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Modeling the Intricate Association between Sustainable Service Quality and Supply Chain Performance with mediating role of Blockchain Technology in America.

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Abstract: Industries are increasingly becoming conscious of the limitation of natural resources, prompting businesses to adopt sustainability measures. The manufacturing/service sectors, which encompasses small and medium-sized enterprises engaged in logistical operations, actively implements strategies to attain the anticipated sustainability objectives. Integrating sustainable service quality qualities has recently become vital for achieving competitive advantages and sustainability goals. The present study investigates the impact of sustainable service quality attributes on sustainable supply chain performance (SSCP) and the attainment of triple-bottom-line sustainability outcomes. Using random sampling, the data was collected from 312 small and medium-sized logistics service providers in America. The collected data were subsequently analyzed using the Statistical Package for the Social Sciences (SPSS). Based on the results, there is a positive correlation between SSQAs and SSCP. Blockchain technology (BT) is crucial in mediating the relationship between SSQAs and SSCP. Additionally, BT is substantially influential mediating in the relationship between SSQAs and SSCP. This study contributes to the existing knowledge in the field of sustainability by examining the distinct relationship between sustainable service quality features and SSCP. The study presents novel findings on the subject issue within the context of 312 logistics small and medium-sized enterprises (SMEs) in a country such as the United States of America. The study's results are valuable for managers seeking to enhance their services by integrating SSQAs and cultivating their teams with the requisite knowledge and resources to attain desired goals.

Keywords: Sustainable Service Quality Attributes (Ssqas); Sustainable Supply Chain Performance (SSCP); Blockchain Technology (BT), SMC US America.

1.1: INTRODUCTION: The relentless process of industrialization and rapid economic growth provides multiple challenges in maintaining competitive advantages. Businesses should thoroughly examine their service-related characteristics, as industries are currently investigating innovative solutions to address sustainability concerns. Firms must modify their business operations strategies and incorporate sustainability-related features into their products or services during manufacturing (Yuen et al., 2017; Jaegler & Goessling, 2020). Sustainable service quality attributes (SSQAs) include environmental, social responsibility, and financial sustainability. Manufacturing businesses implement these practices to minimize waste, maximize resource efficiency, and connect their plans with the triple bottom line's key values of people, planet, and profit. Many companies are making significant financial investments to balance sustainability and profitability harmoniously (Niu & Zhang, 2021). Logistics and supply chain businesses encounter ongoing difficulties in formulating and executing sustainable operational strategies that provide advantages to internal and external customers while reducing environmental aspects (Gupta et al., 2021). Implementing sustainable quality initiatives in alignment with blockchain technologies is still in its early stages. The slow recognition of the unfolding fact has presented companies in the country with significant financial, social, and environmental difficulties. Hence, those in charge must acknowledge the growing need for efficient and effective warehouse storage facilities and services in the contemporary era of supply chain and logistics. As (Ozbekler and Ozturkoglu, 2020) argue that they play a crucial role in attaining competitive advantages and achieving sustainability. Logistics companies have been integrating sustainability policies into their operations to gain a competitive edge and deliver efficient and effective logistics services with reduced carbon emissions and energy waste. This allows them to enhance service quality for their customers (Centobelli and colleagues, 2017). Sustainable service quality features in the modern period enable rapid speed, improved reliability, reduced operational costs, and convenient storage and delivery of goods, thereby strengthening the firm's competitive edge. The logistics industry acknowledges the growing significance of a metric for evaluating sustainable service quality attributes (SSQAs). This statistic facilitates the provision of services by logistics organizations to their consumers and acts as a tool for assessing the quality of service (Kaswengi et al., 2020). In order to incorporate sustainable practices into their supply chains, logistics service providers recognize the importance of tackling challenges such as ineffective communication, shipping delays, and inadequate control of carbon footprint (Thongkruer & Wanarat, 2021). Studies have demonstrated that implementing sustainable operational methods substantially impacts stakeholder satisfaction and enhances supply chain performance (SSCP). Furthermore, research has shown that implementing sustainable practices contributes to attaining SSCP goals (Saberi, S. 2018). Hence, Logistics Service Providers must provide top-notch services to excel in competitive marketplaces with high consumer expectations (Jain et al., 2021). Adaptability and creativity are crucial elements for achieving success in continuously developing marketplaces. The growing interest among scholars in SSQAs underscores their significance (Gupta & Mangla, 2021).There is no text provided. The primary motivation for doing this study is the failure of small and medium-sized enterprises

