

## RESEARCH ARTICLE

 OPEN ACCESS

Received: 23-08-2023

Accepted: 12-10-2023

Published: 17-11-2023

**Citation:** Altalhi HH, Basiouni AF (2023) An Empirical Study on the Applicability of the Customer Satisfaction Index Model in Guiding the Adoption of Supply Chain Management Systems Among Businesses in Saudi Arabia. Indian Journal of Science and Technology 16(43): 3948-3958. <https://doi.org/10.17485/IJST/v16i43.2147>

\* **Corresponding author.**[abasiouni@gmail.com](mailto:abasiouni@gmail.com)**Funding:** None**Competing Interests:** None

**Copyright:** © 2023 Altalhi & Basiouni. This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Published By Indian Society for Education and Environment ([iSee](https://www.isee.org/))

**ISSN**

Print: 0974-6846

Electronic: 0974-5645

# An Empirical Study on the Applicability of the Customer Satisfaction Index Model in Guiding the Adoption of Supply Chain Management Systems Among Businesses in Saudi Arabia

Hassen H Altalhi<sup>1</sup>, Abdullah F Basiouni<sup>2\*</sup>

<sup>1</sup> Associate Professor, Management Sciences Department, Yanbu Industrial College, Saudi Arabia

<sup>2</sup> Professor, Management Sciences Department, Yanbu Industrial College, Saudi Arabia

## Abstract

**Objectives:** This research aimed to identify the factors that influence the effective adoption of supply chain management systems, specifically focusing on customer satisfaction in the context of Saudi Arabia. **Methods:** Data was collected through convenience sampling, targeting a proposed sample size of 1000 individuals representing diverse nationalities and areas. A total of 629 valid responses were obtained. Path analysis was conducted using the Structural Equation Modeling (SEM) method and the AMOS 21 analytical tool. **Findings:** The results of the analysis showed a reasonably good fit between the model and the data, as indicated by the following statistics: Chi-square (2701.069), Chi-square / DF (5.204), RMSEA (0.042), PCFI (0.757), and TLI (0.848). The findings confirmed all hypothesized relationships, except for the relationships between customer expectations and customer satisfaction, as well as perceived quality and customer satisfaction, which lacked significant statistical associations. Additionally, the study revealed that customer expectations strongly predict perceived performance, perceived performance strongly predicts customer satisfaction, and customer satisfaction strongly predicts customer retention. **Novelty:** The research provides novel insights into the factors influencing the adoption of supply chain management systems and their impact on customer satisfaction and retention in the Saudi Arabian market. The study also highlights the relationships between customer expectations, perceived performance, customer satisfaction, and customer retention, contributing to the existing body of knowledge in this field. **Implications:** These findings have practical implications for decision-makers, offering guidance for enhancing the successful implementation of supply chain management systems. By improving customer satisfaction and retention, businesses can refine their product and service quality, ultimately leading to customer referrals and potential client acquisition. Overall, the study emphasizes the importance of adopting efficient supply chain management systems in achieving customer

satisfaction and retention goals in the Saudi Arabian market.

**Keywords:** Customer Satisfaction Index (CSI); Technology Adoption; Supply Chain Management Systems; Driving Forces; Challenges; Saudi Arabia

---

## 1 Introduction

During the Covid-19 outbreak, Saudi Arabia prioritized its national economy, offering several incentives (both financial and administrative) to mitigate the impact on the economy. The notable effects included a sharp increase in shipping costs, a decline in the availability of certain imports such as cars, computers, and mobile phones, and a subsequent rise in their prices. Despite these challenges, the Jeddah Islamic Port, responsible for over 65% of the Kingdom's imports, improved its global ranking from 42nd to 37th<sup>(1)</sup>.

Supply Chain Management (SCM) is a relatively new concept in Saudi Arabia. The efficiency of a supply chain relies on managers adhering to defined policies and procedures. With recent improvements in infrastructure and the economy, there is an expectation of significant advancements in supply chain efficiency<sup>(2)</sup>. However, developers may miss opportunities to improve the supply chain process if they are unaware of the existing issues. This research aims to identify and evaluate the most pressing supply chain management problems in Saudi Arabia. The responsibility for supply chain management (SCM) lies with the Saudi Arabian Ministry of Transport and Logistics Services. Article<sup>(2)</sup> also highlight that Saudi Arabia's supply chain management industry is still in its infancy. Implementing established procedures can help managers ensure the smooth operation of their supply chains. Recent infrastructure and economic improvements in Saudi Arabia are expected to have a profoundly positive impact on the country's supply chain management. However, failure to address the challenges faced may lead to missed opportunities for improvement. In line with Vision 2030, Saudi Arabian officials have announced the 2020 National Transformation Program (NTP), aiming to diversify income and reduce reliance on oil production<sup>(3)</sup>.

In 2016, Saudi Arabia initiated its National Transport and Logistics Strategy with the objective of establishing itself as a globally recognized logistics hub, connecting Asia, Africa, and Europe, as reported by the Public Investment Fund Program (2021). The improvement of logistics efficiency is crucial for Saudi Arabia to bolster its supply chain and achieve the economic diversification goals outlined in Vision 2030. Strengthening the strategic advantages offered by local supply chain networks is a significant component of this plan<sup>(3)</sup>.

Aligned with the global trend of more effective supply chains, Saudi Arabian officials have developed plans to leverage the nation's advantageous position and establish it as a well-known logistics and distribution hub, as indicated in Vision 2030. Additionally, the<sup>(3)</sup> reports the launch of the Global Supply Chain Resilience Initiative (GSCRI) by Saudi Arabia, aimed at promoting the country as the top choice for major international industrial companies seeking a competitive edge. In line with the National Transport and Logistics Strategy, the Kingdom is gearing up for an ambitious expansion of its logistics infrastructure, encompassing industrial cities, airports, and ports.

