

Impact of Modern Supply Chain Factors on Customer Satisfaction and Building Brand Loyalty

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ABSTRACT

Purpose: This paper aims to examine the role of digital supply chain factors such as digitalization, ethical practices, human-centricity, and sustainability, and their impact on customer satisfaction, and subsequently the impact on brand loyalty in the context of digital supply chain operational strategy.

Design/methodology/approach: By utilizing a quantitative approach, the research applied a structured questionnaire with a five-point Likert scale, which was completed by 391 respondents. In this study, the relationship between digitalization, ethical practices, human-centricity, and sustainability with brand loyalty through SEM, using SmartPLS 3.0, was examined, using customer satisfaction as a mediating variable.

Findings: The results indicate that digitalization, ethical practices, and sustainability positively influence customer satisfaction. Human-centricity, surprisingly, was not significantly associated with adoption, given the relatively young and technology-savvy sample of respondents who might place a greater priority on digital efficiency.

Research limitations/implications: This study focuses on young, infrequent online shoppers, which limits its generalizability. Future research may adopt a different demographic background and industry context and investigate new technologies such as AI and blockchain.

Practical implications: This develops a different perspective in companies concerning digital tools, ethical transparency, and sustainability strategies to increase both satisfaction and loyalty, contemplating customer preferences.

Originality/value: In competitive markets, a modern integrated model linking why and how supply chain dimensions connect with customer satisfaction and loyalty is particularly important.

Keywords: Supply chain management, Customer satisfaction, Brand loyalty, Digitalization, Sustainability

1. INTRODUCTION

In today's fast-paced, hyper-competitive business climate, current supply chain operations are no longer simply a determinant of customer satisfaction, but also sustainable brand allegiance. Digital transformation, human-centred solutions, ethical governance, and sustainable operations are no longer nice-to-have capabilities but rather strategic levers to achieve supply chain excellence. In the pursuit of meeting the changes associated with customer expectations, supply chain innovation is a necessity for value creation, responsiveness, and competitiveness.

Recent research evidence that today supply chain factors of digitalization, integration of Internet of Things (IoT), vendor-managed inventory, customization, and just-in-time (JIT) practice-based operational efficiency and customer satisfaction are of pronounced significance (Lelo & Israel, 2024). Elements of effective Supply Chain Management (SCM), such as timely delivery, clear transparency, and elevated levels of service, are integral parts of SCM that can affect consumer confidence and satisfaction (Ahmed et al., 2024). Characteristic of an age in which social media and immediate consumer feedback are so influential, supply chain agility in terms of responsiveness and innovation has become increasingly significant in the ability to meet such market changes while maintaining a favourable brand image (Mahmud et al., 2024).

Moreover, the effect of agility varies across different types of customers, with agility having a more powerful influence on acquiring new customers than on retaining current customers in both B2B and B2C environments (Gligor et al., 2020). However, if it is true, then customer satisfaction is not merely about fast pace and continuous creative ideas but also about relationships quality. Human factors, such as efficient CRM and cooperative supplier engagement, play as mediators which strengthens the relationship of supply chain value with customer loyalty (Helal et al., 2024). Likewise, the inclusion of internal and external stakeholders contributes to the efficiency in operations and also strengthens the relationship between satisfaction and loyalty (Abdirad & Krishnan, 2022).

In the digital market environment, especially in the e-commerce space, e-supply chain capabilities, including process discipline and customer focus, have to enhance the quality and customer satisfaction (Ahmed et al., 2023). At the same time, consumers are becoming more drawn to environmental and social causes, making them want brands to be more transparent and ethical. Consequently, sustainable supply chain management, including environmental stewardship, social equity, and economic profit, has shown strong associations with customer satisfaction and brand loyalty. Particularly in the hospitality industry (Modica et al., 2020).

However, the increasing body of literature notwithstanding, there is still a shortage of empirical research that integrates and simultaneously analyses the impacts of digitalization, ethical practices, human centricity, and sustainability in the relationship between supply chain and customer satisfaction, and its impact on brand loyalty. Studies found in the literature often study these variables separately, compare them to each other, or occasionally overlook the mediator role of customer satisfaction in generating loyalty. In addition, relatively few studies contextualize these relationships in traditional and digital supply chain ecosystems, hence representing a noteworthy research gap.

This study seeks to fill this gap by proposing an overarching model of critical supply chain dimensions of the present era on customer satisfaction, which in turn leads to brand loyalty. Thus, by integrating multiple theoretical constructs and capitalizing on recent empirical findings, the current research offers relevant implications for managers, marketers, and supply chain practitioners who seek to improve consumer satisfaction and to develop sustainable brand relationships.

2. LITERATURE REVIEW

The influence of the supply chain on customer satisfaction and brand loyalty has been the focus of much academic discussion in recent years. The key topics to expect in this field are the effects of digitalization, ethics, human-focused efforts, sustainability, and the satisfaction-loyalty relationship. Empirically, this literature review integrates pertinent evidence in these regions.

2.1 Digitalization in the Supply Chain and Customer Satisfaction

Supply chain management's digital transformation has disrupted firm operations, and it has profound impacts on customer satisfaction by increasing the tendency toward greater integration, responsiveness, and efficiency. Liu et al. (2024) offer compelling evidence from Chinese listed companies that, as digitalization advances, decreased customer concentration is realized by the reduction of information asymmetry and enhancement of technology matching efficiency, which broadens customer bases. Similarly, Guo et al. (2023) argue that digitalization among large customers works as a catalyst to digital adoption in the supply chain, especially in the presence of a tech-minded top management and with fewer financial constraints.

Digitalisation also serves as a means of moderating participation risks. According to Fang et al. (2024), high supplier and customer concentration generally has a negative effect on circular economy performance, but strong digital capabilities play a role in mitigating it. Ning & Yao (2023) argue that not only does digital transformation improve supply chain capabilities and sustainable competitive advantage under such environmental uncertainties. In the post-pandemic era, Salamah et al. (2023) argue that digitalization enhances the integration and efficiency of the supply chain, leading to better performance. Further, Sun & Xi (2025) emphasise that digitalisation involves a subtler function in servitisation: although it helps ameliorate the negative impact of customer concentration, it can worsen the problem of supplier dependence. Picking up on this stream of literature, Hai et al. (2023) assert that supply chain digitalization and integration collectively enhance firm performance, with integration acting as a partially mediating factor and digitalization as a moderating factor of the link.

