How Do Supply Chain Management Practices Influence Organizational Performance? A Case Study of Bangladesh's Agro-Food Industry

Abstract

Introduction: Supply chain management practices are essential for enhancing organizational performance, particularly in the Agro-food industry. This study examines the impact of specific SCM factors—Strategic Supplier Partnership, Customer Relationship, Level of Information Sharing, and Quality of Information Sharing—on organizational performance in Bangladesh.

Methodology: Data were collected via a structured questionnaire targeting key stakeholders in Bangladesh's Agro-food industry, using a 5-point Likert scale to measure responses. Structural equation modeling (SEM) was utilized to analyze the relationships between SCM practice factors and organizational performance factors such as marketing and financial performance.

Findings: The analysis revealed that customer relationships, quality of information sharing, and strategic supplier partnerships have significant positive relationships with organizational performance, particularly in terms of financial and marketing outcomes. However, the level of information sharing did not show a significant impact on both financial and marketing performance.

Managerial Implications: The study emphasizes the significance of prioritizing strategic supplier partnerships, customer relationships, and high-quality information sharing for improving organizational performance in Bangladesh's Agro-food industry. Strengthening these SCM practices can lead to better financial and marketing performance, providing valuable insights for managers to develop targeted strategies.

Keywords: Strategic Supplier Partnership, Customer Relationship, Level of Information Sharing, Quality of Information Sharing, Agro-based food industry, Bangladesh.

1. 0 Introduction

The term "SCM practices" refers to a set of actions implemented by a company to ensure efficient supply chain management. Donlon (1996) highlights recent advancements in SCM methods, including outsourcing, continuous process flow, cycle time compression, and supplier collaboration. Tan et al. (1998) describe“SCM processes through aspects like purchasing, quality management, and customer relations in their empirical study”. Alvarado and Kotzab (2001) “list SCM best practices such as focusing on core competencies, utilizing inter-organizational tools like EDI, and minimizing excess inventory by delaying customization until the end of the supply chain”. Tan et al. (2002) identify “six dimensions of SCM practice using factor analysis: supply chain integration, information exchange, supply chain characteristics, customer service management, geographic proximity, and JIT capability”. Chen and Paulraj (2004) evaluate “buyer-supplier relationships through supplier base reduction, long-term partnerships, communication, cross-functional teams, and supplier involvement”. Min and Mentzer (2004) assert that“SCM includes shared vision and goals, collaboration, process integration, long-term partnerships, and established supply chain leadership”. Thus, the literature presents various perspectives on SCM practices, all aiming to enhance organizational performance.In South Asian countries, top management performance is typically assessed by financial performance (Hossin, M.A., et al., 2021), whereas middle management performance is evaluated based on operational performance Hossain, M.I.;

2020). Based on the above study, I have formulated the following research question to investigate organizational performance:

RQ 1: Which aspects of supply chain management strategies impact organizational performance in Bangladesh's Agro-based supply chain management industry?

2. 0 Objective of the Study

- ✓ The goal of this study is to determine the relationship between supply chain management practices and organizational performance in Bangladesh's Agro-food sector.

3.0 Literature Review

Four dimensions—customer connection, degree of information sharing, strategic supplier partnership, and quality of information sharing—were chosen to assess SCM practices. These dimensions cover internal supply chain processes, information flows, and upstream/downstream aspects. Despite their breadth, they are not exhaustive, as additional elements like JIT capabilities and cross-functional teams were excluded due to survey length concerns. Thus, SCM practices are proposed as a multi-dimensional concept.

3.1 Supply Chain Management Practices

Supply Chain Management (SCM) practices are defined as a series of activities undertaken within an organization to enhance the effective management of its supply chain. Chen and Paulraj (2004) measure buyer-supplier relationships through supplier base reduction, long-term relationships, communication, cross-functional teams, and supplier involvement. Tan et al. (2002) identify "six aspects of SCM practices via factor analysis: supply chain integration, information sharing, supply chain characteristics, customer service management, geographical proximity, and just-in-time (JIT) capability". Alvarado and Kotzab (2001) identify "SCM practices such as focusing on core competencies, using inter-organizational systems like EDI, and reducing excess inventory by postponing customization until the end of the supply chain". Tan et al. (1998) represent SCM practices through purchasing, quality, and customer relations in their empirical study. Donlon (1996) outlines the latest evolution in SCM practices, which includes supplier partnerships, outsourcing, cycle time compression, continuous process flow, and the sharing of information technology.

Table 1: List of sub-constructs for SCM practice

Sub-constructs	Definitions	Source
Strategic supplier partnership	The long-term relationship between the organization and its suppliers is designed to leverage the strategic and operational capabilities of each participating organization, helping them achieve significant ongoing benefits.	Tan KC. et al., (2002) Stuart FI. (1997) Balsmeier PW. et al., (1996) Gunasekaran A. et al., (2001) Monczka RM. et al., (1998)
Customer relationship	The comprehensive set of practices used to manage customer complaints, build long-term relationships with customers, and enhance customer satisfaction.	Moberg CR. et al., (2002) Tan KC. et al., (2002)
Level of information sharing	The degree to which critical and proprietary information is shared with a supply chain partner.	Childhouse P. et al., (2003) Lalonde BJ. Et al., (1998) Balsmeier PW. et al., (1996) Monczka RM. et al., (1998)

Quality of information sharing	Refers to the accuracy, timeliness, adequacy, and reliability of exchanged information.	Moberg CR. et al., (2002) Monczka RM. et al., (1998)
Financial & Marketing Performance	Organizational performance refers to the extent to which an organization achieves its market-oriented and financial objectives.	Yamin et al., (1999) Hosain, M.S.; 2021 Raut, R.D.; et al., 2019 Younis, H.; et al., 2016

