values obtained from the six items in the reliability dimension, it is evident that item Rel5 (company resolves complaints from hospitals/laboratories quickly) holds the most significant influence on customer satisfaction, with a factor loading value of 0.921. The second item is Rel1 (company effectively handles counterfeit and expired products) at 0.905. Third is Rel2 (company processes orders from hospitals/laboratories accurately and efficiently) at 0.900, next is Rel3 (company delivers products ordered by hospitals/laboratories on time) at 0.870, then Rel4 (company regularly informs hospitals/laboratories about changes in market demand) at 0.815, and the last-ranking item is Rel6 (company makes routine visits to hospitals/laboratories) at 0.585. The factor loading values reveal that the prompt resolution of complaints is highly important to the respondents (hospitals and clinical laboratories). Based on these research findings, companies can devise strategies and improve their performance in handling complaints, ensuring the continued satisfaction of hospitals and laboratories as customers.

In conclusion, it inferred that the service quality of Healthcare Supply Chain Management has a comprehensive impact on the entire healthcare supply chain, encompassing distributors, healthcare facilities, healthcare professionals, and ultimately, patients as end-users. This implies that the quality of SCM services is crucial for any healthcare company aiming for sustainability in the market and the ongoing satisfaction of its customers. In the context of this research, the primary entities are hospitals and laboratories.

5. Conclusions

This study focuses on analysing the service quality of healthcare supply chain management and understanding its effects on the satisfaction of hospitals and clinical laboratories. Based on the data processing and analysis conducted, the study concludes that the service quality in Healthcare Supply Chain Management has a positive influence on the satisfaction of both hospitals and clinical laboratories, with the reliability dimension being identified as the most significant factor.

The analysis outcomes suggest practical implications for managerial decisions within healthcare companies. This research can serve as a guide for healthcare companies in formulating strategies to deliver optimal service quality to hospitals and clinical laboratories. The study highlights that the reliability dimension significantly influences customer satisfaction. Among the six items in the reliability dimension, item Rel5, addressing the prompt resolution of complaints by Company A, is particularly vital, given its highest factor loading value of 0.921. These research findings enable

companies to devise specific strategies, especially in handling complaints from hospitals/laboratories, thereby ensuring sustained customer satisfaction.

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