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SUPPLY CHAIN INTEGRATION AND PRODUCT PERFORMANCE OF NIGERIA BOTTLING COMPANY

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Abstract. This article explored the impact of supply chain integration on the performance of the Nigeria Bottling Company by identifying customer integration, supply chain partner coordination, and information sharing as components of supply chain integration. A descriptive survey was used as a research method. The study population consisted of consumers of Nigeria Bottling Company products in the city of Ibadan. Because of the infinite nature of the population, Godin's formula was used to determine the sample size of 384 respondents who were randomly selected from the capital city of Ibadan. Primary data for the study were obtained through a survey of respondents. The study used both descriptive and inferential statistics when analyzing data using SPSS version 23. The results showed that supply chain integration has a strong positive impact on performance, with an r value of 0.645 in the hypothesis tested, i.e. an impact of 64.5%. The study concluded that supply chain integration has a significant impact on product performance and therefore recommends that managers at the Nigeria Bottling Company improve their supply chain performance, especially information sharing, to ensure productivity.

Key words: supply chain integration, customer integration, information sharing, coordination of supply chain partners, product performance.

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ИНТЕГРАЦИЯ ЦЕПОЧКИ ПОСТАВОК И ПРОИЗВОДИТЕЛЬНОСТЬ КОМПАНИИ «NIGERIA BOTTLING COMPANY»

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Аннотация. В данной статье изучалось влияние интеграции цепочек поставок на производительность компании «Nigeria Bottling Company» путем определения интеграции клиентов, координации партнеров по

цепочке поставок и обмена информацией. В качестве метода исследования был использован описательный опрос. Совокупность респондентов исследования состояла из потребителей продукции компании «Nigeria Bottling Company» в городе Ибадан. Из-за бесконечного характера населения формула Година использовалась для определения размера выборки из 384 респондентов, которые были выбраны случайным образом из столичного города Ибадан. Первичные данные для исследования были получены с помощью опроса респондентов. В исследовании применялась как описательная, так и логическая статистика при анализе данных с помощью программы SPSS версии 23. Результаты показали, что интеграция цепочек поставок оказывает сильное положительное влияние на производительность, значение *r* в проверенной гипотезе составляет 0,645, то есть 64,5 %. В исследовании сделан вывод о том, что интеграция цепочек поставок значительно влияет на характеристики продукта, и поэтому рекомендуется менеджерам для обеспечения производительности в компании «Nigeria Bottling Company» улучшить свою работу по цепочкам поставок (особенно обмена информацией).

Ключевые слова: интеграция цепочки поставок, интеграция клиентов, обмен информацией, координация партнеров по цепочке поставок, производительность продукта.

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Introduction

Long-term organisational performance depends increasingly on supply chain integration (hereinafter SCI) [Huo et al., 2014]. Businesses must integrate with their consumers and suppliers and work closely with them if they want to thrive. In an effort to maximise internal and external resources and competencies throughout the entire supply chain, producers and their supply chain allies strategically collaborate [Flynn et al., 2010]. The supply chain's participants cooperate and work together to boost efficiency, which meets consumer demand while increasing profitability [Kumar et al., 2017]. SCI is frequently acknowledged as a crucial element that enhances businesses' competitive advantage [Devaraj et al., 2007]. It has shown to significantly improve a company's operational and monetary results [Mohammadi et al., 2014]. Integrated company information and material flow would result in the best supply chain management. It entails the coordination of business operations between a company's internal departments and its supply chain partners so as to save costs, enhance customer value, and increase supply chain performance for all sundries [Stank et al., 2011].

The use of supply chain integration shows that connections amid supply chain businesses boost performance, encourage the use of information technology, foster the building of strategic alliances between supply chain partners, and improve customer relationship management. More businesses from a variety of industries are now integrating their supply chains, and corporate managers claim that this has improved customer service since there are more supply chain linkages between them and third parties [Frohlich et al., 2011]. Supply chain integration allows for the monitoring and management of continually increasing and contracting product portfolios as a result of the wider variety of operations in Water and Companies, including engineering services and product-design initiatives [Lysons et al., 2006].

The success or failure of supply chains is determined in the marketplace by the end consumer. Getting the right product, at the right price, at the right time with the right quality to the consumer is not only the key success factor to competitive success but also the key to survival. The performance of the supply chain is measured by how companies are able to match supply to demand whilst driving down costs and simultaneously improving product performance [Christopher et al., 2011]. By thinking in terms of supply chains instead of individual operations or departments, executive officers can improve their competitive strategies. These strategies, in turn, change organisational operations, roles, and information systems. Today, companies are increasingly focusing on their downstream supply chain to enhance the customer experience and gain competitive advantage. Product quality and timely product delivery to customers, which speaks loud on the performance of a product, is a key objective of supply chain integration processes.

This study hence seeks to examine the impact of supply chain integration on product

performance of the Nigeria Bottling Company. The study identified, Customer integration, coordination of supply chain partner and Information sharing as the components of supply chain integration.

Literature review

Supply chain integration

As a management philosophy, supply chain integration is related to ideas about supply chain cooperation and supply chain coordination [Mackelprang et al., 2014]. The alignment of a company's exterior activities with its internal processes can be seen as a collection of procedures or as a partnering process [Lockström et al., 2010]. In a perfect world, these procedures would eliminate all obstacles to the free movement of data, goods, and money across a supply chain [Romano, 2013]. It is acknowledged as a tactic for enhancing company performance in circumstances with intense competition. Manufacturing companies have been adopting a range of supply chain management strategies in response to this [Morash et al., 2018).