3.2 Organizational Performance

Organizational performance pertains to the extent to which an organization attains its market-oriented and financial goals (Yamin et al., 1999). The primary short-term objectives of SCM are to boost productivity, decrease inventory, and reduce cycle time, while the long-term objectives focus on increasing market share and profits for all supply chain members (Tan KC et al., 1998). Financial metrics have been utilized to compare organizations and assess their behavior over time (Holmberg S., 1998). Marketing performance (MP) is the alignment between a marketing team's predetermined goals and its actual performance. Typically, MP is measured using various key performance indicators (KPIs) such as cost per sale, cost per lead, customer lifetime value, and customer loyalty. Measuring MP is a data-driven approach that focuses on tangible results related to sales, brand value, and customer loyalty (Raut, R.D.; et al., 2019; Younis, H.; et al., 2016).Environmental performance (EP) reflects a firm's commitments and actions towards the environment and society. This can include using green energy, recycled products, or implementing a green supply chain through inbound and outbound logistics. Although EP is not always quantifiable, it is recognized by external stakeholders such as local communities, customers, and government regulatory agencies (Hosain, M.S.; 2021).Ultimately, any organizational initiative, including supply chain management, should enhance organizational performance.Operational performance is a component of organizational performance. The concept of operational performance (OP) can be defined in various ways, including the effectiveness of enforcing policies and measures governing employees and ensuring stakeholder participation in the policymaking process (Hosain et al., 2020). The size of the firm and the operational technology employed are significant factors in OP. OP also involves the efficient utilization of human and physical resources, such as human capital, machines, tools, equipment, and material funds. Effective exploitation of any resource or a combination of resources can enhance the productivity of goods and the efficiency of services while reducing costs within the stipulated time frame (Hosain et al., 2020). Additionally, OP can be defined as a firm's strategic success in maintaining a balance between cost and productivity. A high-performing firm identifies wasteful processes that drain resources and reduce organizational profits (Hosain et al., 2020). Effective green supply chain management (GSCM) secures competitive advantage and improves operational performance (OP). This study examines the link between GSCM practices and OP in Bangladesh's manufacturing sector, finding that green eco-design (GED) and green supply chain partnering (GSCP) positively impact OP, while internal green orientation (IGO) does not; perceived competitive advantage (PCA) mediates these relationships variably (Ahmed Mustafi, M.A., 2024). Sustainable supply chain management (SSCM) has become crucial for achieving economic, environmental, and social benefits. This study uses a fuzzy multi-criteria approach and fuzzy TOPSIS to evaluate sustainable supplier selection (SSS) and firm performance during COVID-19, highlighting the pandemic's negative impact (Khokhar, M., 2022).

3.3 Customer Relationship

According to Day (2000), committed relationships provide the most enduring benefits due to their inherent barriers to competition. With the rise of mass customization and personalized service, managing customer relationships is becoming increasingly vital for a company's sustainability. Effective implementation of supply chain management (SCM) programs is crucial for maintaining positive relationships with all stakeholders, including consumers. Claycomb et al. (1999) and Tan et al. (1998) note that SCM encompasses a comprehensive set of techniques to address customer complaints, build lasting relationships, and enhance customer satisfaction. Noble (1997) and Tan et al. (1998) view customer relationship management as a key component of SCM strategies. Magretta (1998) adds that close customer connections help a business stand out from competitors, foster customer loyalty, and significantly increase the value offered to consumers. Building on this extensive literature, we propose to examine the following hypothesis, reflecting the sole direct effect:

H1: Customer relationships have a positive impact on the marketing performance of Bangladesh's agro-food industry.

H5: Customer relationships have a positive impact on the financial performance of Bangladesh's agro-food industry.

3.4 Quality of information sharing

According to Feldmann et al. (2003), the quality of information in supply chain management is influenced by conflicting interests, opportunistic behavior, and informational asymmetries among participants. This quality encompasses aspects such as the timeliness, sufficiency, accuracy, and reliability of the information shared (Moberg et al., 2002; Monczka et al., 1998). While information sharing is essential, its impact on SCM depends on the content, timing, method, and recipient of the information (Chizzo, 1998; Holmberg, 2000). The literature well documents the dysfunctional effects of inaccurate or delayed information as it moves through the supply chain (Lee et al., 1997; Mason-Jones, 1997; McAdam, 2001; Metters, 1997). Some theories suggest that businesses might intentionally falsify information to protect it from competitors, suppliers, and clients (Mason-Jones, 1997). Since disclosing information is often seen as a loss of power, there is a natural reluctance within organizations to share more than the minimum required (Berry et al., 1994). Given these tendencies, ensuring the quality of shared information becomes a critical aspect of effective SCM (Feldmann et al., 2003). Organizations need to treat their information as a strategic asset, ensuring it flows with minimal delay and distortion. Building on this extensive literature, we propose to examine the following hypotheses:

H2: Customer relationships have a positive impact on the marketing performance of Bangladesh's agro-food industry.

H6: Customer relationships have a positive impact on the financial performance of Bangladesh's agro-food industry.

3.5 Strategic supplier partnership

According to Tan et al. (2002), organizations can operate more productively by forming strategic relationships with a select few significant suppliers who are willing to share accountability for the products' success. Early-stage suppliers can provide cost-effective design options, assist in selecting appropriate materials and technologies, and aid in design evaluation. A strategic partnership emphasizes direct, long-term relationships and promotes cooperative problem-solving and planning (Gunasekaran,

Patel et al., 2001). Such partnerships involve ongoing collaboration between a company and its suppliers, utilizing strategic and operational skills to achieve significant and continuous benefits (Stuart, 1997; Balsmeier, 1996; Monczka et al., 1998). These strategic partnerships aim to foster mutual advantages and sustained involvement in critical areas such as technology, products, and markets (Yoshino et al., 1995). Balsmeier (1996) notes that strategically aligned organizations can work closely together, reducing wasted time and effort. Noble (1997) emphasizes that excellent supplier collaboration is essential for an advanced supply chain. Building on this extensive literature, we propose to examine the following hypotheses:

H3: Customer relationships have a positive impact on the marketing performance of Bangladesh's agro-food industry.

H7: Customer relationships have a positive impact on the financial performance of Bangladesh's agro-food industry.

3.6 Level of information sharing

According to empirical research by Childhouse and Towill (2003), the key to a seamless and efficient supply chain is to streamline and make all information flow highly visible throughout the chain. Several academics assert that providing accurate and current marketing data at every point in the supply chain is essential for smooth operations. Mentzer et al. (2000) note that shared information can range from tactical to strategic, covering logistical activities to broad market and consumer information. Moberg et al. (2002) and Monczka et al. (1998) identify two critical dimensions of information sharing: quantity and quality, both of which are crucial for SCM procedures.Jones (1998) and Novack et al. (2000) argue that information can serve as a competitive advantage when readily accessible data is disseminated to stakeholders throughout the supply chain. Monczka et al. (1998) describe the extent of sharing important and confidential information with supply chain partners as the level (quantity aspect) of information sharing. Lalonde (1998) identifies information sharing as one of the five components of a strong supply chain relationship. Stein and Sweat (1998) emphasize that frequent communication among supply chain participants allows them to function as a cohesive unit, leading to a better understanding of end-user requirements and a faster response to market changes. Additionally, Tompkins and Ang (1999) highlight that the effective use of relevant and timely information by all functional elements within the supply chain is a key competitive and distinguishing factor. Building on this extensive literature, we propose to examine the following hypotheses:

H4: Customer relationships have a positive impact on the marketing performance of Bangladesh's agro-food industry.

H8: Customer relationships have a positive impact on the financial performance of Bangladesh's agro-food industry.