H1: *There is a positive relationship between supply chain digitalization and customer satisfaction.*

2.2 Ethical Practices in the Supply Chain and Customer Satisfaction

Socially responsible practices such as green supply chain management (GSCM), fair sourcing, labor welfare, and operational transparency are emerging as key determinants for customer satisfaction in the contemporary business world. Consumer interest has been gaining

momentum, leading to calls for responsibility and sustainability among consumers as they explore the supply chain. Chavez et al. (2016) also point out that customer-oriented GSCM in relation to GSCM practice specifically concerning environmental impact, which stresses meeting the customer goal, creates an effect on operational performance and customer satisfaction. These ethically oriented tactics enhance firm performance and contribute to brand authenticity.

In support of this, Karim et al. (2024) contend that customer satisfaction is likely a mediating variable, connecting green supply chain practices to attitudinal outcomes, such as brand loyalty, positive word-of-mouth, and a willingness to pay a premium for ethically-produced products. This means that consumers know about these sustainability efforts of companies and reward them for it in the form of consumerism. There are also certifications and third-party verifications, such as Fair-Trade logos and eco-labels, which serve to substantiate claims through supporting consumer trust in ethical claims. Affan et al. (2024) underscore that such recommendations act as strong proofs of authenticity, especially in those sectors where greenwashing (cheating consumers with deceptive green claims) is a rising issue. Le et al. (2022) caution that businesses may risk damaging consumer trust and thus their brand if such ethical pledges are not transparently conveyed and genuinely implemented. To solve these technological challenges, innovations such as blockchain and big data analytics have emerged. Shafiq et al. (2020) emphasize the ability of these technologies to improve traceability, transparency, and accountability of the supply chain to guarantee ethical behaviours and provide trust to consumers. Ultimately, when this is put into practice with sincerity and is coupled with clear communication and technical evidence, ethical supply chain practices go beyond meeting the moral expectations of informed consumers and become a strategic differentiator. Bag et al. (2023) argue that a value-driven organization may derive considerable long-term benefits in terms of increased customer satisfaction, higher brand loyalty and enduring profitability if organization's processes are geared towards the upholding of ethical values.

H2: Ethical practices in the supply chain will significantly and positively influence Customer Satisfaction.

2.3 Human-Centricity in the Supply Chain and Customer Satisfaction

Humanizing supply chain management, responding to the needs of employees, as well as to the customers with more than products and services, is playing a crucial role in driving customer satisfaction and business performance. The objective of aligning supply chain performance with human-centric goals such as worker safety, collaboration, service excellence, and reduced waste, coupled with the capability for employee engagement in the transformation of corporate objectives into better customer experiences and increased customer satisfaction, can be accomplished (Maaz & Ahmad, 2022). Jena (2023) reinforces such a viewpoint by showing that customer-focused marketing in the FMCG supply chain can visibly improve efficiency and profitability among small and medium-sized enterprises (SMEs). The findings indicate that placing people, including internal ones such as employees and external ones such as customers are at the heart of supply chain strategies is the means to establish a competitive advantage.

Adding to this, the addition of human-centered practices with technology and sustainability may help to maximize the supply chain's role in satisfaction. Asha et al. (2023) find that customer-centric green supply chain management (GSCM), when combined with supportive organizational culture and technology orientation, improves delivery quality and responsiveness. This convergence supports companies to deliver individual-based, on time, and respectful of the environment services. According to Thekkoot (2022), data-driven supply chains that utilize real-time analytics can help firms to easily adjust strategically to consumer demand changes in order to improve customer satisfaction and operational flexibility. On the other hand, Kang et al. (2024) warn that SMEs will encounter difficulties in deploying such widespread systems owing to constraints of resources and technology. Notwithstanding these impediments, Baldi et al. (2024) offer a rigorous base and empirical evidence on the fact that human- and customer-oriented supply chains are not only necessary to create brand loyalty and satisfy evolving customer needs, but also to sustain long-run business development.

H3: *Human-centricity in the supply chain has a positive effect on customer satisfaction.*

2.4 Sustainability in the Supply Chain and Customer Satisfaction

Sustainability in the supply chain and the sustainability of individual companies impact customer satisfaction, as eco-friendly and ethical practices have become part of consumer expectations and brand preferences. Nangpiire et al. (2024) observed that sustainable supply chains impact satisfaction and repurchase intentions to a high degree, especially in industries such as hospitality, where the customer experience has a direct line to brand values. Lim et al. (2022) also write that green operations, e.g., lower carbon emission, ethical sourcing, waste reduction, etc., not only improve the environmental performance but also increase the customer perception. In addition, sustainability's social and economic dimensions, that is, fair labor practices and community participation, provide indirect benefits in the form of improved quality of service and greater competitive positioning of a brand. More eco-conscious consumers are also more likely to reward brands that share their values by forgoing less sustainable options.

Customer satisfaction is one of the most important potential mediators of how sustainable supply chain practices might influence customer behaviours (e.g., brand loyalty, advocacy, pay premium, etc.). Khan et al. (2021) illustrate that firms with sustainability investment projects enjoy increased customer satisfaction accompanied by a more intense behavioural response. Meaning sustainability is the responsibility of the corporation, and it is a commercial tool for forming long-term relationships with customers. But the road to successful sustainability incorporation is a delicate one. Sutia (2022) stresses the significance of clear communication for preventing scepticism and greenwashing, whereas Suresh (2024) notes the difficulties in relation to cost and demographic differences in sustainability perceptions. Nevertheless, there is strong evidence of such a connection, with Mohamed, Xu & Gursoy (2015) augmenting that a well-implemented sustainability strategy can improve customer trust and long-term business performance.

H4: *Supply chain sustainability has a positive effect on customer satisfaction.*

2.5 Customer Satisfaction and Brand Loyalty in the Supply Chain

Customer satisfaction is an important connecting factor in the supply chain performance and brand loyalty creation. Today, in fiercely competitive markets, firms are becoming aware that the efficiency, reliability, and responsiveness of the supply chain, rather than manufacturing efficiency, are also crucial factors influencing the perception and satisfaction of customers. Asamoah et al. (2021) point out that effective supply chain integration leads to an improved operational performance, which in turn increases customer satisfaction and ultimately brand loyalty. To do this, the organization must be able to streamline its supply chain processes through cooperation and the sharing of information, and with it, they are more likely to meet their customers' demands for fast responses, flexibility, and consistency in service. Bupu et al. (2023) also stress the importance of high service quality, a rapid response to customer needs, and clear and transparent communication between chain supply points for customer satisfaction and retention. These are the service parts that contribute to trust and confidence, ultimately allowing its customers to develop long-term relationships with the brand. Satisfaction turns into a favor and an intangible weapon in customer loyalty.