According to<sup>(2)</sup>, Saudi Arabia's favorable geographic position, size, business climate, infrastructure, and other factors position it well to make significant contributions to the expansion of the Middle Eastern supply chain. The country's objectives for 2020 and 2030 prioritize the pivotal role of logistics and supply chain management, aiming to reduce dependence on oil revenue. Vision 2030 specifically aims to eliminate unemployment among Saudi citizens by creating more job opportunities within the country. To facilitate the export of crude oil and petrochemicals to the international market, Saudi Arabia has developed large industrial cities on its eastern and western coasts, necessitating effective supply chain management.

This study focuses on exploring and highlighting various research constructs related to users' satisfaction with the implemented supply chain management systems in Saudi Arabia. These constructs include User Expectations (UE), Perceived Performance (PP), Perceived Quality (PQ), User Satisfaction (US), User Challenges (UC), and Future Behavior Intention (FBI). For example, <sup>(4)</sup> define "user expectations" as the level of constancy individuals anticipate from the items they use, which can shift during product utilization. Researchers such as <sup>(2)</sup> and <sup>(4)</sup> found that unrealistic expectations, whether too high or too low, tend to evolve into more realistic levels, and low expectations are associated with lower levels of user satisfaction. Moreover, User Experience (UX) encompasses how people feel about interactive technical products and includes their thoughts, feelings, perceptions, motivations, preferences, beliefs, attitudes, and emotional responses. There is a connection between user experiences and needs, where a positive experience is more likely when a product aligns with user needs. The expectations and experiences users have while interacting with a product are referred to as user demands.

Furthermore, the term "perceived performance" refers to how customers subjectively evaluate a product's performance after consumption. Findings from empirical studies conducted by <sup>(5-7)</sup> shed light on the significant role of perceived performance in shaping overall customer satisfaction. These studies reveal that when individuals perceive a higher level of performance in a given context, it leads to a greater sense of fulfillment. Therefore, individuals' subjective evaluation of how well a product, service, or experience meets their needs and desires can have a greater impact on their overall satisfaction compared to solely assessing whether their expectations were fulfilled.

Therefore, these empirical findings emphasize the significance of perceived performance as a crucial factor in understanding and predicting satisfaction levels. Acknowledging the influence of perceived performance can assist businesses and organizations in identifying areas for improvement and enhancing customer satisfaction by focusing on consistently surpassing expectations and aligning with customers' subjective evaluations of performance.

The concept of perceived performance has been defined by <sup>(8)</sup> as opinions regarding a product's attributes, levels, or outcomes. Similarly, <sup>(9)</sup> defines it as the results attained from the attributes of a product or service. Further, <sup>(10)</sup> goes beyond the notion that needs and values influence expectations and argues that desired standards, such as wants and needs, can be integrated into predictive standards. What is anticipated may not necessarily be desirable. However, <sup>(8)</sup> argue that the correlation can either be statistically significant or not. Thus, the focus here lies in differentiating between direct and indirect effects on retailers' and providers' perceptions of each other's performance in their respective relationships, with the former indicating a positive and significant impact on the studied relationship.

According to <sup>(11)</sup>, perceived quality refers to how customers perceive the superiority of a product. The satisfaction derived from the supply chain management system and its impact on customers are considered focal points. The study of <sup>(12)</sup> argue that satisfaction is a measure of how well a product or service meets the expectations of its users. If the service falls short of their expectations, customers feel dissatisfied. Conversely, when their expectations are met, customers feel happy and are more likely to return for future purchases. Additionally, <sup>(11)</sup> defines perceived quality as consumers' assessment of a product's overall quality in comparison to its competitors. Therefore, perceived quality is related to a product's ability to satisfy consumers when compared to similar offerings from competing brands, making our brand likely to be preferred over competitors due to its perceived high quality.

User satisfaction can be defined as a collection of feelings influenced by the interaction of several factors in response to a particular circumstance, according to <sup>(13)</sup>. Furthermore, scholars such as <sup>(11,14,15)</sup> argue that the user experience is just as important as the outcomes in achieving the desired level of user happiness. According to <sup>(16)</sup>, Saudi Arabia's supply chain management problems are related to road networks and limited rail networks, which are primarily used for passenger movement. Moreover, this is also linked to a short-term focus on revenue rather than establishing a stronger market position or market share. These issues may be exacerbated by limited warehouse space and a lack of supply chain management specialization. Additionally, the reliance on expatriate drivers creates visa complications.

Future behavioral intentions can be described as conative loyalty, which is a component of the four-stage loyalty paradigm, according to <sup>(10)</sup>. This research study utilizes the theoretical frameworks of the "Swedish Customer Satisfaction Index" (SCSI) and "the European Customer Satisfaction Index (ECSI)." Unlike American and European indexes, the Swedish Customer Satisfaction Index (SCSI) examines a smaller number of relationships. The model is based on satisfaction, with expectations and perception of performance acting as causal factors on the left-hand side, while the effects (complaints and loyalty) are represented on the right-hand side. In contrast, the ECSI model introduces additional causal variables, including the perceived quality of the product and service, perceived value, and image. The ECSI model does not necessarily incorporate complaints, and loyalty, impact, and image are directly interconnected, as illustrated in Figure 1.