4.0 Conceptual framework

This exploratory study investigates four independent variables: customer relationship, quality of information sharing, strategic supplier partnership, and level of information sharing. These variables are examined about two dependent variables representing organizational performance: marketing performance and financial performance. The theoretical model is depicted in Figure 1 below:

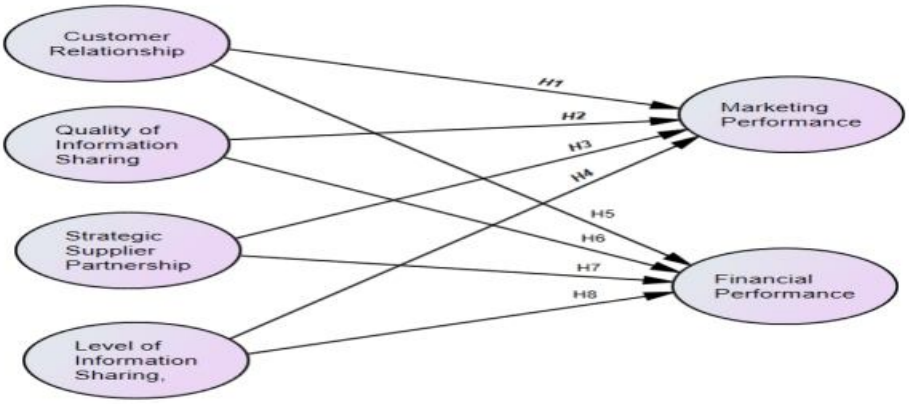

Figure 1: Conceptual Framework of Organizational Performanceof Bangladesh's Agro-food Industry.

5.0 Method

5.1 Nature of data, selection of respondents, and sampling technique

In conducting this empirical study, data collection focused on gathering perception-based insights from a broad range of key decision-makers within the corporate hierarchy. Respondents were selected from various Agro-based food industries in Bangladesh using a judgment sampling technique. A list of respondents from different food industries was compiled, including CEOs, Directors, Managers, and other participants involved in Bangladesh's Agro-based food supply chain.

5.2 Description of measurements

The study employed a reflective first-order model to assess all the constructs, including Supply Chain Management Practices (SCM), which was divided into four factors: customer relationship, quality of information sharing, strategic supplier partnership, and level of information sharing. This approach was aligned with the methodology used in similar studies.In the study, the strategic supplier partnership, as an independent factor, consisted of five items adapted from Tan et al. (2002), Stuart (1997), Balsmeier et al. (1996), Gunasekaran et al. (2001), and Monczka et al. (1998). Customer relationship was also an independent factor, constructed from five items adapted from Moberg et al. (2002) and Tan et al. (2002). The quality of information sharing was another independent factor, comprising five items adapted from Moberg et al. (2002) and Monczka et al. (1998). Similarly, the level of information sharing was an independent factor, constructed from five items adapted from Childhouse et al. (2003), Lalonde et al. (1998), Balsmeier et al. (1996), and Monczka et al. (1998). Financial and marketing performance were assessed as independent factors, each constructed from three items adapted from Yamin et al. (1999). Respondents were asked to express the extent to which their firms had implemented SCM practices to enhance organizational (financial and marketing) performance, using a 5-point Likert-type scale (ranging

from 1 = strongly disagree to 5 = strongly agree). We used SPSS 26.0 software for data preparation and descriptive analyses. AMOS version 24.0 was employed to identify the supply chain management practices that influenced organizational performance in Bangladesh's Agro-food industry. A total of twenty-six (26) items were utilized to gauge these five constructs. Both descriptive and inferential statistics were applied to analyze the data. To identify the significant factors, we used several statistical techniques, including Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM).

5.3 Sample size

To initiate our data collection process, we identified a pool of 500 potential respondents leveraging our network and contacts. These individuals held key roles such as CEOs, Directors, Managers, and other significant positions within Bangladesh's Agro-based food supply chain. We determined the appropriate sample size using G'power 4.0 software (Soper, 2023), Cohen's (2013) guidelines, and Westland's (2010) recommendations. This calculation considered an effect size (f2) of 0.3 (moderate), a significance level (alpha) of 0.05, six predictors, and 26 observed variables. With a desired statistical power of 80% (Gefen et al., 2011), the recommended minimum sample size was determined to be 161. We facilitated the distribution and collection of questionnaires using Google Forms links sent via email, which streamlined the data collection process. Initially, questionnaires were sent to 500 individuals. However, to ensure robustness in our analysis, we received 300 completed questionnaires, out of which 276 surveys were deemed valid for analysis. This resulted in a valid response rate of 55.2%, surpassing response rates observed in recent studies such as Rubel et al. (2016), which reported rates of 33.3%.

6.0 Data Analysis

6.1 Normality of the Data

Our latent factor indicators exhibited a normal distribution in terms of skewness, with kurtosis values ranging from -0.89 to 2.71. Although this deviates from strict normality, it adheres to the more lenient criteria suggested by Sposito et al. (1983), who propose 3.3 as the upper threshold for normality. Therefore, the data's normal distribution enabled researchers to proceed with their investigation (Table 02).

Table 2: Descriptive Statistics

	N	Mean	Std. Deviation	Skewness	Std. Error	Kurtosis	Std. Error
	Statistic	Statistic	Statistic	Statistic		Statistic	
SSP1	276	3.88	0.75	-0.71	0.13	1.27	0.25
SSP2	276	3.88	0.74	-0.97	0.13	2.18	0.25
SSP3	276	3.75	0.77	-0.79	0.13	1.17	0.25
SSP4	276	3.75	0.73	-0.75	0.13	1.30	0.25
SSP5	276	3.75	0.77	-0.80	0.13	1.20	0.25
CR1	276	3.98	0.69	-0.61	0.13	1.15	0.25
CR2	276	3.99	0.71	-0.61	0.13	0.97	0.25
CR3	276	4.05	0.70	-0.58	0.13	0.89	0.25
CR4	276	3.99	0.70	-0.72	0.13	1.39	0.25

CR5	276	4.03	0.71	-0.72	0.13	1.01	0.25
LIS1	276	2.03	0.76	0.88	0.13	1.29	0.25
LIS2	276	1.98	0.74	0.87	0.13	1.45	0.25
LIS3	276	2.12	0.83	0.88	0.13	0.69	0.25
LIS4	276	2.08	0.81	0.93	0.13	0.97	0.25
LIS5	276	2.11	0.77	0.73	0.13	0.79	0.25
QIS1	276	3.37	0.86	-0.49	0.13	-0.29	0.25
QIS2	276	3.25	0.96	-0.37	0.13	-0.64	0.25
QIS3	276	3.27	0.92	-0.28	0.13	-0.68	0.25
QIS4	276	3.12	0.87	-0.29	0.13	-0.80	0.25
QIS5	276	3.23	0.87	-0.26	0.13	-0.60	0.25
MP1	276	3.72	0.86	-0.77	0.13	0.69	0.25
MP2	276	3.37	0.95	-0.28	0.13	-0.44	0.25
MP3	276	3.64	0.86	-0.66	0.13	0.36	0.25
FP1	276	3.79	0.69	-1.15	0.13	2.71	0.25
FP2	276	3.76	0.71	-0.82	0.13	1.30	0.25
FP3	276	4.01	0.57	-0.52	0.13	2.05	0.25

6.2Demographic information

Respondents were purposively selected from diverse sectors of the Bangladeshi food industry to gather supply chain insights. Table 03 illustrates the distribution of sample respondents across demographic factors, including job title and years of experience within the sector. As depicted in Table 03, most respondents (65%) held managerial positions, while 60% reported having 8 or more years of experience in the industry.