The relationship between satisfaction and loyalty is also strongly developed by product quality, fair price, and strong brand. According to Devi & Yasa (2021), these factors determine the overall customer experience and increase emotional and functional brand loyalty. Incorporating these aspects within supply chain strategies guarantees consistent value creation, resulting in repeat purchases and customer advocacy. There is also a very important sustainability aspect to it. Mohamed, Thanushan & Kennedy (2020) indicate that the relationship between customers' satisfaction and loyalty is enhanced with more sustainable and socially responsible supply chain practices, ethical sourcing, environmentally friendly logistics, and fair labour policies. Consumers are looking more and more for brands that are a beacon of their values, and companies that are able to meet this will often find themselves with a competitive edge. Lastly, the supply chain is rising as a key driver of competitive differentiation. Huo et al. (2023) argue that implementing new systems and practices like automation, digital tracking, and predictive analytics, among others, contributes to improving agility in the supply chain, as well as giving a better experience to customers. The consequence is even stronger satisfaction levels, even deeper brand loyalty, and very precious reputational capital, which is the fuel of long-term commercial success.

H5: Brand loyalty is positively influenced by customer satisfaction.

The available literature suggests that new supply chain strategies (digitalization, ethical practices, human-centricity, and sustainability practices) are transforming and improving customer satisfaction. It's that satisfaction which drives brand loyalty, competitive distinction, and the long-term health of the enterprise. In a world where customers are increasingly savvy and value-driven, supply chain design will need to be operationally efficient, ethically transparent, and digitally nimble. Future research may focus on the interaction of these dimensions within the context of emerging markets and specific industries.

2.6 Theoretical Foundation

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Oliver (1980), Expectation-Confirmation Theory (ECT) is the fundamental perspective to use for conceptualizing customer satisfaction in the new supply chain world. Based on such a theory, satisfaction occurs only when performance falls within or exceeds consumer expectations. Customers have, in turn, come to expect the digitalized, real-time tracking, eco-friendly packaging, and timely delivery in their supply chain relationships. If these elements meet or exceed customers' expectations, a positive disconfirmation occurs, which leads to satisfaction. And then creates customer loyalty and brand affinity over time. As a result, the theory provides a rationale for investigating the extent to which each of the innovative/sustainable supply chain factors impacts perceived performance.

Beyond satisfying customer demands, it is important to acknowledge the broader aspect of supply chain management, and that is where the Stakeholder Theory (Freeman, 2010) applies. According to this theory, a firm is successful to the extent that it develops value for shareholders and other stakeholders with whom it interacts, including consumers, employees, suppliers, and the broader community. In today's supply chain, this approach sees the firm focusing on becoming what it sees as a responsible corporate citizen, improving ethical labor practices, environmental responsibility, and community engagement to show stakeholders it is acting to ensure their well-being. These measures help get public confidence in the firm, for which it receives credit as a responsible corporate citizen, which further encourages the development of enduring brand loyalty and satisfaction, especially among ethically and socially responsible consumers.

Together, these two theories provide complementary explanations for how contemporary supply chain approaches create satisfied and loyal customers. It draws on Expectation-Confirmation Theory and its focus on the performance-related aspect of meeting consumer expectations and Stakeholder Theory, which extends the concept to incorporate the ethical, social, and environmental dimensions of a product. By incorporating these perspectives, the research is able to systematically examine the joint effect of supply chain innovations and value-driven practices on perceived value and the type of long-run relational outcomes, such as trust and loyalty.

From the literature review and theoretical support, we build the following model.

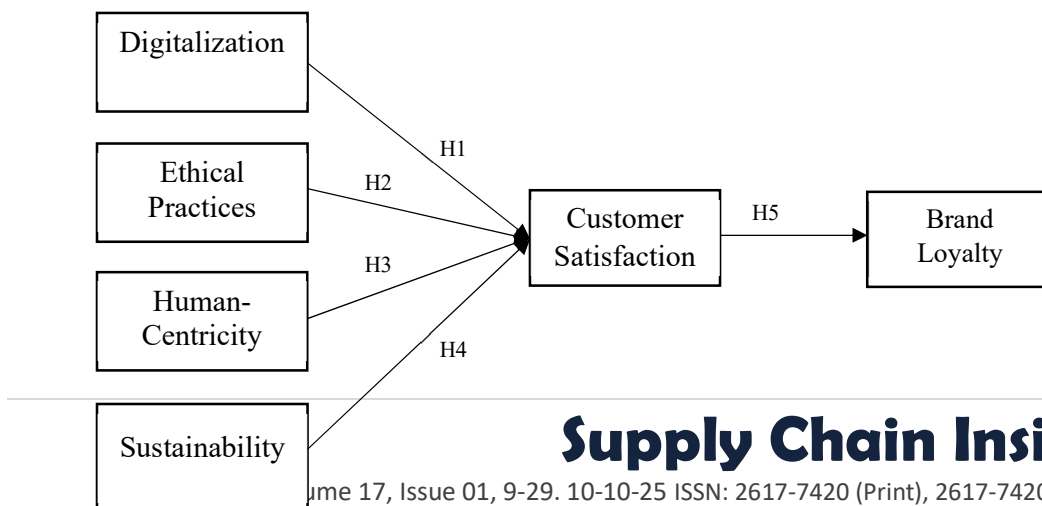


Figure 1: Conceptual Framework

3. METHODOLOGY

3.1 Research Design

The present research adopts a quantitative approach using a five-point Likert scale-based structured questionnaire to assess the respondents' attitudes towards the Impact of Modern Supply Chain Factors on Customer Satisfaction and Building Brand Loyalty. Primary data constitutes the research design and is the focal point of analysis. Structural Equation Modelling (SEM) was used to analyse the data by using SmartPLS 3. This modern statistical package is suitable for predictive and exploratory research and is widely utilized in social science and behavioural research (Sarstedt et al., 2024).

3.2 Constructs and Indicators

The proposed research model in this study includes four exogenous constructs: Digitalization (D), Ethical Practices (EP), Human-Centricity (HC), Sustainability (S), and Brand Loyalty (BL) as an endogenous construct, and Customer Satisfaction (CS) acts as a mediating construct. Every construct was measured using a set of observed variables measured on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Here is the table with the construct and indicators.