According to <sup>(3)</sup>, the Saudi Ministry of Industry and Mineral Resources has initiated an initiative to establish domestic supply chains for approximately 9,000 manufacturing items, aiming to increase public understanding of Saudi Arabia's manufacturing and distribution systems. This program intends to address the challenges faced by small and medium-sized firms when

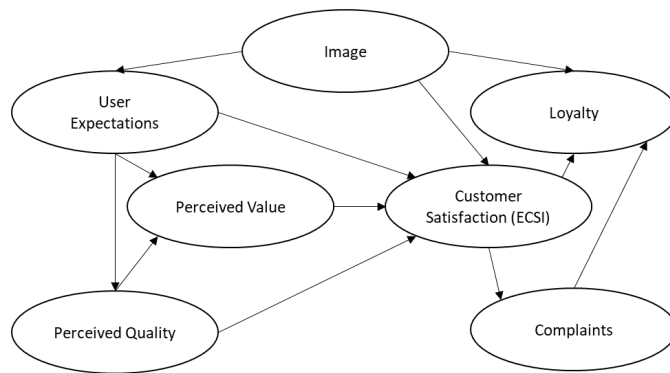


Fig 1. Theoretical Model of the European Customer Satisfaction Index<sup>(17)</sup>

trying to join supply networks and provide tools for evaluating local supply chains. Additionally, Saudi Arabia is working on strengthening its supply chains and logistics by establishing 59 logistics zones, with 18 different industrial zones selected to become logistics industrial powerhouses.

The program<sup>(3)</sup> emphasizes the significance of logistics in driving Vision 2030. The project aims to enhance private sector involvement in logistics-dependent industries by leveraging Saudi Arabia’s strategic geographic location and tapping into globalized supply chains through the Red Sea. The goal is for Saudi Arabia to become a competitive transactional global logistics center for air, sea, and land logistics. The report also mentions that if tourist traffic doubles in line with national tourism targets, big new initiatives will be introduced across the Kingdom to enhance export, re-export, and domestic cargo volumes. The Public Investment Fund (PIF) has developed a supply chain strategy to ensure project materials and services are available at affordable prices, increase localization levels, and capitalize on investment opportunities without displacing or undercutting the private sector.

In terms of investment, Saudi Arabia plans to invest SAR 550 billion (approximately USD 147 billion) in transportation and logistics over the next nine years, with a focus on expanding airports, improving the rail system, and implementing technology advancements<sup>(18)</sup>. This investment drive is a collaboration between the government and private investors, with the government funding 35% and private investors funding the remaining 75%. The initiative aims to boost Saudi Arabia’s GDP and increase non-oil income to SAR 45 billion by 2030.

However, the COVID-19 pandemic presented challenges to the supply chain sector in Saudi Arabia. Supply chain restrictions emerged as governments worldwide implemented shutdown measures in early 2020. The shortage of personal protective equipment, respirators, and certain pharmaceuticals posed difficulties for the Saudi healthcare sector. Although the supply chain sector is showing signs of recovery, these factors have slowed down progress in the supply chain sector in Saudi Arabia<sup>(9)</sup>. Further,<sup>(19)</sup> highlight that supply chain problems can arise due to discrepancies in language, practices, opinions, and the interpretation of data, all of which can impact supply chain efficacy. Researchers such as<sup>(6,20)</sup> argue that supply chains operate in locations with diverse business customs, requiring flexibility in supply chain management to accommodate these differences. Thus, there is a strong link between the cultural component and supply chain challenges.

In alignment with the Saudi Vision 2030, which emphasizes national transformation through localization, there is a significant focus on developing logistics and local capabilities<sup>(2)</sup>. Recognized as a visible form of industrial diversification across various industries, supply chains have received extensive attention as a visible type of industrial diversification in a variety of businesses. However, the specific factors that contribute to customer satisfaction and retention within these newly adopted SCM systems remain understudied.

This study aims to fill this research gap by delving into the realm of customer satisfaction and retention within recently implemented SCM systems. While the rate of SCM system adoption is not the focus of this research, understanding the impact of these systems on customer satisfaction and retention is crucial. In an era marked by technological advancements, the internet’s rise, and the transformation of the global economy, supply chains have emerged as primary catalysts for demand. These intricate networks consist of independent entities that collectively strive to meet customer needs<sup>(21)</sup>. Consequently, customers throughout the supply chain hold high expectations for prompt fulfilment and satisfaction.

By addressing these complexities and gaps in existing literature, this study seeks to contribute to a deeper understanding of customer satisfaction and retention in the context of SCM systems, specifically within Saudi Arabia. The findings of this research will provide valuable insights for businesses in Saudi Arabia and serve as a foundation for developing effective supply

chain management strategies that meet customer expectations and ensure long-term success.

## 2 Methodology

### 2.1 Hypotheses Development

In this paper, we argue that utilizing the Customer Satisfaction Index (CSI) model provides an effective framework for evaluating supply chain management systems (SCMS) implementation success<sup>(5)</sup>. The CSI facilitates a comprehensive and accurate measurement of customer satisfaction, a vital metric strongly linked to supply chain performance. The CSI allows organizations to quantify satisfaction by capturing multiple aspects of the customer experience, like expectations, quality perception, and perceived value<sup>(5)</sup>. This multidimensional lens ensures all satisfaction influencers are incorporated into assessments. As a result, CSI analysis delivers more nuanced insights compared to single-factor metrics.

Applying the CSI also aids in pinpointing specific supply chain weak points for targeted improvement, crucial for continuous satisfaction gains<sup>(5)</sup>. By parsing the drivers of satisfaction, supply chain strategies can be customized to better serve customer needs, culminating in elevated satisfaction levels overall. Furthermore, the CSI's predictive capabilities have been validated across industries, correlating well with factors such as loyalty, word-of-mouth, and repeat buying<sup>(5)</sup>. Leveraging its theoretical foundation enables more accurate forecasting of how supply chain dynamics impact both current and future customer retention. The model additionally allows benchmarking internally and externally to derive strategic competitive advantages.