Table 3: Demographic information of respondents based on a questionnaire.

	Category	Frequency	Percentage
Job title	CEO	25	7
	Director	55	20
	Manager	179	65
	Others	17	5
Year of experience	Below 2 years	22	8
	2-4 years	41	15
	5-8 years	47	17
	8 years and above	166	60

6.3 Multivariate Normality:

The data exhibited a normal distribution, enabling researchers to proceed with their investigation. Cook's distance analysis (Figure 2) was utilized to identify any (multivariate) influential outliers, revealing no cases with a Cook's distance greater than one in this study. Moreover, most cases had a p-value less than 0.025, indicating a normal distribution for all items.

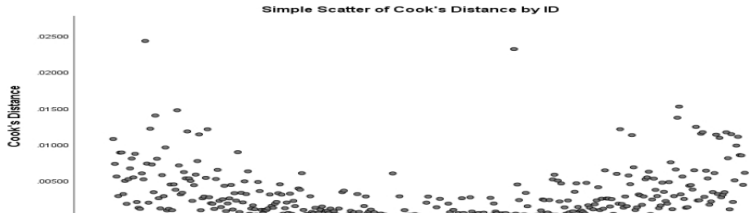

Figure 2: Multivariate Normality of Organizational Performance

6.4 Preliminary analysis

Table 04 presents descriptive statistics for the variables, encompassing means, standard deviations, and correlations. All key variables in the study were connected via estimated paths, with Table 4 illustrating the correlations among variables. Notably, factors such as FP, MP, LIS, SSP, QIS, and CR exhibited high correlations with each other at a 1% significance level for a two-tailed test.

Table 4: Correlations

	Mean	Std. Deviation	FP	MP	LIS	SSP	QIS	CR
FP	3.78	0.57	1					
MP	3.63	0.75	.380**	1				
LIS	2.03	0.65	-0.005	0.038	1			
SSP	3.96	0.66	.369**	.366**	0.063	1		
QIS	3.37	0.78	.158**	.467**	0.044	.109*	1	
CR	3.99	0.61	.498**	.469**	0.066	.591**	.243**	1
**. Correlation is significant at the 0.01 level (2-tailed).								
*. Correlation is significant at the 0.05 level (2-tailed).								

6.5 Tests of Reliability and Validity

Table 05 provides an assessment of data reliability using the average variance extracted (AVE) and composite reliability, which all fall within acceptable limits defined by Hair et al. (1998), Fornell & Larcker (1981), and Henseler, Ringle, & Sinkovics (2009). Discriminant validity was tested by comparing the AVE value with correlation values with other variables, following Fornell and Larcker's (1981) principle. The square root of AVE exceeded the correlation with other variables, demonstrating discriminant validity as shown in Table 05. Common method bias was assessed, with a relationship value below 0.85 indicating its absence, as per Henseler, Ringle, and Sarstedt (2015). The analysis revealed that the relationship between any other factor was below 0.85, confirming the absence of common method bias, as indicated by correlation metrics in Table 05.

Table 5: Model validity measures.

	CR	AVE	CR	QIS	SSP	LIS	MP	FR
CR	0.94	0.72	**0.84**					
QIS	0.92	0.69	0.226***	**0.83**				
SSP	0.90	0.65	0.555***	0.101†	**0.81**			
LIS	0.90	0.65	0.06	0.04	0.06	**0.80**		
MP	0.91	0.70	0.436***	0.433***	0.340***	0.03	**0.83**	

FR	0.82	0.62	0.452***	0.141*	0.333***	-0.01	0.341***	**0.78**

6.6 Exploratory factor analysis

We adhered to four common assumptions for conducting Exploratory Factor Analysis (EFA), as outlined by Hair et al. (2014): sampling adequacy (Kaiser-Meyer-Olkin (KMO) value greater than 0.5), minimum Eigen value per factor, factor loading of each item exceeding 0.50, and utilization of Promax Rotation for simplified factor interpretations (Henseler et al., 2009). Table 6 illustrates a KMO value of 0.874, surpassing the KMO threshold, and Bartlett's test yielding a significant result ($p = 0.000$), suggesting the appropriateness of factor analysis for this study's data. The variables included in the analysis are customer relationship, quality of information sharing, strategic supplier partnership, level of information sharing, marketing performance, and financial performance.

In the exploratory factor analysis pattern matrix results, all items exhibited factor loadings exceeding 0.50. A six-factor model explaining 69.84 percent of the total variance was identified, with an Eigenvalue surpassing one. A total of 26 items were categorized into six distinct factors based on Eigenvalues, namely: (i) customer relationship, (ii) quality of information sharing, (iii) strategic supplier partnership, (iv) level of information sharing, (v) marketing performance, and (vi) financial performance. Additionally, the factor loadings for the variables ranged from 0.54 to 0.96.

Hence, the first factor (customer relationship), comprising 5 items, accounts for 27.94 percent of the total variance, while the second factor (quality of information sharing) explains 12.86 percent. Similarly, the third factor (strategic supplier partnership) explains 12.62 percent, and the fourth factor (level of information sharing) elucidates 6.10 percent of the total variance. The fifth factor (marketing performance) contributes to 5.57 percent of the total variance, and the sixth factor (financial performance) explains 4.75 percent. Overall, the results indicate that all factors are collectively conducive to further investigation (Table 06).

Table 6: An exploratory factor analysis of supply chain management practices reveals which practices influence the organizational performance of Bangladesh's Agro-food industry.