(SMEs) in developing countries to incorporate innovative changes in their logistical operations effectively. Attaining SSCP certifications entails numerous obstacles, ambiguities, and uncertainties. Several environmental uncertainties in a dynamic business environment significantly impact firm's performance (Inman & Green, 2021). The supply chain performance is always threatened by the rapid evolution of technology, sudden changes in customer demand, supplier's performance, and rival's actions and reactions (Inman & Green, 2021). The development of infrastructure that aids in mitigating such risks has become a complementary aspect to achieving improved performance (Pashutan et al., 2021). Businesses are allocating resources toward technological advancements to obtain a competitive edge and mitigate the adverse impacts of environmental uncertainty (Khan et al., 2021). Blockchain technology (BT) allows tracking and disclosing information at every step of the supply chain, ensuring accountability and visibility. Healthcare systems enable the secure storage and sharing of precise medical records while safeguarding patient confidentiality. BT plays a significant role in developing a long-lasting infrastructure, and the adoption of BT by small and medium-sized enterprises (SMEs) has become well-known in recent years (Cheng et al., 2021). The primary goal of BT is to establish a value system that embodies traits such as transparency and traceability. According to (Kouhizadeh et al., 2021), BT is considered a highly dependable factor that significantly impacts the SSCP. While there is a wealth of literature on the triple bottom line (TBL) concept, there is a lack of material that examines the relationship between social and sustainable quality attributes (SSQAs) and TBL as a predictor. A recent systematic literature analysis on sustainable service quality has identified certain deficiencies to conduct empirical studies to investigate sustainable service quality to attain sustainability (Ren et al., 2020). The study conducted by (Gupta et al., 2021) focuses solely on evaluating logistics service provider's environmental performance through sustainable service quality attributes. The report recommends investigating the correlation between environmental performance and economic, social, and environmental factors. The authors proposed undertaking empirical studies to investigate the impact of Industry 4.0 on sustainable supply chain performance, specifically focusing on logistics service quality. In addition, (Li et al., 2021) emphasized the importance of enterprises being watchful and studying the impact of uncertain situations on SSCP. A study on small and medium-sized enterprises (SMEs) indicated that the adoption of business technology (BT) should be carefully supervised due to its potential impact on supply chain partners and their operational effectiveness (Khan et al., 2021). On this above discussion the following gaps proposed there are positive influence of SSQAs on the SSQAs Moreover, Block chain technologies (BT) have positive mediating relationship between the SSQAs and SSPC.

2. UNDERPINNING THEORIES AND CONCEPTS:

2.1. Dynamic Capabilities View (DCV): Dynamic capability is the ability of an organization to effectively and efficiently adapt, enhance, and adjust its internal and external capabilities to respond to continuous changes in the environment (Teece et al., 1997). Dynamic Capabilities View

has been extensively used by organizations as a theoretical framework to enhance their capabilities and effectively navigate environmental challenges (Gupta et al., 2021). Extensive study has elucidated the crucial function of DCV in comprehending how firms adapt to uncertainty in their supply chain and fortify themselves against disruptions (Kalubanga et al., 2021). DCV has been used to assess an organization's capacity to adapt and recover in the face of a volatile and ever-changing environment, specifically during the COVID-19 pandemic, and stated that DCV is crucial for integrating internal quality management with the triple bottom line. It used the DCV framework to comprehend the significance of dynamic service quality innovation in enhancing businesses innovation performance. As (Ali et al., 2021) used the DCV methodology to assess the impact of sustainable logistics service quality on the connections between small and medium enterprises (SMEs). Adopting the DCV is the most pragmatic theoretical framework for logistics firms to cultivate durable service quality qualities to respond to demanding business conditions and effectively attain enduring performance. Furthermore, DCV can explain the factors that affect the triple bottom line in the presence of environmental unpredictability using the assistance of blockchain technology.