Customer expectations fundamentally shape satisfaction judgments as a reference for product/service performance evaluations<sup>(16)</sup>. Per expectancy-disconfirmation theory, fulfilment or surpassing of anticipations drives satisfaction<sup>(10)</sup>. Within this paradigm, the CSI appropriately emphasizes satisfaction's linkage to the degree expectations align with perceived delivery - an assertion supported by empirical studies<sup>(5)</sup>.

Together, these strengths indicate the CSI presents a rigorous and insightful framework for ongoing optimization efforts aimed at strong, mutually-beneficial customer relationships through best-in-class supply chain administration. Its application supports strategic decision-making based on quantifiable satisfaction data.

#### **H1: Customer expectations and perceived performance exhibit a positive correlation.**

Customer expectations serve as a benchmark for evaluating performance, representing what customers anticipate receiving<sup>(11)</sup>. Perceived quality then encompasses customers' judgment of a product or service's overall excellence relative to these expectations. The relationship between expectations and perceived quality is vital within the CSI model, as it reflects how well the customer believes the organization has delivered on their anticipated quality level. Empirical studies have validated this connection.

For instance, research by<sup>(11)</sup> found customer expectations influenced perceived quality evaluations, which together determined satisfaction. Similarly,<sup>(8)</sup> demonstrated expectations have a direct, positive impact on perceived quality appraisals. This confirms expectations are paramount to how customers assess attributes like quality.

#### **H2: Customer expectations and perceived quality exhibit a positive correlation.**

Perceived quality represents a customer's judgment of the overall excellence or superiority of a product or service<sup>(11)</sup>. There is substantial empirical evidence supporting the positive correlation between perceived performance and perceived quality. For instance,<sup>(5)</sup> found a direct and positive influence of perceived performance on perceived quality, which subsequently affected customer satisfaction and loyalty.

#### **H3: Perceived performance and perceived quality exhibit a positive correlation.**

Customer satisfaction, as explained by<sup>(10)</sup>, results from the extent to which a product or service meets or surpasses a customer's expectations. Therefore, understanding the relationship between perceived performance and satisfaction is crucial in determining whether a product or service successfully meets or exceeds consumer expectations. Empirical data strongly support the link between perceived performance and customer satisfaction. For example,<sup>(5)</sup> found that perceived performance directly impacted customer satisfaction, which, in turn, influenced customer loyalty. These findings highlight the significant role of perceived performance in determining levels of customer satisfaction.

#### **H4: Perceived performance and customer satisfaction exhibit a positive correlation.**

Empirical evidence further supports the positive correlation between customer expectations and customer satisfaction in the CSI model. For instance,<sup>(8)</sup> found a direct and positive impact of customer expectations on customer satisfaction, confirming the vital role of expectations in shaping customer satisfaction. Additionally,<sup>(11)</sup> demonstrated that customer expectations influenced perceived quality, which subsequently affected overall customer satisfaction, underscoring the importance of meeting or surpassing customer expectations to achieve high levels of satisfaction.

#### **H5: Customer expectations and customer satisfaction exhibit a positive correlation.**

The CSI model proposes a positive association between customer satisfaction and perceived quality, which is supported by empirical research. For instance, <sup>(5)</sup> discovered a direct and favorable relationship between perceived quality and customer satisfaction, underscoring the critical role of quality perception in determining consumer satisfaction. Their findings highlight the importance of providing high-quality goods and services to increase customer happiness.

**H6: Perceived quality and customer satisfaction exhibit a positive correlation.**

Customer challenges refer to the difficulties or obstacles faced by customers during their interactions with a product or service <sup>(22)</sup>. Conversely, customer satisfaction is the result of customers comparing their expectations with their perception of the actual performance of a product or service <sup>(10)</sup>. Therefore, addressing customer challenges is crucial for understanding and enhancing customer satisfaction as it directly impacts the overall customer experience.

Empirical evidence supports the presence of a negative relationship between customer challenges and customer satisfaction within the CSI model. For instance, <sup>(23)</sup> found that customer challenges have a negative association with customer satisfaction, highlighting the significance of addressing and resolving customer challenges to achieve higher satisfaction levels. Similarly, <sup>(24)</sup> demonstrated that customer challenges negatively correlate with customer satisfaction, subsequently impacting customer loyalty and repurchase intentions.

**H7: There is a negative correlation between customer challenges and customer satisfaction.**

Customer retention refers to the ability of a business to keep clients for an extended length of time, leading to repeat business and promoting customer loyalty <sup>(5)</sup>. Understanding the link between customer satisfaction and retention is essential because happy customers are more likely to show loyalty to a firm, which promotes long-term business success. The positive relationship between customer satisfaction and retention in the CSI model is supported by empirical data. For example, <sup>(5)</sup> found a strong positive relationship between customer satisfaction and customer retention, indicating that higher satisfaction levels lead to increased customer retention rates. Similarly, <sup>(25)</sup> demonstrated that even small improvements in customer satisfaction can result in substantial increases in customer retention, emphasizing the importance of customer satisfaction in maintaining long-term customer relationships. Several authors have found that higher customer satisfaction levels are associated with increased customer retention rates <sup>(24,26)</sup>. Yet, <sup>(27)</sup> also argued that meeting customer expectations significantly impacts customer satisfaction. When customers receive products or services that meet their expectations, their satisfaction and loyalty increase. Retaining the most profitable customers is crucial, and the increased focus on customer retention arises from intensified competition among domestic and global industries, as customer retention contributes to cost efficiency <sup>(28)</sup>.