Pattern Matrix					
Factors Name	Items	Variables	Factor	CR	AVE
Customer Relationship, Total=7.27, % of Variation=27.94, Cumulative %=27.94	CR1	We regularly engage with customers to establish standards for reliability, responsiveness, and other key metrics.	0.96	0.94	0.76
	CR2	We consistently measure and evaluate customer satisfaction.	0.95		
	CR4	We make it easy for customers to seek assistance from us.	0.83		
	CR3	We actively identify future customer expectations.	0.81		
	CR5	We periodically assess the importance of our relationship with our customers.	0.78		
Quality of Information Sharing (Total=3.34, % of Variation=12.86, Cumulative %=40.79)	QIS2	The information exchanged between our trading partners and us is accurate.	0.88	0.92	0.69
	QIS3	The information exchanged between our trading partners and us is complete.	0.85		
	QIS1	The information exchanged between our trading partners and us is timely.	0.84		
	QIS5	The information exchanged between our trading partners and us is reliable.	0.80		
	QIS4	The information exchanged between our trading partners and us is adequate.	0.78		

Strategic Supplier Partnership (Total=3.28, % of Variation=12.62, Cumulative %=53.41)	SSP1	Quality is our top criterion when selecting suppliers.	0.95	0.90	0.64
	SSP2	We frequently collaborate with our suppliers to solve problems.	0.89		
	SSP3	We assist our suppliers in improving their product quality.	0.74		
	SSP4	Our continuous improvement programs involve our key suppliers.	0.72		
	SSP5	We include our key suppliers in our planning and goal-setting activities.	0.67		
Level of Information Sharing (Total=1.59, % of Variation=6.1, Cumulative %=59.52)	LIS4	Our trading partners share business knowledge of core processes with us.	0.84	0.91	0.66
	LIS2	Our trading partners share proprietary information with us.	0.82		
	LIS1	We notify trading partners in advance of changing needs.	0.82		
	LIS3	Our trading partners keep us fully informed about issues affecting our business.	0.80		
	LIS5	We and our trading partners exchange information to support business planning.	0.78		
Marketing Performance (Total=1.45, % of Variation=5.57, Cumulative %=65.09)	MP1	My company has an established and highly competent marketing team.	0.93	0.91	0.76
	MP3	We place a strong emphasis on our marketing policy to achieve satisfactory performance.	0.90		
	MP2	Our marketing policy incorporates customers' opinions and surveys.	0.78		
Financial Performance (Total=1.24, % of Variation=4.75, Cumulative %=69.84)	FP1	Financial strength is crucial for a company's survival.	0.90	0.81	0.60
	FP2	My company possesses strong financial strength.	0.83		
	FP3	My company maintains sufficient internal cash reserves as a backup for any emergency supply disruptions.	0.54		

6.7 Results of the *Measurement* Model

Confirmatory factor analysis (CFA) is a statistical method utilized to validate the factor structure of observed variables, ensuring their association with the respective factor. The relative Chi-Square for this model stood at 1.689, falling below the threshold of 5.0, as advised by Marsh and Hocevar (1985), while other fit indices also indicated a favorable fit for the measurement model. The Goodness of Fit Index (GFI) attained a value of 0.875, surpassing the recommended threshold of 0.85, as suggested by Anderson & Gerbig (1984). The summarized outcome of the analysis is detailed below:

In the present study, the adjusted goodness of fit index (AGFI) recorded a value of 0.861, meeting the recommended threshold (>0.85) advocated by Anderson and Gerbing (1984), thus indicating a favorable fit supported by Figure 2 and Table 6. Additionally, the comparative fit index (CFI) yielded a value of 0.957, surpassing the suggested cut-off level of 0.90 by Bentler (1990). The root mean residual (RMR) value in the confirmatory factor analysis (CFA) was 0.043, below the commonly recommended threshold of 0.08 by Hu and Bentler (1998). Moreover, the root mean square error of approximation (RMSEA) stood at 0.046, demonstrating a good fit for the data as suggested by Browne and Cudeck (1993). Lastly, the standardized mean square residual (SRMR) was 0.052, falling under the 0.08 threshold recommended by Browne and Cudeck (1993).

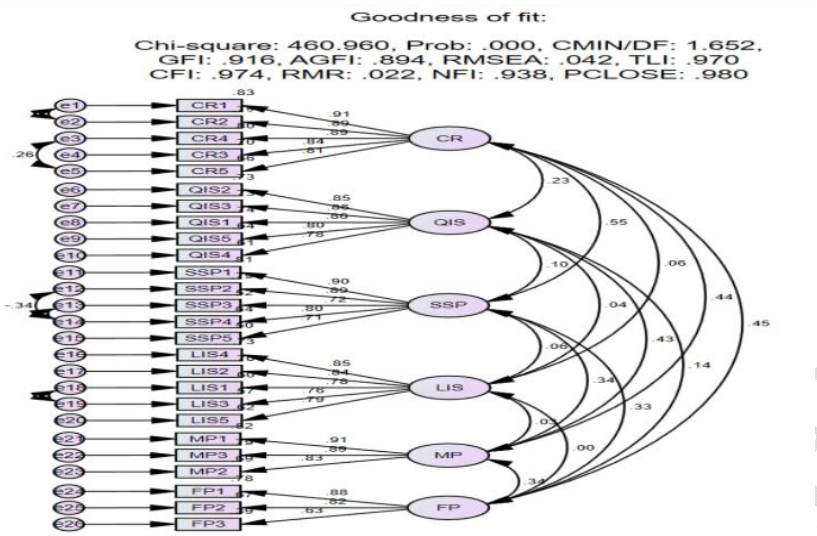

Figure 3: Outcome of confirmatory factor analysis. Source: Confirmatory factor analysis.

Table 7: Model fit indices and their acceptable thresholds.

Goodness of Fit Index	Value	Level of Acceptance	Reference
Chi-square/Df	1.689	<5.0	Marsh and Hocevar (1985)
CFI	.957	>0.90	Bentler (1990)
RMR	.043	<0.08	Hu & Bentler (1998)
GFI	.875	>0.90	Joreskog&Sorbom (1993)
AGFI	.850	>0.85	Anderson & Gerbig (1984)
RMSEA	.046	<0.08	Browne &Cudeck (1993)
SRMR	**.052**	<0.08	Browne &Cudeck, 1993

Df: degree of freedom; CFI: comparative fit index; RMR: root mean square residual; GFI: goodness of fit index; AGFI: adjusted goodness of fit index; RMSEA: root mean square error of approximation; SRMR: standardized mean square residual. Source: A literature review.

6.8 Multicollinearity Test

The variance inflation factors (VIFs) range from 1 to 10 and indicate the extent to which the variance of each coefficient is inflated. A VIF value of 1 suggests no correlation between variables, 1–5 indicates moderate correlation, and above 5 indicates high correlation. In this study, VIFs were computed to assess multicollinearity among variables, revealing a maximum value of 1.62 (Table 08), well within the acceptable range according to Hair et al. (1998).

Table 8: Variance inflation factor (VIF) and tolerance in multicollinearity.