2.2. The Sustainable Service Quality Attributes (SSQAs) And Sustainable Supply Chian Performance: Service quality refers to the ability to satisfy customer expectations and adhere to the standards established by the client. Measuring the quality of service is challenging because it has characteristics such as perishability, heterogeneity, and inseparability (Parasuraman et al., 1985). The clients employ tangibility, responsiveness, dependability, empathy, and assurance to build their sense of service quality (Zeithaml et al., 2002). Contemporary technological advancements have compelled researchers to include information and communication technology as an additional aspect of service quality (Gil Saura et al., 2008). Researchers have increasingly focused on sustainable service quality qualities to meet sustainability objectives by incorporating green practices and lowering environmental effects (Gupta et al., 2020). Moreover, sustainable supply chain performance refers to achieving an organization's strategic sustainability objectives via the collaborative efforts of all supply chain partners. These efforts include economic, environmental, and social aspects and are carried out with a long-term perspective (Carter & Rogers, 2008). SSCP allow enterprises and their partners to cultivate positive consumer sentiment, increase financial gains, allocate resources towards social welfare, and mitigate adverse environmental effects (Kumar & Goswami, 2019). SSCP facilitates the development of motivation and capacities necessary to meet triple bottom line (TBL) performance metrics (Aliakbari et al., 2019). The features of sustainable logistic services contribute to customer satisfaction and foster solid connections (Parasuraman et al., 1985). The market-oriented approach to promoting sustainability enables firms to develop policies for greater sustainable performance (Sun et al., 2020). Implementing environmentally friendly methods revolutionizes the services industry and enables organizations to perform better (Li et al., 2020; Gupta et al., 2020). The researchers assessed the level of operational excellence across logistic service providers (LSPs) in India. The

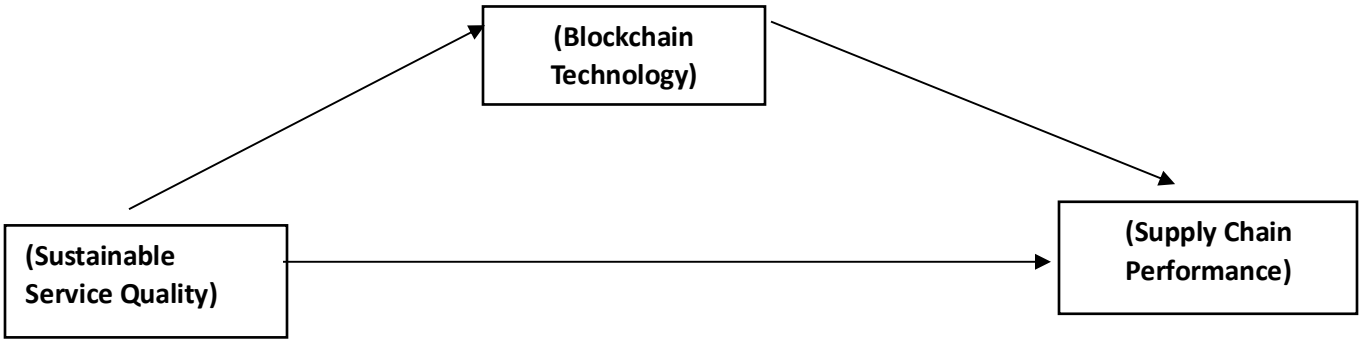
results showed that LSPs that effectively use their resources help achieve supply chain performance goals. Separate research examined the influence of the service quality offered by the LSPs, which substantially improves sustainable supply chain management and enhances the company's performance. Furthermore, it is important to include sustainable features and indicators in the business model to achieve sustainable supply chain performance. Implementing sustainable practices is essential for enhancing the firm's overall sustainability performance. Adhering to environmentally friendly practices is essential for LSPs in cross-border commerce to ensure high service quality. These practices enhance customer satisfaction and foster a stronger and more dependable relationship between supply chain partners (Ahmad et al., 2021). Social, economic, and environmental characteristics are performance indicators to measure the TBL in supply chains (Ali et al., 2021). Businesses that operate their supply chains sustainably gain the capacity to be more adaptable and resilient, as well as aid in the process of restoration (Xu et al., 2021). A company's commitment to sustainability is demonstrated, in the opinion of (Shou et al., 2019), by sustainable supply chain management that considers social, environmental, and economic considerations. This study conducted a comprehensive literature review to investigate green supply chain management techniques. According to the analysis, companies can create triple-bottom-line performance indicators with the aid of sustainable supply chain (SSC) practices (Mardani et al., 2020). Oman's manufacturing companies investigated the environmental impact of a green supply chain (Al-Sheyadi et al., 2019). It was stated that GSCM greatly improves an enterprise's environmental impact while lowering environmental costs. Furthermore, companies' actions in relation to sustainability aid in detail the supply chain to become more environmentally conscious and less detrimental (Ali et al., 2021). Based on the considerations above, sustainable service quality features indicate sustainable supply chain performance. A business may get greater SSCP by increasing its SSQAs. Therefore, it is suggested that: Hypothesis: H1. SSQAs have a significant relationship with SSCP.