**H8: Customer satisfaction exhibits a direct positive impact on customer retention.**

Research findings in the CSI model provide measurable evidence supporting the inverse association between customer challenges and customer retention. For example, <sup>(24)</sup> discovered that customer challenges have a negative impact on customer retention, underscoring the significance of addressing and resolving such challenges to foster long-term customer relationships. Similarly, <sup>(29)</sup> demonstrated that effectively managing customer challenges can lead to increased customer retention and loyalty, as customers who experience satisfactory resolution of their challenges are more inclined to remain loyal to a company. Understanding the correlation between customer challenges and customer retention is crucial for organizations seeking to enhance customer retention. By identifying and addressing customer challenges, organizations can enhance the overall customer experience, thereby boosting customer retention, commitments, and positive word-of-mouth recommendations <sup>(11)</sup>. Furthermore, a better understanding of this relationship enables organizations to prioritize their efforts and allocate resources effectively to address customer challenges <sup>(30)</sup>.

**H9: Customer challenges have a direct negative effect on customer retention.**

The following Figure 2 demonstrates the theorized hypotheses of this research.

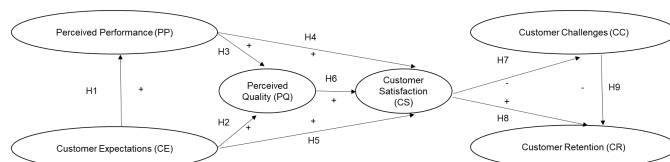


Fig 2. Theorized Customer Satisfaction Model for Supply Chain Management Systems Adoption

## 2.2 Quantitative Methods

This study utilizes a quantitative research approach to address the research questions. Quantitative research involves numerical data and statistical analysis, enabling an objective examination of the subject matter<sup>(31)</sup>. Table 1 presents the demographic data of the respondents. Among the 1000 surveys distributed, 629 were returned completed, yielding a response rate of 62.9%.

Table 1. Demographic Analysis

Demographics	Categories	Frequency	Percentages
Gender	Male	408	65%
	Female	221	35%
Age	< 30 years	379	60.4%
	30- 39	177	28.2%
	40 - 49	52	8.4%
	50 - 59	16	2.5%
	> 59 years	5	0.5%
Education level	Associate Diploma	275	44%
	Bachelor	142	22.5%
	Master	18	2.8%
	Others	194	30.7%
Income (SAR)	<3000	226	36 %
	3001-5000	125	20 %
	5001-8000	208	33 %
	>8001	70	11 %

The survey is divided into two parts and is designed based on tools used in previous research to address the objectives of this study. Part one collects demographic information from the participants, while part two examines practices related to customer satisfaction when using supply chain management systems. A 7-point Likert scale is employed to measure the respondents' agreement levels with each item in the survey, facilitating statistical comparisons<sup>(31)</sup>. The scale ranges from 1 = Strongly Disagree to 7 = Strongly Agree.

## 3 Results and Discussion

As the collected data may exhibit biases towards females, associate diploma holders, and younger employees, it becomes crucial to conduct tests for sample representation. The researchers performed analyses to assess the influence of potential biases on the overall findings of our study. By examining relationships and associations between variables within various subgroups categorized by gender, education level, and age, we consistently observed comparable patterns and reached similar conclusions. This consistency across subgroups implies that the biases present in our sample did not introduce substantial distortions or modify the overall findings of the study.

To assess the validity of factors and indicators associated with the use of supply chain management systems to enhance customer satisfaction in Saudi Arabia, the researchers employed the r-value. The validity of the research variables and paths was evaluated by comparing the obtained r-value with the r-table. Subsequently, a reliability test was conducted using Cronbach's Alpha to assess customer retention and satisfaction within the context of implementing supply chain management systems, as suggested by<sup>(8)</sup>.

The consistency of variables across the study items was examined using Cronbach's Alpha<sup>(31)</sup>. A Cronbach's Alpha score between 0.7 and 0.9 indicates excellent reliability. As shown in Table 2, all variables yielded scores above 0.7, falling within the recommended range. Overall, the structural equation modeling (SEM) results demonstrated a strong fit between the collected data and the proposed research model: Chi-square (2701.069), Chi-square / DF (5.204), RMSEA (0.042), PCFI (0.757), and TLI (0.848).

The results presented in Table 3 provide useful insights into how different variables impact customer satisfaction and retention. A few key findings emerge: Firstly, the significant negative correlations between customer satisfaction (CS) and both customer challenges (CC) and customer retention (CR) confirm hypotheses H7 and H9. Logically, decreasing levels of customer satisfaction are linked to increased challenges and lower customer retention, which is consistent with<sup>(16)</sup> who also found satisfaction acts as an intermediary factor. Secondly, the positive significant association between customer satisfaction

**Table 2.** Reliability Analysis

Variables	Number of Items	Cronbach's Alpha
Customer Expectation (CE)	5	0.835
Perceived Performance (PP)	7	0.893
Perceived Quality (PQ)	5	0.890
Customer satisfaction (CS)	6	0.758
Customer Retention (CR)	4	0.881
Customer Challenge (CC)	6	0.798

(CS) and customer retention (CR) supports hypothesis H8. This suggests higher levels of customer satisfaction help drive greater customer retention, in line with models presented by<sup>(10,23)</sup>. The empirical evidence validates the important role of satisfaction in maintaining customer loyalty over time.

Together, these path correlation findings offer several implications:

- Reducing customer challenges and dissatisfiers can help boost overall satisfaction, aligning with recommendations by<sup>(12,24,28)</sup> to meet future needs and maintain quality relationships.
- Fostering stronger satisfaction should lead to improved retention if the significant relationship holds.
- Satisfaction appears to act as a mediator between challenges and retention outcomes.
- Hypotheses H7, H8 and H9 receive validation, pointing to the value of continually monitoring these satisfaction-related factors.