Table 1: Constructs and Indicators with statements

SL.		Study Items
Digitalization (D)		

D1.	The online store/platform I purchased recently provided digital payment options.	Digital payment
D2.	I was able to track my online order in real-time.	Order tracking
D3.	I received timely digital notifications (email/SMS).	Timely notification
D4.	The platform had a user-friendly interface.	User-friendly Interface
Ethical Practices (EP)		
EP1.	The online seller/platform provided transparent information about product sourcing.	Sourcing transparency
EP2.	I believe ethical standards were maintained in the delivery process.	Ethical standards
EP3.	The product description was honest and not misleading.	Accurate description
EP4.	I received a fair return/refund option.	Return/refund policy
EP5.	The seller avoided unethical marketing tactics.	Ethical marketing
Human-Centricity (HC)		
HC1.	The seller/platform responded promptly to my queries.	Prompt response
HC2.	I felt that the service was tailored to my needs.	Needs satisfaction
HC3.	The delivery agent/customer service was respectful.	Respectful service
HC4.	The platform made me feel valued as a customer.	Customer value
HC5.	I had control over delivery timing/preferences.	Delivery control
Sustainability (S)		
S1.	The packaging used was recyclable or minimal.	Recyclable/Minimal packaging
S2.	The delivery process aimed to reduce environmental impact (e.g., grouped deliveries).	Reduced environmental impact
S3.	The product was advertised as eco-friendly.	Eco-friendly advertising
S4.	The seller/platform promotes green initiatives.	Green initiatives
S5.	I considered sustainability in my purchase decision.	Sustainability consideration
Customer Satisfaction (CS)		
CS1.	I am satisfied with the product I received online.	Product satisfaction
CS2.	The overall online buying experience met my expectations.	Expectation fulfillment
CS3.	I feel that the delivery service was efficient.	Delivery efficiency
CS4.	My issues (if any) were resolved promptly.	Issue resolution
CS5.	I would rate this purchase experience positively.	Positive experience
Brand Loyalty (BL)		
BL1.	I would buy again from this online store/platform.	Repeat purchase intention
BL2.	I recommend this platform/seller to others.	Recommendation
BL3.	I prefer this platform over others when shopping online.	Platform preference

BL4.	I follow the brand/seller online.	Brand following
BL5.	I feel connected to this brand/seller emotionally.	Emotional connection

3.3 Data Collection and Analysis

Primary data was collected through an online and offline survey distributed to individuals. A brief screening question was asked to ensure that only those individuals with proper exposure to Digitalization (D), Ethical Practices (EP), Human-Centricity (HC), Sustainability (S), Brand Loyalty (BL), and Customer Satisfaction (CS) completed the questionnaire. From them, 391 valid responses were received, fulfilling the PLS-SEM's recommended sample size criteria (Cochran, 1942). For proper analysis, five times as many measurement items are preferably used (Hair, Risher, et al., 2019).

The data were analysed using SmartPLS version 3, and it can be used to test both the measurement model (validity and reliability) and the structural model (testing of hypotheses and fit of the model). Methods applied in this study are Reliability and convergent validity, Descriptive statistics, and correlations among latent variables and hypothesis testing for a complete understanding of the constructs and how they interrelate. These analyses allow researchers to test for the statistical and practical significance of Digitalization (D), Ethical Practices (EP), Human-Centricity (HC), Sustainability (S), Brand Loyalty (BL), and Customer Satisfaction (CS).

4. RESULTS AND DISCUSSIONS

Table 2: Demographics of the respondents

Variable	Categories	Frequency/Statistics	Percentage
Gender	Female	168	43

	Male	223	57
Age	Less than 20	6	1.5
	21-30	369	94.4
	31-40	16	4.1
	41-50	0	0
	More than 50	0	0
Occupation	Student	343	87.7
	Staff/Employee	41	10.5
	Housewife	7	1.8
	Self-employed	0	0
Frequency of Online Shopping	Daily	3	0.8
	Several times a week	8	2
	Once a week	9	2.3
	2-3 times a month	59	15.1
	Once a month	63	16.1
	Less than once a month	249	63.7
Comfort Level with Technology	Very uncomfortable	6	1.5
	Uncomfortable	14	3.6
	Neutral	66	16.9
	Comfortable	228	58
	Very comfortable	77	19.7
Total Samples: 391			

The dataset has been collected from 391 participants and is evenly split by gender: 57% of participants are male, 43% female. Most of the respondents (94.4%) are in the 21–30 age group depicting mostly a younger crowd. The majority of participants are students (87.7%), a small number of staff/employees (10.5%), and a few housewives (1.8%), and none of them are self-employed. Regarding the online shopping frequency, most (63.7%) shop online monthly or less, while very few shop more frequently. In terms of technological comfort, 58% of the participants expressed that they were comfortable with technology, while 19.7% were very comfortable. Few participants felt indifferent or uncomfortable, so the majority were digitally literate, consistent with a young, student sample.

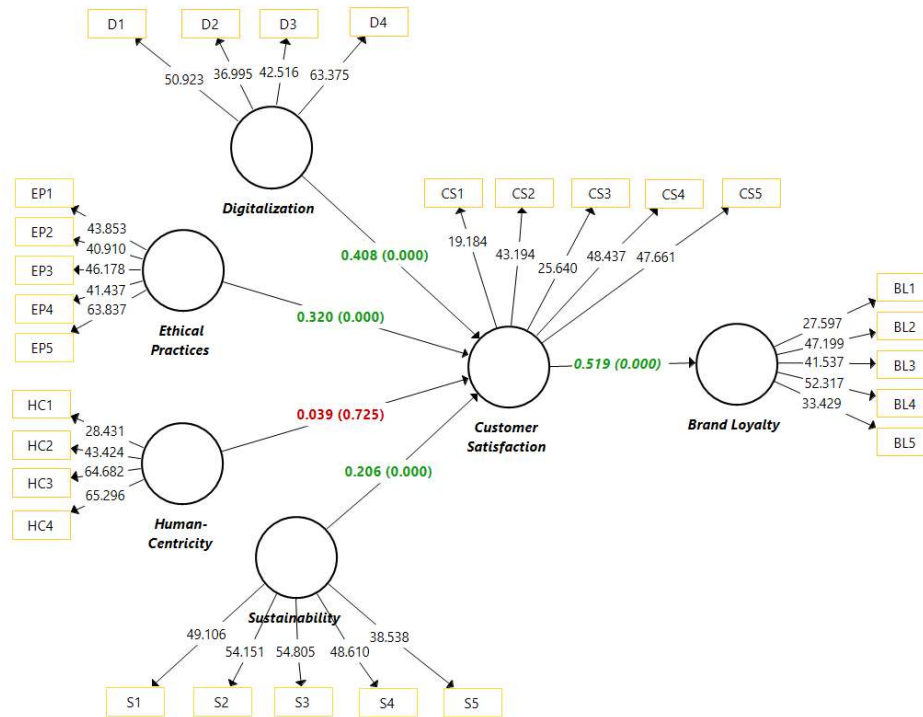


Figure 2: Structural Model Path Diagram (PLS-SEM Output)