2.3: The Medating Role of Blockchain Technology (BT):

BT utilizes an electronic database to let enterprisesstore and share information transparently. This technology enhances the capacities of supply chain partners, leading to increased efficiency (Cole et al., 2019; Kim et al., 2019). Blockchain and other contemporary technologies help businesses handle goods, information, and services more effectively. While BT cannot solve every problem with supply chain performance, it can impact transparency, make processes and products traceable, foster flexibility among partners, and foster confidence. AS (Aslam et al., 2021) assert that BT can impact supply chain operations and offer advice to enhance corporate performance. BT has enormous potential to revitalize the industrial sectors and change the supply chain from an operational process to a partnership role (Dutta et al., 2020). It was discovered that BT impacted the internationalization of high-tech SMEs and increased the integration among supply chain partners by boosting their marketing and financial performance in a study involving 291 employees of these businesses (Rakshit et al., 2021). Furthermore, Huang et al. (2021) concluded that BT is

a key component in advancing circular supply chain management and a major influencer in developing technical capabilities and technological viability. The use of BT in the supply chain helps businesses by offering a decentralized distributed ledger that keeps full records of all transactions. It is essential to the functioning of the supply chain (Poongodi et al., 2021). The points above demonstrate how blockchain technology affects SSCP. Thus, it is suggested that: Hypothesis: H2: There is Positive influence of SSQA on BT. Hypothesis H3: There is Positive Influence of BT on SSCP. Hypothesis H4: The Block chain technology has mediating role in between SSQAs and SSCP.

3.1. Research Methodology: The current study demonstrates how the sustainable service quality affects sustainable performance in US industrial enterprises. It examines how block chain technology as mediators. Throughout the data collection process, respondents' private information was kept private (Saddique et al., 2021; Shafiq et al., 2021). The data comprises 312 study samples. The results of study shown below.



Conceptual Model:

Table.3.1 Items and variable detail:

Variable	Items	Reference
(Sustainable Service Quality Attributes)	"15"	(Gupta et al., 2021)
(Blockchain Technology)	"4"	(Khan et al., 2021).
(Sustainable Supply Chain Performance)	"7"	(Saddique et al.,2021)

Table: 3.2. Demographic Status:

"Particular"	**"Characters"**	**"F"**	**"%"**

"Gender"	"Female Male"	116 196	37.2 62.3
"Ages"	"Less than 30 31-45 46-60"	75 165 72	24 53 23
"Education level"	Intermediate Graduate Post-Graduation	25 161 126	8.01 51.6 40.3
"Work Experience"	< 5 Years <10 Years Above 10 Years	100 121 91	32.1 38.7 29.1

Explanation: Table 3.2 The survey findings indicate the demographic status of the 312 respondents. Of the total, 196 individuals were male, while 116 were female. The ages of the participants were categorized into three distinct groups: 53% of respondents were between the ages of 31 and 45, while 23% were between 46 to 60. The qualification categories are categorized into three distinct groups. Most respondents, comprising 51.6%, have university graduation degrees, while a minor proportion of respondents, 8.01%, have intermediate degree. Based on work knowledge, it is divided into three categories. It has less than 10 years of experience, accounting for 38.01% of the total. Conversely, the most minor proportion of respondents, 29%, have above ten years of experience.