**Table 3.** Paths and hypothesis analysis

Theorized Hypothesis	Theorized Relationship	Estimate	P	Hypothesis State
CE->PP (H1)	Positive	+0.64	<0.001	Accept
CE->PQ (H2)	Positive	+0.31	<0.001	Accept
PP->PQ (H3)	Positive	+0.31	<0.001	Accept
PP->CS (H4)	Positive	+0.68	<0.001	Accept
CE->CS (H5)	Positive	-0.10	0.640	Reject
PQ->CS (H6)	Positive	+0.10	0.425	Reject
CS->CC (H7)	Negative	-0.24	<0.001	Accept
CS->CR (H8)	Positive	+0.42	<0.001	Accept
CC->CR (H9)	Negative	-0.32	<0.001	Accept

The results from Table 3 provide additional insight into the relationships between key variables. Several hypotheses are supported, though two are rejected based on the findings. The positive, significant correlations between customer expectations, perceived performance, perceived quality and customer satisfaction confirm hypotheses H1, H2, H3 and H4. This indicates meeting or exceeding expectations lifts perceptions of performance and quality, ultimately enhancing customer satisfaction, which aligns with findings from<sup>(16,22)</sup>.

However, the negative and insignificant correlation between customer expectations and satisfaction rejects hypothesis H5. This suggests expectations alone may not determine satisfaction levels, providing a more nuanced understanding compared to prior research by<sup>(5)</sup> which found a direct link. Similarly, the non-significant positive link between perceived quality and satisfaction fails to support hypothesis H6, challenging assumptions and supporting<sup>(10)</sup> who showed satisfaction is influenced by multiple factors beyond just quality. Rejecting H5 and H6 offers a more nuanced understanding of the variables compared to prior literature. While expectations, performance and quality collectively shape satisfaction according to the expectancy-disconfirmation model, expectations and quality independently may not drive satisfaction. This reinforces that customer satisfaction is a multifaceted concept influenced by multiple interrelated factors. The evidence challenges assumptions and advances satisfaction theory to provide more robust insights for managing these important customer metrics. Overall, the findings offer both validation and refinement of hypotheses to deepen knowledge in this domain.

The study emphasizes the importance of establishing strategic partnerships with customers in supply chain management systems as an indirect and positive influence on customer satisfaction in Saudi Arabia. Therefore, businesses should prioritize the perceived quality of their customers. Collaborating with customers to address issues and continuously improve services and products can significantly enhance customer satisfaction, agreeing with<sup>(31)</sup> who showed cooperation across the supply



chain improves customer service quality. Consistent with previous research<sup>(16)</sup>, long-term customer relationships contribute to improved perceived quality, reduced lead times, and responsive customer support, all of which enhance customer satisfaction. Collaboration between retailers and risk and reward sharing also play a role in enhancing customer perceived quality. Developing enduring relationships relies on close cooperation within the supply chain channels<sup>(2,9)</sup>. Thus, fostering strong connections among supply chain management partners improves customer satisfaction by effectively addressing their needs.

Furthermore, the study reveals that weak customer relationships have a negative impact on customer satisfaction, resulting in limited customer interaction and compromised response and reliability standards, which harm customer connections. Regularly evaluating customer satisfaction, anticipating future needs, addressing service requests, and consistently assessing customer relationships are critical, aligning with recommendations by<sup>(7,10)</sup>. Previous research by<sup>(8,9)</sup> demonstrates that integrating suppliers and customers within the supply chain contributes to its success and enhances customer satisfaction.

In accordance with the results of<sup>(8,9)</sup>, improved customer connections are linked to greater levels of customer satisfaction and organizational performance. However, it is important to note that customer happiness can be either positively or negatively influenced by changes in customer relationship management over time. Customer satisfaction levels can be impacted by data acquired from numerous encounters with the company<sup>(19)</sup>.

The study reveals that the implementation of dynamic supply chain management systems has a significant impact on customer satisfaction in Saudi Arabia. Therefore, it is crucial for businesses to adopt standardized assembly processes and postpone product and assembly operations until they reach the final destination closest to customers. Dynamic strategies, as highlighted by<sup>(6,8)</sup>, allow businesses to adapt by creating different product versions, addressing shifting consumer needs, differentiating products, and adjusting demand functions, ultimately leading to higher customer satisfaction. These findings align with the results of the current study. However, it is important to note that the applicability of dynamic strategies, as suggested by<sup>(8)</sup>, depends on market characteristics and product type, making it not universally relevant, supporting the conditional applicability observed in<sup>(29)</sup>.

In order to enhance customer retention, companies should implement marketing strategies that outperform competitors in providing and conveying greater customer value to their target audience, as customer satisfaction directly impacts customer retention<sup>(10)</sup>, which is in line with models presented by<sup>(16,28)</sup>. Furthermore, organizations are advised to offer diverse choices in their commercial and non-commercial operations to please consumers and improve customer retention. Extensive research has demonstrated that customer happiness significantly influences client retention, thereby establishing a loyal customer base and providing a competitive advantage to businesses<sup>(10)</sup>.

Moreover, as highlighted by<sup>(16)</sup>, unhappy customers are more likely to share their negative experiences with nine other people, while happy customers are more likely to share positive experiences with five other people. Hence, increased customer retention is more likely when customer satisfaction is enhanced. The findings of the study support the notion that the utilization of supply chain management systems improves customer retention and satisfaction. Retailers should consider building strategic relationships with suppliers, improving customer interactions, maintaining effective communication, ensuring data accuracy, and implementing dynamic strategies. By prioritizing customer satisfaction and continuously improving the quality of goods and services, businesses can enhance customer retention and encourage customers to refer their products to others.

This study examines the impact of supply chain management techniques on customer retention and satisfaction in Saudi Arabia. It is recommended to conduct further research in diverse contexts, considering variations in customer purchasing behavior to gain deeper insights.