Dependent Variable		LIS	SSP	QIS	CR
MP	Tolerance	0.99	0.65	0.94	0.62
	VIF	1.01	1.54	1.07	1.62
FP	Tolerance	0.99	0.65	0.94	0.62
	VIF	1.01	1.54	1.07	1.62

6.9 Structural Model

Covariance-based structural equation modeling, a multivariate analysis technique, was employed to discern significant relationships among six constructs: (i) customer relationship, (ii) quality of information sharing, (iii) strategic supplier partnership, (iv) level of information sharing, (v) marketing performance, and (vi) financial performance. The analysis (Table 10) revealed highly significant associations between customer relationships, information-sharing quality, and strategic supplier partnerships with marketing performance, evidenced by t-values exceeding 1.96 at the 1% level of significance. H_1, H_2, and H_4 were corroborated by the findings. However, the level of information sharing did not exhibit a significant relationship with marketing performance, as indicated by t-values below ±1.96 at the 1% significance level, thus failing to support H3. Conversely, customer relationships and strategic supplier partnerships demonstrated strong associations with financial performance, with t-values exceeding ±1.96 at the 1% significance level.

H_6 and H_7 received support from the analysis. However, only the quality of information sharing and level of information sharing did not demonstrate significant associations with financial performance, with t-values below ±1.96 at the 5% significance level, thereby failing to support H5 and H_8. In marketing research, Cohen (1988) suggested that R2 values between 0.02 and 0.12 are weak, 0.13 to 0.25 are moderate, and 0.26 or higher are considered large. Based on the study's path diagram, four factors—customer relationship, quality of information sharing, strategic supplier partnership, and level of information sharing—accounted for 33% of the marketing performance attributed to supply chain management practices in Bangladesh's food industries. The study's path diagram further illustrated those four factors—customer relationship, quality of information sharing, strategic supplier partnership, and level of information sharing—accounted for 22 percent of the financial performance attributed to supply chain management practices in Bangladesh's food industry. This R_2 value aligns with Cohen's (1988) recommendations.

Table 9: Hypothesis Testing

	Estimate	S.E.	C.R.	P	Comment	R^2 value
MP<---CR	0.34	0.076	4.50	***	**Supported**	0.33
MP<---QIS	0.34	0.049	6.98	***	**Supported**	
MP<---LIS	-0.007	0.055	-0.13	0.899	Not Supported	
MP<---SSP	0.177	0.068	2.61	0.009	**Supported**	
FP<---QIS	0.037	0.041	0.91	0.361	Not Supported	0.22
FP<---CR	0.366	0.066	5.57	***	**Supported**	
FP<---SSP	0.11	0.052	2.12	0.06	Supported	
FP<---LIS	-0.033	0.047	-0.69	0.49	Not Supported	

Note: ***indicates p value < 0.01, Source: Structural equation modeling (AMOS 24)

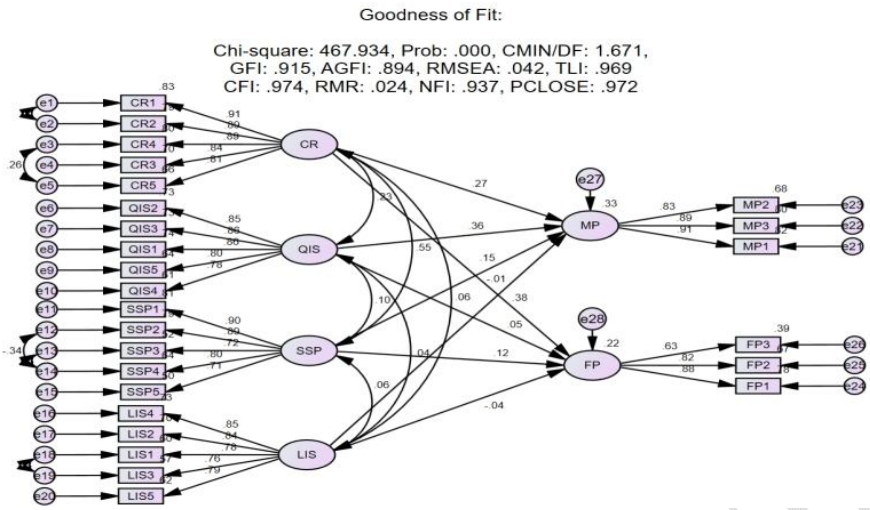

Figure 4: Structural Equation Modelling of Organization Performance.

7.0 Discussion

This study explores the impact of Strategic Supplier Partnership (SSP), Customer Relationship (CR), Level of Information Sharing (LIS), and Quality of Information Sharing (QIS) as predictors of Marketing Performance (MP) and Financial Performance (FP). It examines the relationship between Supply Chain Management (SCM) practices and Organizational Performance (OP) by developing a Structural Equation Model (SEM) based on data from Bangladesh's agro-food industry. The study highlights several reasons for incorporating Green Supply Chain Management (GSCM) practices into company operations.The findings reveal that SSP is positively and significantly related to MP, supported by previous studies (Tan et al., 2002; Stuart, 1997; Balsmeier et al., 1996; Gunasekaran et al., 2001; Monczka et al., 1998). Additionally, CR shows a positive and significant relationship with MP, consistent with the findings of Moberg et al. (2002) and Tan et al. (2002). Similarly, QIS is positively and significantly related to MP, as supported by Moberg et al. (2002) and Monczka et al. (1998).Furthermore, SSP is positively and significantly related to FP, supported by the studies of Tan et al. (2002), Stuart (1997), Balsmeier et al. (1996), Gunasekaran et al. (2001), and Monczka et al. (1998). CR also shows a positive and significant relationship with FP, aligning with the research of Moberg et al. (2002) and Tan et al. (2002).

8.0 Managerial Implication

Based on the findings of the study regarding the significant relationships between supply chain management practices and organizational performance in Bangladesh's Agro-Food Industry, the following managerial implications can be drawn:

Considering the notable association observed between customer relationships and organizational performance, managers should prioritize endeavors aimed at bolstering customer satisfaction and loyalty. Such initiatives may entail the implementation of personalized services, effective handling of customer complaints, and fostering strong connections with customers. Additionally, given the recognized impact of information-sharing quality on organizational performance, managers should allocate resources towards enhancing communication channels and optimizing information exchange mechanisms across the supply chain.

To leverage the identified benefits of strategic supplier partnerships on organizational performance, managers could concentrate on cultivating strong relationships with key suppliers. This could involve

fostering collaboration, aligning goals and objectives, and implementing effective communication strategies. Additionally, investing in robust information systems, promoting transparency, and ensuring timely and accurate sharing of information among stakeholders can further enhance the positive impact of supply chain practices on organizational performance.

Addressing these key supply chain management practices, such as customer relationships, information sharing quality, and strategic supplier partnerships, can yield benefits like improved product quality, reduced lead times, and enhanced supply chain efficiency. By strategically focusing on these aspects, managers in Bangladesh's Agro-Food Industry can boost both financial and marketing performance, thereby gaining a competitive advantage in the market.