Table#, 3.3: Analysis of Reliability:

"Study Variables"	**"Cronbach's Alpha"**
(Sustainable Service Quality Attributes)	"0.80"
(Blockchain Technology)	"0.82"
(Sustainable Supply Chain Performance)	"0.78"

Explanation: Table 3.3 examined "the reliability of the above scale through Cronbach's alpha". findings above exceeded 0.70, indicating that the measurements demonstrated data dependability and reliability and were appropriate for further investigation.

Table#, 3.4 Correlation:

"Variables"	1	2	3

1. (Sustainable Service Quality Attributes)	1		
2. (Blockchain Technology)	0.67**	1	
3. Sustainable Supply Chain Performance	0.512**	0.590**	1

* Significant = 0.05, **Significant = 0.01.

Explanation: Table#3.4 displays the statistical significance of the correlation between the SSQA and BT (r=0.67, p=0.00) and the link between the SSQA and SSCP (r=0.512, p=0.00). On the other hand, there is a significant correlation between the BT and SSPC, as indicated by the relationship with a correlation coefficient of 0.590 and a p-value of 0.00.

3.5. Regression Analysis

3.5.1. Model between Sustainable Service Quality Attributes and Sustainable Supply Chain Performance:

Variable	R^2	beta	t	sig
Sustainable Service Quality Attributes	0.297	0.567	9.12	0.000

Variable Dependent: SSCP "*p < 0.05".

Explanation: The results of regression research on the relationship between the SSQA and SSCP are presented in Table 3.5.1. An "ANOVA" value with a p-value of less than 0.05 demonstrates the model's statistical significance. The correlation coefficient (R-square) of 0.297 indicates a positive relationship between the increase in the SSQA and SSCP, with 29.7% of the variation. The p-value of 0.00 suggests that the relationship between both is positive. The beta coefficient 0.567 suggests a strong correlation between SSQA and SSCP. Thus, hypothesis 1 has been Accepted.

3.5.2. Model between Sustainable Service Quality Attributes and Blockchain Technology:

Variable	R^2	Beta	t	sig
Sustainable Service Quality Attributes	0.645	0.748	23.07	0.00

Variable Dependent: Blockchain Technology, "*p < 0.05".

Explanation: The influence of the SSQA on BT is illustrated in Table 3.5.2. The p-value of the ANOVA is less than 0.05, indicating that this result can be deemed statistically significant. The R-squared value of 0.645 indicates that SSQA significantly influences 64.5% on BT. The coefficient's statistical significance is 0.000, which falls below the threshold of 0.05, indicating a significant link. The beta coefficient, which has a value of 0.748, indicates the influence of SSQA on BT. Therefore, Hypothesis 2 is deemed to be Accepted:

3.5.3. Model between Competitive Advantages and Sustainable SCP

Variable	R^2	B	t	sig
Blockchain Technologies	0.367	0.612	14.67	0.000

Dependent Variable: Sustainable Supply Chain Performance, *p < 0.05.

Explanation: The regression analysis results investigating the impact of BT on SSPC presented in Table 3.5.3. The ANOVA is statistically significant at a significance level of 0.05. The R-squared value of 0.367 indicates a strong link between the rise in BT and the corresponding increase in SSCP by 36.7%. This correlation is statistically significant as it is below the specified threshold of 0.05. The beta coefficient 0.612 indicates a favorable correlation between blockchain technology and sustainable SCP. Hypothesis number 3 has been accepted.

3.5.4: The Analysis of Mediation:

"Table 3.5.4": "Mediation analysis using through Bootstrap"

"Relationships"	*"β"*	*"P"*	Bootstraps @ 95% "LL"	"UL"	"Hypotheses"
SSQA →BT →SSCP					
"Direct effect"	"0.172	***	0.178	0.398"	
"Indirect effect"	"0.465	***	0.223	0.573"	

"Note": ***p<0.01

Explanation: A total of one thousand bootstraps were used to assess the variable that represents the mediating hypothesis at a 95% confidence level to establish the upper and lower limits BT mediate between the SSQA and SSCP. Hypothesis H4 is confirmed as the influence is indirect, with a coefficient of 0.172 (LL=0.178, UL=0.398, P=0.00). The direct effect, represented by β, is also significant, with a P-value of 0.00. Furthermore, the absence of "0" within both limitations

provides additional evidence supporting this conclusion. There is a mediated relationship of BT SSQA and SSCP.