## 4 Conclusion

This ground-breaking research explores the key determinants that drive the successful adoption of cutting-edge supply chain management systems, with a specific focus on customer satisfaction in the dynamic landscape of Saudi Arabia. In line with the nation's visionary agenda for 2030, which centres around bolstering local capabilities and optimizing logistics, this study aims to revolutionize the country's economy and fortify its supply chain network. By forging strategic alliances with customers, the study reveals a positive and indirect influence on customer satisfaction, underscoring the immense potential for enhanced collaboration in supply chain management systems.

The research provides invaluable insights that demonstrate the importance of nurturing long-term customer relationships and prioritizing customer-centric solutions. These practices have been found to enhance perceived quality, reduce lead times, and ensure responsive customer support, ultimately resulting in overall satisfaction (estimated at +0.68). This indicates that investing one unit of development in customer relationships and customer-centric solutions can yield a significant 68 percent improvement in customer satisfaction. Conversely, the study also highlights the detrimental effects of weak customer relationships, which compromise service standards and limit interactions, leading to decreased satisfaction (estimated at -0.24). Therefore, conducting regular evaluations of customer satisfaction and relationship quality emerges as critical factors

in optimizing supply chain management systems.

Moreover, the research underscores the pivotal role of marketing strategies in not only providing superior value to customers but also effectively communicating this value. As customer satisfaction directly influences customer retention, businesses must prioritize the continuous improvement of their products and services to mitigate the risk of negative experiences being shared by dissatisfied customers. To account for variations in customer purchasing behavior, the researchers recommend conducting further studies in diverse contexts, thus expanding the scope and applicability of these findings.

In light of these transformative findings, it is recommended that Saudi Arabian businesses actively embrace strategic partnerships with customers, fostering collaboration and leveraging their insights to enhance supply chain management systems. Additionally, businesses should invest in cultivating enduring customer relationships, as they contribute to improved satisfaction levels and demonstrate a commitment to customer-centricity. By implementing regular evaluations of customer satisfaction and relationship quality, organizations can proactively identify areas for improvement and refine their strategies accordingly. Furthermore, adopting marketing approaches that emphasize superior value and effectively communicate it to customers will serve as a catalyst for customer satisfaction and long-term retention.

## Acknowledgment

Authors appreciate the support from Yanbu Industrial College – Royal Commission for Jubail and Yanbu.

## References

- Hallak H. How Jeddah Islamic Port is growing into its future. 2022. Available from: <https://spacewatchafrica.com/how-jeddah-islamic-port-is-growing-into-its-future/>.
- Basiouni A. Blockchain Technology Adoption in the Context of Saudi Arabia: An Empirical Analysis for a Future Outlook. *Mathematical Statistician and Engineering Applications*. 2022;71(4):3248–3259. Available from: <https://doi.org/10.17762/msea.v71i4.886>.
- Public Investment Fund Program 2021-2025. PIF Program is directly mandated to realize Vision 2030, including second pillar "Thriving Economy". 2021. Available from: <https://www.pif.gov.sa/VRP%202025%20Downloadables%20EN/PIFStrategy2021-2025-EN.pdf>.
- Alojairi A, Basiouni A, Tan K, Ali H. A socio-technical perception on the impact of project management software in logistics and distribution center: A case study in Saudi Arabia telecommunication company. 2019. Available from: [https://media.proquest.com/media/hms/PFT/1/LR1DH?\\_s=W6MzvHad%2BZVkkEwf4xC8zLVRFr4%3D](https://media.proquest.com/media/hms/PFT/1/LR1DH?_s=W6MzvHad%2BZVkkEwf4xC8zLVRFr4%3D).
- Lamela-Orcasitas C, Garcia-Madariaga J. How to really quantify the economic value of customer information in corporate databases. *Humanities and Social Sciences Communications*. 2023;10(1):1–3. Available from: <https://doi.org/10.1057/s41599-023-01654-6>.
- Alojairi A, Amin S, Akhtar N, Basiouni A, Bahamdan W. Driving Forces for Business Growth in Saudi Arabia: Industrial Cross Sectional Analysis. *Journal of Organisational Studies and Innovation*. 2020;7(1). Available from: <https://www.mbacademy.org.uk/journals/2020-2021/Ahmad%20Alojairi.pdf>.
- Altalhi H, Basiouni A. Blockchain Technology Adoption in Canadian Pharmaceutical Sectors: An empirical analysis for a future outlook. *Journal of Pharmaceutical Negative Results*. 2022;13(S01):1983–1989. Available from: <https://doi.org/10.47750/pnr.2022.13.S01.233>.
- Sulaeman MM, Harsono M. Supply chain ontology: model overview and synthesis. *Journal Mantik*. 2021;5(2):790–799. Available from: <https://iocscience.org/ejournal/index.php/mantik/article/view/1401>.
- Aljadede R, Alruthia Y, Balkhi B, Sales I, Alwhaibi M, Almohammed O, et al. The Impact of COVID-19 on Essential Medicines and Personal Protective Equipment Availability and Prices in Saudi Arabia. *Healthcare*. 2021;9(3):290. Available from: <https://doi.org/10.3390/healthcare9030290>.
- Lookman CD. The Effect of Reliability, Service Price, Guarantee, Organization Image and Responsiveness on Customer Satisfaction and Customer Loyalty on The Freight Forwarding Service Company PT Lookman. *International Journal of Review Management Business and Entrepreneurship (RMBE)*. 2022;2(2):160–172. Available from: <https://doi.org/10.37715/rmbe.v2i2.3411>.
- Al-Asadi R, Muhammed S, Abidi O, Dzenopoljac V. Impact of servant leadership on intrinsic and extrinsic job satisfaction. 2019. Available from: <http://dx.doi.org/10.1108/LODJ-09-2018-0337>.
- Bungatang B, Reynel R. The Effect of Service Quality Elements on Customer Satisfaction. 2021. Available from: <https://doi.org/10.52970/grmapb.v1i2.102>.
- Rahman NSFA, Hamid AA, Lirn TC, Kalbani KA, Sahin B. The adoption of industry 4.0 practices by the logistics industry: A systematic review of the gulf region. *Cleaner Logistics and Supply Chain*. 2022;5:100085. Available from: <https://doi.org/10.52970/grmapb.v1i2.102>.
- Osborne SP, Radnor Z, Nasi G. A New Theory for Public Service Management? Toward a (Public) Service-Dominant Approach. *The American Review of Public Administration*. 2013;43(2):135–158. Available from: <https://doi.org/10.1177/0275074012466935>.
- Al-Bourini FA, Aljawarneh NM, Bourini I, Almaaitah MF, Alomari K, A K. Directing Strategic Decision and Perceived Faculty Performance Using PLS Analysis and Monte Carlo Simulation in Jordanian Private Universities. *Talent Development & Excellence*. 2020;12(3s):2235–2252. Available from: <https://shorturl.at/fhkp5>.
- Ahmed A. The Importance of Supply Chain Management Practices in Increasing Customer Satisfaction and Customer Retention: Evidence from Saudi Arabia. *International Journal of Scientific Research and Management*. 2021;9(03):2136–2151. Available from: <https://doi.org/10.18535/ijstrm/v9i03.em04>.
- Becker JM, Cheah JH, Gholamzade R, Ringle CM, Sarstedt M. PLS-SEM's most wanted guidance. 2023. Available from: <https://doi.org/10.1108/IJCHM-04-2022-0474>.
- Lewis S. Transportation and logistics in Saudi Arabia form a key part of the country's framework to diversify its economy and boost non-oil revenues. 2023. Available from: <https://www.cityscape-intelligence.com/saudi-industrial/usd-147-billion-push-transportation-and-logistics-ksa>.
- Alsadi A, Alaskar TH, Mezghani K. Adoption of Big Data Analytics in Supply Chain Management: Combining Organizational Factors with Supply Chain Connectivity. *International Journal of Information Systems and Supply Chain Management*. 2021;14(2):88–107. Available from: <http://doi.org/10.4018/IJISSCM.2021040105>.
- Hejazi MT, Batati BA, Bahurmuz A. The Influence of Green Supply Chain Management Practices on Corporate Sustainability Performance. *Sustainability*. 2023;15(6):5459. Available from: <https://doi.org/10.4018/IJISSCM.2021040105>.