9.0 Conclusion

This study examines the relationship between supply chain management (SCM) practices and organizational performance, focusing on four dimensions: strategic supplier partnership, customer relationship, level of information sharing, and quality of information sharing. Utilizing structural equation modeling, data from various Agro-based food industries were analyzed to explore these connections. The findings suggest that SCM practices can positively impact organizational performance, particularly through strategic partnerships with customers and suppliers, enhancing both marketing and financial outcomes. Given the universal goal of improving organizational performance, businesses prioritize implementing strategies and tools to enhance operations, with the supply chain playing a crucial role. The study confirms that implementing SCM practices can indeed enhance organizational performance, both financially and in the market.

The study examines the significant relationships between supply chain management practices and organizational performance within Bangladesh's Agro-Food Industry, unveiling certain limitations: Firstly, the research focuses solely on specific supply chain practices, neglecting other potentially influential factors like technology adoption and process optimization. This narrow scope may limit the comprehensive understanding of supply chain dynamics' impact on performance. Secondly, the study's exclusive focus on the Agro-Food Industry in Bangladesh raises concerns regarding the generalizability of its findings to other sectors or geographical regions. Different industries may exhibit unique supply chain dynamics, potentially invalidating the study's applicability beyond its specific context. Thirdly, the utilization of a cross-sectional design hinders the capture of temporal changes in supply chain practices and performance. Adopting a longitudinal approach could provide deeper insights into the evolution of these dynamics over time. Additionally, reliance on self-reported data introduces potential biases, such as common method bias and social desirability bias. Subjective interpretations of variables like customer relationships and information-sharing quality further compound measurement challenges. Lastly, the study overlooks external factors like macroeconomic conditions and regulatory changes, which could influence organizational performance. Ignoring these factors may limit the study's ability to provide a holistic understanding of the complex interplay between supply chain practices and performance outcomes. While the study offers valuable insights into the Agro-Food Industry's dynamics in Bangladesh, acknowledging these limitations is crucial for interpreting its findings accurately and informing future research endeavors.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc have been used during writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

Reference

1. Ahmed Mustafi, M.A., Dong, Y.-J. and Hosain, M.S. (2024), "The mediating role of perceived competitive advantage on the relationships between green supply chain management practices and operational performance: evidence from Bangladeshi manufacturing firms", *Benchmarking: An International Journal*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/BIJ-06-2023-0377
2. Alvarado, U. Y., &Kotzab, H. (2001). Supply chain management: the integration of logistics in marketing. *Industrial marketing management*, *30*(2), 183-198.
3. Anderson, J. C., & Gerbing, D. W. (1984). The effect of sampling error on convergence, improper solutions, and goodness-of-fit indices for maximum likelihood confirmatory factor analysis. *Psychometrika*, *49*, 155-173.
4. Balsmeier, P. W., & Voisin, W. J. (1996). Supply chain management: A time-based strategy. *Industrial Management*, *38*(5).
5. Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*(2), 238-246.
6. Berry D, Towill DR, Wadsley N. Supply chain management in the electronics products industry. International Journal of Physical Distribution and Logistics Management 1994;24(10):20–32.
7. Berry, D., Towill, D. R., & Wadsley, N. (1994). Supply chain management in the electronics products industry. *International Journal of Physical Distribution & Logistics Management*, *24*(10), 20-32.
8. Browne, M. W., &Cudeck, R. (1992). Alternative ways of assessing model fit. Sociological Methods & Research, 21(2), 230-258.
9. Chen, I. J., & Paulraj, A. (2004). Towards a theory of supply chain management: the constructs and measurements. *Journal of operations management*, *22*(2), 119-150.
10. Childerhouse, P., &Towill, D. R. (2003). Simplified material flow holds the key to supply chain integration. *Omega*, *31*(1), 17-27.
11. Chin, W. W. (1998). The partial least squares approach to structural equation modeling. *Modern methods for business research*, *295*(2), 295-336.
12. Chizzo, S. A. (1998). Supply chain strategies: solutions for the customer-driven enterprise. *Software magazine*, *1*(4), 9.

13. Claycomb, C., Dröge, C., & Germain, R. (1999). The effect of just-in-time with customers on organizational design and performance. *The International Journal of Logistics Management*, *10*(1), 37-58.
14. Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. Hillsdale: Erlbaum.
15. Day, G. S. (2000). Managing market relationships. *Journal of the academy of marketing science*, *28*, 24-30.
16. Dell, M. (1998). The power of virtual integration: an interview with Dell Computer's Michael Dell. Interview by Joan Magretta. *Harvard Business Review*, *76*(2), 73-84.
17. Donlon, J. P. (1996). Maximizing value in the supply chain. *Chief Executive*, *117*(1), 54-63.
18. Feldmann, M., & Müller, S. (2003). An incentive scheme for true information providing in supply chains. *Omega*, *31*(2), 63-73.
19. Field, A. (2000). *Discovering Statistics Using SPSS for Windows*. Sage Publications: Thousand Oaks, London/New Delhi.
20. Fornell, C. and Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research*, 382-388.
21. Gunasekaran, A., Patel, C., &Tirtiroglu, E. (2001). Performance measures and metrics in a supply chain environment. *International journal of operations & production Management*, *21*(1/2), 71-87.
22. Hair, J. F. J., Anderson, R. E., Tatham, R. L., Black, W. C. (1998). *Multivariate Data Analysis* (5th Edition). Prentice Hall: Upper Saddle River, New Jersey, USA.
23. Hair, J. F., Black, W. C, Babin, B. J. and Anderson, R. E. (2014). *Multivariate Data Analysis*. Pearson Education Limited: California, USA.
24. Hair, J., F. Jr., Black, W. C., Babin, B. J. and Anderson, R. E. (2010). *Multivariate Data Analysis: A Global Perspective* (7th Edition). Pearson Prentice Hall: New Jersey, USA.
25. Hair, J.F., Anderson, R.E., Tatham, R.L. and Black, W.C. (1998). *Multivariate Data Analysis* (5th Eds.), Prentice Hall, New Jersey.
26. Henseler, J., C. M. Ringle, and M. Sarstedt (2015). A New Criterion for Assessing Discriminant Validity in Variance-based Structural Equation Modeling, Journal of the Academy of Marketing Science, 43 (1), 115-135.
27. Henseler, J., Ringle, C. M. and Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. *Advances in International Marketing*, 20, 277-319.
28. Holmberg, S. (2000). A systems perspective on supply chain measurements. *International journal of physical distribution & Logistics management*, *30*(10), 847-868.
29. Hosain, M. S. (2021). What does it Take to be Green? Evidence from Asia and the Pacific. *Journal of Sustainable Development Studies*, *14*, 1-9.
30. Hossain, M. I., San, O. T., Ling, S. M., & Said, R. M. (2020). The role of environmental awareness and green technological usage to foster sustainable green practices in Bangladeshi manufacturing SMEs. *International Journal of Advanced Science and Technology*, *29*(7s), 3115-3124.
31. Hossin, M. A., Hosain, M. S., Frempong, M. F., Adu-Yeboah, S. S., & Mustafi, M. A. A. (2021). What Drives Sustainable Organizational Performance? The Roles of Perceived Organizational Support and Sustainable Organizational Reputation. *Sustainability*, *13*(22), 1-19.
32. Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, *6*(1), 1-55.