4. DISCUSSION AND IMPLICATIONS OF THE STUDY: Environmental issues, including high carbon emissions and energy waste, make TBL sustainability essential for enterprises. First hypothesis: SSQAs has positive influence on the SSCP. Results validated this idea. The results showed that organizations were learning to meet promises and supply green services consistently. They also respond quickly to customers utilizing green techniques and have a sufficient eco-friendly fleet. They prioritize sustainability and coordinate with all supply chain partners to implement process changes. They also learn to trust supply chain partners, consume resources, and prefer sustainable resources. Logistics service providers attain sustainable supply chain performance because of this. Therefore, these organizations become more cautious in responding to supply chain network risk, significantly reduce waste, and more efficiently meet client expectations. These findings support (Rajesh et al., 2021), who stated that sustainable supply chain performance requires sustainable qualities and indicators in the business model and sustainable activities to improve business performance. Additionally, LSPs' cross-border commerce service quality cannot be reached without green practices, which increase customer satisfaction and strengthen supply chain partnerships. We then learned that SSCP and TBL are closely related. Results showed that logistics organizations enhance supply chain visibility, limit cost, minimize waste, and respond quickly to client requests. The triple bottom line benefits from environmentally friendly and lean inventory management supply chains (Khan et al., 2020). Such organizations strengthen pollution controls, prioritize cleaner production, gain market share and revenue, improve their social image, and build procedures for employee and stakeholder health and safety. These findings support previous research suggesting that SSCs assist organizations in building triple-bottom-line performance measures (Mardani et al., 2020). Sustainability investments help the business meet its micro- and macro-level financial goals more efficiently and create a win–win situation for stakeholders concerned about supply chain economic, social, and environmental benefits (Farooq et al., 2021). Another finding of study show that BT mediate the SSQAs affect SSCP and TBL performance.. The results showed that logistics firms using blockchain technology provide extended visibility and traceability of business processes, create smart contracts with supply chain partners, improve customer services and make them sustainable, improve organizational processes and structure, and improve supply chain performance. BT helps organizations decrease supply chain costs, meet environmental regulations, and satisfy internal and external stakeholders. It helps organizations track and reduce supply chain carbon emissions and energy waste. Similar research found that BT helps supply chain partners design and produce eco-friendly products. Chod et al. (2020) said BT is vital for cost efficiency and supply chain transparency. The first indirect hypothesis found that SSCP mediates SSQA-TBL. Results showed that logistics organizations could deliver items sustainably with trained workers who followed green warehouse norms and implemented green practices. IT support for promoting green practices

includes modifying and updating processes to align them with green objectives, developing dynamic supply chain networks, and having visibility of all these capabilities in the supply chain to develop a mutual understanding of using them to achieve sustainable performance. This sustainable performance is shown by cost reduction, customer value delivery, information transparency, environmentally friendly service design, and green practices and competencies. The results emphasize that TBL, SSQAs, and SSCP are necessary and complementary. The second indirect hypothesis was that SSCP mediates BT and TBL, and BT improves SSCP. Then, SSCP improves logistics organizations' economic, social, and environmental performance (Hussein Ali et al., 2022). The study found that LSPs evaluate service quality to achieve sustainable performance and that GSCM mediates the association between logistical service quality and relationship performance. BT helps meet client wants and expectations more efficiently. BT installation boosts consumer satisfaction and confidence owing to trust. BT influences the interaction between SSQAs and SSCP, and when BT is not deployed, SSQAs do not modify logistics businesses' SSCP. BT implementation enhances relationships and raises SSQAs, improving SSCP. Visibility and traceability, enhanced customer services, updated process structures, and efficiency realized through BT adoption considerably increase SSQA effects and SSCP. As (Huang et al., 2021) found that BT boosts technical capabilities and technological feasibility and drives circular supply chain management. According to the study, supplier and competitor performance is uncertain when client orders change abruptly. Rapid technology advances have led organizations to focus more on SSQAs, which boosts supply chain performance. The findings confirm the prior study that the EU is a crucial contingent element that can boost SC partners' performance if managed effectively. These findings answer our third research question and demonstrate that environmental unpredictability and blockchain technology boost SSCP in organizations.