Fig.2 The model in the figure is SEM, evaluating how various constructs are related to one another and affect customer satisfaction and brand loyalty, containing the effects of each path (path coefficient) specifically in terms of direction and strength. The central construct, Customer satisfaction, is predicted by four main determinants, including Digitization, Ethical Practices, Human-centricity, and Sustainability. These coefficients represent the relative weight of each indicator with its construct.

Customer Satisfaction as a mediating variable towards Brand loyalty has a strong path coefficient of 0.519. The model indicates that the factor having the greatest direct effect on customer satisfaction is Digitization, followed by Ethical Practices; Human-Centricity and Sustainability have some additional, albeit a bit weaker, influence. The positive linkage from Customer Satisfaction to Brand Loyalty emphasizes the importance of satisfaction in building loyalty (Tanveer et al., 2021). The interrelated structure of constructs and indicators emphasizes multilevel insight into how values and practices within organizations influence customer-centric outcomes, while the data offer a quantitative foundation for these relationships within a given research context (Westin et al., 2022).

Table 3: Reliability and convergent validity results

Constructs	Items	Loadings (≥ 0.5)	Alpha (≥ 0.7)	CR (≥ 0.7)	AVE (> 0.5)	rho_A
Digitalization	D1	0.884	0.912	0.938	0.792	0.913
	D2	0.872				
	D3	0.897				
	D4	0.905				
Ethical Practices	EP1	0.874	0.922	0.941	0.761	0.924
	EP2	0.868				
	EP3	0.868				
	EP4	0.87				
	EP5	0.881				
Human-Centricity	HC1	0.819	0.904	0.933	0.778	0.907
	HC2	0.889				
	HC3	0.908				
	HC4	0.908				
	HC5	Dropped				
Sustainability	S1	0.878	0.928	0.945	0.776	0.93
	S2	0.895				
	S3	0.889				
	S4	0.878				
	S5	0.866				
Customer Satisfaction	CS1	0.745	0.889	0.919	0.694	0.894
	CS2	0.876				
	CS3	0.796				
	CS4	0.866				
	CS5	0.875				
Brand Loyalty	BL1	0.778	0.877	0.91	0.671	0.882
	BL2	0.849				
	BL3	0.823				
	BL4	0.856				
	BL5	0.786				

The reliability and convergent validity analyses of constructs in the study are provided in Table 3, which meets the proposed standards, suggesting a robust and reliable measurement model.

All construct loadings, however, are higher than 0.745, indicating acceptable indicator reliability (Hair et al., 2019). The Cronbach's alpha ranges from 0.877 to 0.928, and the composite reliability (CR) is higher than 0.91, indicating high internal consistency (Tavakol & Dennick, 2011). The AVE value for each construct is higher than the superiority value of 0.5, supporting the acceptable convergent validity (Fornell & Larcker, 1981). One item was removed from the Human-Centricity construct, and the remaining items still return reliable outcomes in terms of strong factor loadings and an AVE value of 0.778. Furthermore, the rho_A values, that further evaluate construct reliability, also exceed 0.70 for all the constructs (Dijkstra & Henseler, 2015). Taken together, the findings thus provide evidence for the reliability and validity of the constructs under study: Digitalization, Ethical Practices, Human-Centricity, Sustainability, Customer Satisfaction, and Brand Loyalty, and endorse the appropriateness of the measures for the subsequent structural equation modelling.

Table 4: Descriptive statistics and correlations among latent variables

Variables	Item	AVE	Mean	SD	D	EP	HC	S	CS	BL
D	4	0.792	3.708	0.841	0.890					
EP	5	0.761	3.712	0.835	0.863	0.872				
HC	4	0.778	3.687	0.873	0.847	0.840	0.882			
S	5	0.776	3.687	0.873	0.603	0.636	0.580	0.881		
CS	5	0.694	3.788	0.841	0.841	0.835	0.772	0.678	0.833	
BL	5	0.671	3.516	1.072	0.468	0.467	0.449	0.600	0.519	0.819

All constructs exceed the AVE threshold of 0.50, which evidences satisfactory convergent validity. The mean values are between 3.516 (Brand Loyalty) and 3.788 (Customer Satisfaction). The square roots of AVE are contained in the diagonal and all of which are greater than their respective inter-construct correlations, indicating discriminant validity. Digitalization (D), Ethical Practices (EP), and Human-Centricity (HC). These are also found to have high correlations with Customer satisfaction (CS) with correlation coefficients equal to 0.841, 0.835, and 0.772, which implies that these factors can considerably contribute towards satisfaction. Brand Loyalty (BL) is moderately correlated with CS (0.519) and Sustainability

(0.600), having a substantial yet relatively lesser relationship. Taken together, the table provides support for the reliability, validity, and substantive relationships among the variables in the model.

Table 5: Coefficient of determination (R^2)

	R^2
Customer Satisfaction	0.780
Brand Loyalty	0.270

Table 5 reveals that CS has an R^2 of 0.780, which means that 78% of the variation of CS is explained by independent variables (Digitalization, Ethical Practices, Human-Centricity, and SO). On the other hand, BL has an R^2 of 0.270, which means that Customer Satisfaction contributes 27% to the variance explained in BL.

Table 6: Summary of hypothesis testing

Hypothesis	Paths	t-value	β	p-value	Decision	Supporting References
H1	Digitalization → Customer Satisfaction	4.309	0.095	0.00	Supported	(Baycik & Gowda, 2024)

H2	Ethical Practices → Customer Satisfaction	4.367	0.073	0.00	Supported	(Mohammad et al., 2025)
H3	Human-Centricity → Customer Satisfaction	0.345	0.112	0.73	Not-Supported	(Saad et al., 2024)
H4	Sustainability → Customer Satisfaction	6.313	0.033	0.00	Supported	(Mahar et al., 2025)
H5	Customer Satisfaction → Brand Loyalty	12.958	0.04	0.00	Supported	(Yang et al., 2025)

Four out of five hypotheses are supported. Digitalization (H1), Ethical Practices (H2), and Sustainability (H4) are having an impact on Customer Satisfaction as their p-value = 0.00, their t-values >1.97. Customer Satisfaction has a substantial positive impact on Brand Loyalty (H5) as shown by the high value of t (12.958) and the $\beta = 0.04$, which confirms a strong link. Yet, Human-Centricity (H3) became insignificant ($p = 0.73$, $t = 0.345$), indicating no significant influence on customer satisfaction in this setting. Overall, the results clarify the main factors that drive satisfaction and, in turn, impact on brand loyalty.