33. Jones, C. (1998). Moving beyond ERP: making the missing link. *Logistics Focus*, *6*, 2-7.

34. Khokhar, M., Zia, S., Islam, T., Sharma, A., Iqbal, W., & Irshad, M. (2022). Going Green Supply Chain Management During COVID-19, Assessing the Best Supplier Selection Criteria: A Triple Bottom Line (TBL) Approach. ProblemyEkorozwoju, 17(1), 36–51. https://doi.org/10.35784/pe.2022.1.04

35. Lalonde, B. J. (1998). Building a supply chain relationship. *Supply Chain Management Review*, *2*(2), 7-8.

36. Lee, H. L., Padmanabhan, V., & Whang, S. (1997). Information distortion in a supply chain: The bullwhip effect. *Management Science*, *43*(4), 546-558.

37. Mason□Jones, R., &Towill, D. R. (1997). Information enrichment: designing the supply chain for competitive advantage. *Supply Chain Management: An International Journal*, *2*(4), 137-148.

38. McAdam, R., & McCormack, D. (2001). Integrating business processes for global alignment and supply chain management. *Business Process Management Journal*, *7*(2), 113-130.

39. Mentzer, J. T., Min, S., & Zacharia, Z. G. (2000). The nature of interfirm partnering in supply chain management. *Journal of Retailing*, *76*(4), 549-549.

40. Metters, R. (1997). Quantifying the bullwhip effect in supply chains. *Journal of Operations Management*, *15*(2), 89-100.

41. Min, S., & Mentzer, J. T. (2004). Developing and measuring supply chain management concepts. *Journal of Business Logistics*, *25*(1), 63-99.

42. Moberg, C. R., Cutler, B. D., Gross, A., & Speh, T. W. (2002). Identifying antecedents of information exchange within supply chains. *International Journal of Physical Distribution & Logistics Management*, *32*(9), 755-770.

43. Monczka, R. M., Petersen, K. J., Handfield, R. B., & Ragatz, G. L. (1998). Success factors in strategic supplier alliances: The buying company perspective. *Decision Sciences*, *29*(3), 553.

44. Noble, D. (1997). Purchasing and supplier management as a future competitive edge. *Logistics Focus*, *5*, 23-27.

45. Novack, R. A., Langley Jr, C. J., & Rinehart, L. M. (1995). Creating logistics value: themes for the future.

46. Porter, M. E. (2011). *Competitive advantage of nations: creating and sustaining superior performance*. simon and schuster.

47. Raut, R. D., Luthra, S., Narkhede, B. E., Mangla, S. K., Gardas, B. B., &Priyadarshinee, P. (2019). Examining the performance oriented indicators for implementing green management practices in the Indian agro sector. *Journal of Cleaner Production*, *215*, 926-943.

48. Rungtusanatham, M., Salvador, F., Forza, C., & Choi, T. Y. (2003). Supply□chain linkages and operational performance: A resource□based□view perspective. *International Journal of Operations & Production Management*, *23*(9), 1084-1099.

49. Sheridan, J. H. (1998). The supply-chain paradox. *Industry Week/IW*, *247*(3), 20-26.

50. Sposito, V. A., Hand, M. L., &Skarpness, B. (1983). On the efficiency of using the sample kurtosis in selecting optimal lpestimators. *Communications in Statistics-simulation and Computation*, *12*(3), 265-272.

51. Stein, T., & Sweat, J. (1998). Killer supply chains. *Information week*, *708*(9), 36-46.

52. Stuart, F. I. (1997). Supply□chain strategy: organizational influence through supplier alliances. *British Journal of management*, *8*(3), 223-236.

53. TAN, K. (1998). Supply Chain Management: Supplier Performance and Firm Performance. *Int. J. Purch. Mater. Manage.*, *34*(3), 2-9.

54. Tan, K. C., Lyman, S. B., & Wisner, J. D. (2002). Supply chain management: a strategic perspective. *International journal of operations & production management*, *22*(6), 614-631.

55. Tompkins, J., & Ang, D. (1999). What are your greatest challenges related to supply chain performance measurement?. *IIE Solutions*, *31*(6), 66-66.

56. Towill, D. R. (1997). The seamless supply chain-the predator's strategic advantage. *International Journal of Technology Management*, *13*(1), 37-56.

57. Turner, J. R. (1993). Integrated supply chain management: what's wrong with this picture?. *Industrial Engineering*, 25(12), 52-55.

58. Wines, L. (1996). High order strategy for manufacturing. *Journal of Business Strategy*, *17*(4), 32-33.

59. Yamin, S., Gunasekaran, A., &Mavondo, F. T. (1999). Relationship between generic strategies, competitive advantage and organizational performance: an empirical analysis. *Technovation*, *19*(8), 507-518.

60. Yoshino, M. Y., & Rangan, U. S. (1996). Strategic alliances: An entrepreneurial approach to globalization. *Long Range Planning*, *29*(6), 909-910.

61. Younis, H., Sundarakani, B., & Vel, P. (2016). The impact of implementing green supply chain management practices on corporate performance. *Competitiveness Review*, *26*(3), 216-245.

62. Nsowah, Johnson, George Agyenim-Boateng, and Augustine Anane. 2022. “The Assessment of the Impact of Sustainable Supply Chain Management on the Performance of Manufacturing Firms in Ghana”. Journal of Economics, Management and Trade 28 (12):1-11. https://doi.org/10.9734/jemt/2022/v28i121064.
63. Ayantoyinbo, Dosunmu, and Omorinde. 2024. “Econometric Study: E-Commerce Adoption on Inventory Management for Manufacturing Companies in Nigeria”. South Asian Journal of Social Studies and Economics 21 (4):10-21. https://doi.org/10.9734/sajsse/2024/v21i4796.
64. Govindan K, Azevedo SG, Carvalho H, Cruz-Machado V. Impact of supply chain management practices on sustainability. Journal of Cleaner production. 2014 Dec 15;85:212-25.
65. Ryals L, Knox S. Cross-functional issues in the implementation of relationship marketing through customer relationship management. European management journal. 2001 Oct 1;19(5):534-42.