5.1. Theoretical Implications: The present work provides many forms of theoretical contributions. This study has made a significant contribution by proposing a theoretical framework to accomplish performance indicators of Triple Bottom Line (TBL) in the small and medium-sized enterprise (SME) sector, specifically in logistics enterprises. The study has provided empirical evidence that SSQAs are strong indicators of SSCP, aiding enterprises in attaining their TBL performance goals. This study contributes to the existing literature on the dynamic capability concept by examining the role of SSQAs as a dynamic capability in logistics SMEs in America. The current study contributes to the United Nations' sustainable development goals (SDGs) relating to climate action, responsible production, and consumption by addressing environmental and energy-minimizing concerns. Hence, the study introduces a strategic framework that enables logistics companies to create and provide sustainable services to attain sustainable performance. Furthermore, this study strengthens the existing literature on sustainable supply chain performance and offers proof by embracing and integrating the contingency theory. Furthermore, this study is a pioneering to examine logistics for small and medium enterprises (SMEs) in America. The

proposed framework is crucial for enterprises to attain sustainability, attain faster economic growth, meet societal expectations, and mitigate adverse environmental effects.

5.2. Managerial Implications: The empirical results of this study have important practical and managerial consequences. The findings indicate that to attain the Triple Bottom Line (TBL), managers must guarantee the transformation and development of their services by incorporating qualities of sustainable service quality. The managers are responsible for ensuring that their workforce receives training and possesses environmental knowledge. They should also have access to alternative and renewable energy resources. Also, the managers should make their warehouses environmentally friendly for their customers. They should work towards becoming paperless and establish coordination among their supply chain partners to achieve sustainable practice goals. All of these abilities contribute to the accomplishment of TBL objectives. Furthermore, managers must prioritize the integration of blockchain technology within their organizations. This technology can enhance transparency and traceability in the supply chain, hence facilitating the attainment of SSCP. The management should also be attentive to the external surroundings and be prepared to address them by including more sustainable features in their services to minimize the impacts of environmental uncertainties.

6. CONCLUSIONS: In economies with limited resources, it has become essential to have service quality features that are sustainable. Previous research has utilized order quality, delivery punctuality, information technology skills, and other factors as indicators of service quality. This study examines the influence of sustainable service quality attributes developed by logistics small and medium enterprises (SMEs) in Pakistan on triple bottom line (TBL) sustainability performance metrics. The study also investigates the role of sustainable supply chain performance in mediating this relationship. The study also investigated the mediation influence of BT. The results validated the advantages of including sustainable service quality features in logistics organizations' economic, social, and environmental performance. The studies also indicated that implementing blockchain technology has a major impact on SSCP. The findings give managers valuable insights to develop sustainable service quality features that enhance SSCP. The findings suggest that sustainable service quality attributes play a significant role in achieving SSCP.

7. FUTURE RESEARCH DIRECTIONS AND LIMITATIONS: In economies with limited resources, it has become essential to have service quality features that are sustainable. Previous research has utilized order quality, delivery punctuality, information technology skills, and other factors as indicators of service quality. This study examines the influence of sustainable service quality attributes developed by logistics. Some restrictions constrain the research undertaken in this study. The current study utilized a one-dimensional scale to assess the attributes of sustainable service quality. Scholars have identified five characteristics of it, including commitment, competence, creativity and customization, communication, coordination, and teamwork. Future

studies can utilize the multidimensional scale of SSQAs to enhance comprehension. Furthermore, this study obtained data from logistics company managers to assess the study's variables. Subsequent research endeavors should gather client data to ascertain their perspectives on SSQAs and other related factors. To repeat the current work, scholars can perform a multi-group analysis to determine whether logistics firms with similar industry SSQAs contribute to a higher TBL. Further research efforts include integrating big data analytics, artificial intelligence, circular economy, and smart technologies to enhance the effectiveness of sustainable service quality features related to sustainable supply chains and the environment.

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