5. CONCLUSION

Amid the fast-paced and dynamic ambience of the modern global marketplace, where technology has stretched customer expectations to new heights and competition buzzes with an electric fervour, this study tries to find out how leading supply chain practices influence brand loyalty in today's global marketplace. Empirically tested on a meticulously designed survey of 391 respondents and the analysis conducted through Structural Equation Modelling, we tell a tale that says digitalization, ethical practices, and sustainability are more than just operational spokes; they are the very veins drawing businesses and customers closer by both trust and loyalty. At the centre of this story is the power of digitalization, which is turning supply chains into frictionless, agile processes that smile at customers. These experiences are considered seamless and nimble as a result of tracking orders in real-time, working with easy-to-use online platforms (experiencing fewer hurdles to completion), digital notifications being sent at the right time, and generally meeting today's tech-savvy shopper where their expectations are highest. In turn, ethical practices can't directly create trust by transparent sourcing, honesty in product descriptions, and fair return policies. What customers relate to at a much deeper level, and what ultimately makes them purchase the product, is that products are not just that, but they belong to brands. With a path coefficient of 0.206, the final piece of this trilogy is Sustainability, which pulls heartstrings through eco-friendly packaging and reduced environmental impact, Save-the-Polar-Bears promises. The coronavirus lockdowns

have reminded brands of their power to do good, and the emotional connection they make with people as a result takes them from being just transactional entities.

Interestingly, compared to the aforementioned general practices, the human-centric practices (personalized service and respectful customer interactions) yielded a less significant path coefficient of 0.112 with a p-value of 0.73. The discovery was probably not indicative in a general sense, but more reflective of at least some group body- a digitally-literate people most likely shopping online only sporadically and favouring practicality over the personal touch. This subtlety reveals an important reality: whether or not supply chain strategies actually work, the question is answered by understanding the audience's unique beat. Although the findings reflect a mostly human-centric model, it is important to note where digital and ethical influences are strongest for this age group.

They close and reinvent as a real-time human supply chain, alive not only to transact goods but also to create a joyous experience that bonds people back for years together. The strong connection to customer experience with service interaction and with brand influence, indicated by a path coefficient of 0.519, suggests that not only do happy customers come back, but they also recommend, advocate brands, and establish emotional relationships. Convenience from digitalization, trust with ethical practices, and value alignment from having sustainable products result in a satisfying symphony that lasts beyond the final checkout. It is a world where consumers are seeking more than just another product; they look for brands that mirror their beliefs and values. An efficient and ethical production process is a shining emblem of excellence. The future shoppers study tells us that companies that master these will not only lead the way through today's tricky market, but they will light up bright on a level of bonding with customers and nurtured loyalty which stretches across generations.

6. RECOMMENDATIONS AND FUTURE RESEARCH SCOPE

During the study, it became clear that digitalization was by far the strongest driver, so companies should take advantage of this by implementing digital tools like real-time tracking and user-friendly platforms to further satisfy customers. Both ethical practices (like sustainable sourcing and fair practices) and sustainability efforts, like packaging eco-friendliness, are vital to the successful development of brand trustworthiness among consumers, especially for a value-driven consumer base. However, human-centric practices seemed to have less of a direct impact on these tech & digital natives, as evidenced in license acquisition. New product development and customer group tailoring, strong satisfaction principles, and reliable, focused supply chains should provide for repeat purchase and advocacy.

Future research could involve other demographics, such as older or B2B customers, and industry-specific contexts like Fashion/Hospitality, to have more general insights. Further longitudinal research in the future and investigations into emerging technologies like AI, blockchain, as well as cultural influences, could shed more light on how supply chain strategies evolve to align with changing consumer expectations.