- 21) Manavalan E, Jayakrishna K. A review of Internet of Things (IoT) embedded sustainable supply chain for industry 4.0 requirements. *Computers & Industrial Engineering*. 2019;127:925–953. Available from: <http://doi.org/10.1016/j.cie.2018.11.030>.
- 22) Falter M, Hadwich K. Customer service well-being: scale development and validation. *The Service Industries Journal*. 2020;40(1-2):181–202. Available from: <https://doi.org/10.1080/02642069.2019.1652599>.
- 23) Van Vaerenbergh Y, Varga D, De Keyser A, Orsingher C. The Service Recovery Journey: Conceptualization, Integration, and Directions for Future Research. *Journal of Service Research*. 2019;22(2):103–119. Available from: <https://doi.org/10.1177/1094670518819852>.
- 24) Lasrado F, Thaichon P, Nyadzayo MW. Exploring the role of relationship management and relationship quality in B2B: empirical insights and future research directions. *Journal of Business & Industrial Marketing*. 2023;38(5):1055–1086. Available from: <https://doi.org/10.1108/JBIM-05-2021-0267>.
- 25) Jiang A, Erin YCL. Research on the development of science and technology network industry based on structural equation modeling. *Journal of Mechanical Engineering Research and Developments*. 2018;41(3):82–90. Available from: <http://doi.org/10.26480/jmerd.03.2018.82.90>.
- 26) Mazzù MF, Baccelloni A, Lavini L. Injecting trust in consumer purchase intention through blockchain: evidences from the food supply chain. *Italian Journal of Marketing*. 2022;2022(4):459–482. Available from: <https://doi.org/10.1007/s43039-022-00061-0>.
- 27) Georgiou K, Chasapis A. Novel time slicing approach for customer defection models in e-commerce: a case study. *Data Science and Management*. 2022;5(3):149–162. Available from: <https://doi.org/10.1016/j.dsm.2022.07.001>.
- 28) Kurdi BA, Alshurideh M, Shammout E, Alhamad A, Akour I. Achieving Customer Retention: Emphasizing Strategic Operations on Quality Service and Maximizing Value. 2023. Available from: <https://doi.org/10.54489/ijtop.v3i1.239>.
- 29) Khamitov M, Grégoire Y, Suri A. A systematic review of brand transgression, service failure recovery and product-harm crisis: integration and guiding insights. *Journal of the Academy of Marketing Science*. 2020;48(3):519–542. Available from: <https://doi.org/10.1007/s11747-019-00679-1>.
- 30) Cambra-Fierro J, (xuehui) Gao L, Melero-Polo I, Trifu A. How do firms handle variability in customer experience? A dynamic approach to better understanding customer retention. *Journal of Retailing and Consumer Services*. 2021;61:102578. Available from: <https://doi.org/10.1016/j.jretconser.2021.102578>.
- 31) Tirrel H. Working flexibly: A study on German SMEs in relation to information and communication technology and leadership . . Available from: <https://repository.unic.ac.cy/archive/download/e4c59960-3eae-4269-a754-05e3d1658482.pdf>.