7. REFERENCES

- Abdirad, M., & Krishnan, K. (2022). Examining the impact of E-supply chain on service quality and customer satisfaction: A case study. *International Journal of Quality and Service Sciences*, 14(2), 274–290. <https://doi.org/10.1108/IJQSS-08-2020-0131>
- Asamoah, D., Nuerter, D., Agyei-Owusu, B., & Akyeh, J. (2021). The effect of supply chain responsiveness on customer development. *The International Journal of Logistics Management*, 32(4), 1190–1213. <https://doi.org/10.1108/IJLM-03-2020-0133>
- Asha, A. A., Dulal, M., & Habib, Dr. A. (2023). The influence of sustainable supply chain management, technology orientation, and organizational culture on the delivery product quality-customer satisfaction nexus. *Cleaner Logistics and Supply Chain*, 7, 100107. <https://doi.org/10.1016/j.clscn.2023.100107>
- Bag, S., Rahman, M. S., Srivastava, G., Shore, A., & Ram, P. (2023). Examining the role of virtue ethics and big data in enhancing viable, sustainable, and digital supply chain performance. *Technological Forecasting and Social Change*, 186, 122154. <https://doi.org/10.1016/j.techfore.2022.122154>
- Baldi, B., Confente, I., Russo, I., & Gaudenzi, B. (2024). Consumer-Centric Supply Chain Management: A Literature Review, Framework, and Research Agenda. *Journal of Business Logistics*, 45(4), e12399. <https://doi.org/10.1111/jbl.12399>
- Baycik, N. O., & Gowda, S. (2024). Digitalization of operations and supply chains: Insights from survey and case studies. *Digital Transformation and Society*, 3(3), 277–295. <https://doi.org/10.1108/DTS-09-2023-0087>
- Bupu, R., Sodikin, M., & Sanchita, S. (2023). Towards Customer Satisfaction: The Role of Customer Relationship Management, Service Quality, and Customer Perceptions. *Journal of Digital Marketing and Halal Industry*, 5(1), 41–56. <https://doi.org/10.21580/jdmhi.2023.5.1.15991>
- Chavez, R., Yu, W., Feng, M., & Wiengarten, F. (2016). The Effect of Customer-Centric Green Supply Chain Management on Operational Performance and Customer Satisfaction. *Business Strategy and the Environment*, 25(3), 205–220. <https://doi.org/10.1002/bse.1868>
- Cochran, W. G. (1942). Sampling Theory When the Sampling-Units are of Unequal Sizes. *Journal of the American Statistical Association*, 37(218), 199–212. <https://doi.org/10.1080/01621459.1942.10500626>
- Devi, A. A. D. T., & Yasa, N. N. K. (2021). Role of customer satisfaction in mediating the influence of service quality and perceived value on brand loyalty. *International Research Journal of Management, IT and Social Sciences*, 8(3), 315–328. <https://doi.org/10.21744/irjmis.v8n3.1786>
- Dijkstra, T. K., & Henseler, J. (2015). Consistent and asymptotically normal PLS estimators for linear structural equations. *Computational Statistics & Data Analysis*, 81, 10–23. <https://doi.org/10.1016/j.csda.2014.07.008>
- Faiyaz Bin Mahmud, Md Jawad Bin Rouf, & Mohammad Mynul Islam Mahin. (2024). Optimization of rice supply chain through multivariate forecasting using ensemble learning models. <https://doi.org/10.5281/ZENODO.13865817>
- Fang, M., Yu, Y., Park, K., Liu, F., Xiao, S. (Simon), & Shi, Y. (2024). Supply chain relationship dependencies and circular economy performance: The contingency role of digitalization capability. *Journal of Purchasing and Supply Management*, 30(4), 100902. <https://doi.org/10.1016/j.pursup.2024.100902>
- Fardin Helal, Muhtashim Ahmed Uzzal, & Ayesha Sabira Nisha. (2024). Do Sustainable Supply Chain Practices Really Matter to the Environment? An Empirical Investigation in the Context of Bangladesh. <https://doi.org/10.5281/ZENODO.13865972>
- Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/10.1177/002224378101800104>
- Foysal Ahmed, Sohaib Khan, & Fatema Akter Akhi. (2023). Integrating the Internet of Everything and Artificial Intelligence in Reverse Logistics to Prepare for Industrial Revolution 5.0. <https://doi.org/10.5281/ZENODO.10030772>

- Freeman, R. E. (2010). *Strategic management: A stakeholder approach*. Cambridge university press.
- Gligor, D., Bozkurt, S., Gölgeci, I., & Maloni, M. J. (2020). Does supply chain agility create customer value and satisfaction for loyal B2B business and B2C end-customers? *International Journal of Physical Distribution & Logistics Management*, 50(7/8), 721–743. <https://doi.org/10.1108/IJPDLM-01-2020-0004>
- Guo, C., Ke, Y., & Zhang, J. (2023). Digital transformation along the supply chain. *Pacific-Basin Finance Journal*, 80, 102088. <https://doi.org/10.1016/j.pacfin.2023.102088>
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Hair, J. F., Sarstedt, M., & Ringle, C. M. (2019). Rethinking some of the rethinking of partial least squares. *European Journal of Marketing*, 53(4), 566–584. <https://doi.org/10.1108/EJM-10-2018-0665>
- Huo, B., Guo, M., & Tian, M. (2023). The impact of supply chain specific investments on firms' market performance: The mediating role of innovation. *Journal of Business & Industrial Marketing*, 38(1), 208–222. <https://doi.org/10.1108/JBIM-03-2021-0162>
- Imran Ahmed, A. F.M Fazle Rabbi, & Mst. Jannat Ara Samira. (2024). THE ROLE OF LOGISTICS IN DRIVING CUSTOMER SATISFACTION: AN EMPIRICAL INVESTIGATION IN BANGLADESH. <https://doi.org/10.5281/ZENODO.13865868>
- Jena, S. K. (2023). Impact of customer-centric approach and customer dissatisfying cost on supply chain profit under price competition. *Journal of Business & Industrial Marketing*, 38(11), 2341–2359. <https://doi.org/10.1108/JBIM-02-2022-0111>
- Kang, P. S., Wang, X., Son, J. Y., & Jat, M. (2024). Future of Customer-Centric Service-Based Supply Chains. In P. S. Kang, X. Wang, J. Y. Son, & M. Jat, *Service 4.0* (pp. 71–78). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-63875-6_5
- Karim, R. A., Rabiul, M. K., & Kawser, S. (2024). Linking green supply chain management practices and behavioural intentions: The mediating role of customer satisfaction. *Journal of Hospitality and Tourism Insights*, 7(2), 1148–1168. <https://doi.org/10.1108/JHTI-04-2023-0241>
- Khan, M. I., Khalid, S., Zaman, U., José, A. E., & Ferreira, P. (2021). Green Paradox in Emerging Tourism Supply Chains: Achieving Green Consumption Behavior through Strategic Green Marketing Orientation, Brand Social Responsibility, and Green Image. *International Journal of Environmental Research and Public Health*, 18(18), 9626. <https://doi.org/10.3390/ijerph18189626>
- Le, T. T., Vo, X. V., & Venkatesh, V. G. (2022). Role of green innovation and supply chain management in driving sustainable corporate performance. *Journal of Cleaner Production*, 374, 133875. <https://doi.org/10.1016/j.jclepro.2022.133875>
- Lelo, J. M., & Israel, B. (2024). Supply Chain Innovative Practices and Customer Satisfaction: Insights from Manufacturing SMEs. *Management Dynamics in the Knowledge Economy*, 12(1), 54–69. <https://doi.org/10.2478/mdke-2024-0004>
- Lim, A.-F., Lee, V.-H., Foo, P.-Y., Ooi, K.-B., & Wei-Han Tan, G. (2022). Unfolding the impact of supply chain quality management practices on sustainability performance: An artificial neural network approach. *Supply Chain Management: An International Journal*, 27(5), 611–624. <https://doi.org/10.1108/SCM-03-2021-0129>
- Liu, R., Zheng, L., Chen, Z., Cheng, M., & Ren, Y. (2024). Digitalization through supply chains: Evidence from the customer concentration of Chinese listed companies. *Economic Modelling*, 134, 106688. <https://doi.org/10.1016/j.econmod.2024.106688>
- Maaz, M. A. M., & Ahmad, R. (2022). Impact of supply chain performance on organizational performance mediated by customer satisfaction: A study of dairy industry. *Business Process Management Journal*, 28(1), 1–22. <https://doi.org/10.1108/BPMJ-05-2021-0292>

- Mahar, A. S., Zhang, Y., Sadiq, B., & Gul, R. F. (2025). Sustainability Transformation Through Green Supply Chain Management Practices and Green Innovations in Pakistan's Manufacturing and Service Industries. *Sustainability*, 17(5), 2204. <https://doi.org/10.3390/su17052204>
- Modica, P. D., Altinay, L., Farmaki, A., Gursoy, D., & Zenga, M. (2020). Consumer perceptions towards sustainable supply chain practices in the hospitality industry. *Current Issues in Tourism*, 23(3), 358–375. <https://doi.org/10.1080/13683500.2018.1526258>
- Mohammad, A. A. S., Barhoom, F. N. I., Alshurideh, M. T., Almohaimmeed, B. M., Al Oraini, B., Abusalma, A., Al-Hawary, S. I. S., Vasudevan, A., & Kutieshat, R. J. (2025). Impact of Green Supply Chain Practices on Customer Satisfaction of Industrial Sector in Jordan. In A. Al-Sartawi & H. Ghura (Eds.), *Artificial Intelligence, Sustainable Technologies, and Business Innovation: Opportunities and Challenges of Digital Transformation* (Vol. 1171, pp. 803–816). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-77925-1_70
- Nangpiire, C., Dawdi, A.-A., Shahadu, F. Z., Majeed, M., & Salifu, Z. N. (2024). The Effects of Sustainable Hospitality Supply Chain on Customer Satisfaction and Customer Repurchase Intentions. *Journal of Law and Sustainable Development*, 12(1), e2605. <https://doi.org/10.55908/sdgs.v12i1.2605>
- Ning, L., & Yao, D. (2023). The Impact of Digital Transformation on Supply Chain Capabilities and Supply Chain Competitive Performance. *Sustainability*, 15(13), 10107. <https://doi.org/10.3390/su151310107>
- Oliver, R. L. (1980). A Cognitive Model of the Antecedents and Consequences of Satisfaction Decisions. *Journal of Marketing Research*, 17(4), 460–469. <https://doi.org/10.1177/002224378001700405>
- Saad B A Hai, Md Joshim U, Abdur Rahman R, Moynul Hasan, & Md Mojammel. (2023). Assessing the Challenges, Benefits and Public Acceptance of Drone Technology for Last-Mile Delivery in Bangladesh. <https://doi.org/10.5281/ZENODO.10030778>
- Saad, N. A., Elgazzar, S., & Kac, S. M. (2024). Investigating the impact of supply chain management practices on customer satisfaction through flexibility and technology adoption: Empirical evidence. *Business Strategy & Development*, 7(1), e326. <https://doi.org/10.1002/bsd2.326>
- Salamah, E., Alzubi, A., & Yinal, A. (2023). Unveiling the Impact of Digitalization on Supply Chain Performance in the Post-COVID-19 Era: The Mediating Role of Supply Chain Integration and Efficiency. *Sustainability*, 16(1), 304. <https://doi.org/10.3390/su16010304>
- Sarstedt, M., Richter, N. F., Hauff, S., & Ringle, C. M. (2024). Combined importance–performance map analysis (cIPMA) in partial least squares structural equation modeling (PLS–SEM): A SmartPLS 4 tutorial. *Journal of Marketing Analytics*, 12(4), 746–760. <https://doi.org/10.1057/s41270-024-00325-y>
- Shafiq, A., Ahmed, M. U., & Mahmoodi, F. (2020). Impact of supply chain analytics and customer pressure for ethical conduct on socially responsible practices and performance: An exploratory study. *International Journal of Production Economics*, 225, 107571. <https://doi.org/10.1016/j.ijpe.2019.107571>
- Sun, B., & Xi, Y. (2025). Supply chain concentration, digitalization and servitization of manufacturing firms. *Journal of Manufacturing Technology Management*, 36(1), 112–133. <https://doi.org/10.1108/JMTM-03-2024-0114>
- Suresh, . (2024). Sustainable Practices in Supply Chain and Consumer Perception. *International Journal of Multidisciplinary Research in Science, Engineering and Technology*, 07(12). <https://doi.org/10.15680/IJMRSET.2024.0712230>
- Sutia, S. (2022). Integrating supply chain management with marketing strategies: Enhancing competitive advantage, customer satisfaction, and sustainability. *Journal of Economics and Business Letters*, 2(1), 7–9. <https://doi.org/10.55942/jeb1.v2i1.281>
- Tanveer, M., Ahmad, A.-R., Mahmood, H., & Haq, I. U. (2021). Role of Ethical Marketing in Driving Consumer Brand Relationships and Brand Loyalty: A Sustainable Marketing Approach. *Sustainability*, 13(12), 6839. <https://doi.org/10.3390/su13126839>

- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53–55. <https://doi.org/10.5116/ijme.4dfb.8dfd>
- Thanushan, K., & Kennedy, F. B. . (2020). Brand Equity And Brand Loyalty: The Mediating Effect Of Customer Satisfaction. *International Journal of Scientific and Research Publications (IJSRP)*, 10(12), 456–469. <https://doi.org/10.29322/IJSRP.10.12.2020.p10850>
- Thekkootte, R. (2022). Understanding big data-driven supply chain and performance measures for customer satisfaction. *Benchmarking: An International Journal*, 29(8), 2359–2377. <https://doi.org/10.1108/BIJ-01-2021-0034>
- Westin, L., Hallencreutz, J., & Parmler, J. (2022). Sustainable Development as a Driver for Customer Experience. *Sustainability*, 14(6), 3505. <https://doi.org/10.3390/su14063505>
- Xu, X., & Gursay, D. (2015). Influence of sustainable hospitality supply chain management on customers' attitudes and behaviors. *International Journal of Hospitality Management*, 49, 105–116. <https://doi.org/10.1016/j.ijhm.2015.06.003>
- Yang, M., Hou, A., Wang, P., & Chai, L. (2025). Customer Environmental Performance and Supplier Green Innovation: A Sustainable Supply Chain Perspective. *Sustainability*, 17(3), 1248. <https://doi.org/10.3390/su17031248>
- Yasar Affan, MD Tofajjal Chowdhury, Rubaiya Tabassum, Rifat Uday, & Nafis Ahmed Rafi. (2024). ANALYZING BARRIERS OF SUSTAINABLE CIRCULAR SUPPLY CHAIN MANAGEMENT IN THE TEXTILE SECTOR OF BANGLADESH: A FUZZY DEMATEL APPROACH. <https://doi.org/10.5281/ZENODO.13865539>