Supply chain integration has been envisaged on many different levels, including functional, internal, and external, and it takes into account difficulties with customers, manufacturing, distribution, and buying. According to Saunders [Sanders, 2017], manufacturers frequently use two connected types of integration. The forward physical flow of supplies between suppliers, producers and consumers is coordinated and integrated in the first form of integration. Reverse integration is the second integration strategy. The manufacturer can make a more accurate projection of the input price and, as a result, a more lucrative investment choice thanks to backward integration.

By fusing together, a company's networks, activities, roles, processes, and locations, supply chain integration connects it to its customers, suppliers, and other channel members. According to literature on supply chain management, integration is directly related to carrying out tasks in several domains, each with a certain level of intensity. Integrative activities may be generated in a variety of contexts, including information flow, planning and control, flow of commodities, and organization. According to Bowersox [Bowersox et al., 2016], the integration of suppliers and customers should be the starting point for the supply chain process. Internal and external integration may be achieved by effective information exchange, strategic connections with suppliers and customers, ongoing standardization of each internal logistic function, and other means.

Dimension of supply chain integration

Organization coordination

According to Mentzer [2010], collaborative system development and shared decision-making with suppliers and consumers improve management decision comprehension among partners, which in turn encourages the sharing of risks and resources within the supply chain. This often results in decreased time and cost for product development as well as improved profit margins. Internal coordination activities strengthen communal trust and commitment to the organisation by increasing knowledge of the objectives and actions among various functional units. People are driven to seek out greater coordination as they become more trustworthy and devoted to their organisations, which enhances the effectiveness of product creation [Bstieler, 2016].

Information sharing

Information sharing is one of the most important organisational procedures inside SCI. Information on technology, marketing, manufacturing, and inventories that suppliers and customers share is referred to here [Stock et al., 2001]. The majority of writers have argued that information sharing is a crucial component of processes for effective supplier growth. Burton [Burton, 2010] defined information sharing as the act of transmitting business-related knowledge in a manner that allows the recipient to act. Mentzer [Mentzer et al., 2014] stressed the importance of information sharing in the supply chain for securing competitive advantages through a variety of means, including enhanced knowledge of market developments and customer needs, the acquisition of new innovative products, and recognition of ways to enhance manufacturing techniques and shorten overall cycle times.

Customer integration

Customers are viewed as the lifeblood of businesses, irrespective of the good or service they offer, and they are also seen as the breath of fresh air that an organization needs to increase and be able to thrive in the face of fierce rivalry. What was formerly seen as vital may soon turn out to be complimentary since customer demands and expectations are always changing. As a result, organizations need to keep an eye on developments in the political, economic, social, technical, and legal environments. In addition, they should act pro-actively rather than reactively to outperform rivals in meeting client demands. Managing the client relationship is seen as a crucial component of the supply chain.

Diverse research viewpoints were considered, and customer integration was developed. According to Flynn et al. [2010], customer integration calls for key skills that are developed via collaboration with important clients. Flynn et al. [2010] conducted research on the integration of purchasers. Building and sustaining a solid relationship and collaboration with the customers is the process of customer integration. It includes discussing information, experiences, goods, services, and recommendations with clients. Selected items that investigate the connection, partnership, and associated topics were used to measure it.

Benefits of supply chain integration

The SCI process is fundamental to supply chain management (hereinafter SCM). Mentzer et al. [2011] defined SCM as the structured, proper planning of the traditional business operations and the techniques across these business operations within a given business and across businesses within the supply chain to improve the long-term effectiveness of every company and the supply chain as a whole. The supply chain is said to be a crucial component of SCM, while inter-firm coordination is said to be a key component. Other scientists have made similar claims. The supply chain's channel members must be connected to the outside world effectively [Lee, 2010]. The secret to successfully implementing SCM is coordination amongst the many companies in the supply chain [Frohlich et al., 2011].

Challenges to supply chain integration

The following challenges are highlighted from the supply chain literature: deficiency of information technology, absence of information interchange, lack of trust, demand distortion-bullwhip, dearth of system compatibility, dearth of knowledge, dearth of competence, and the expense of integration [Sammuel et al., 2013].

Ellinger et al. [2016] looked at five SCI barriers: a deficiency of communication, a corrupt working relationship, clashing goals, and a lack of guidance from senior management. They also found that there was deficiency of understanding of the other function. According to Moberg [2002], internal politics, misaligned goals and objectives, inadequate management information systems, a short-term focus on organisational goals, a lack of trust, a lack of knowledge, and other complicated supply chain difficulties are the main obstacles to supply chain execution. Barratt [Barratt et al., 2014] outlined several SCI integration hurdles on all levels and claimed that these problems exist at the tactical, operational, and planned levels of the organization. Knowing the hurdles is vital, but removing them or finding solutions to them is even more crucial for SCI. Misaligned information systems, a lack of trust and ineffective inventory management are just a few of the difficulties involved in managing an efficient supply chain. Handfield and Nichols [1999], in their investigation into the challenges facing the integration of supply chain information, ineffective management of supply chain partners was identified as a challenge facing supply chain integration.

Product performance

Product performance is identified as one of the dimensions of product quality [Kotler et al., 2001]. Performance is a term used to describe a product's main functional aspects. Product display indications, product cleanliness, and product freshness are used to gauge it. Product performance is a measure of a product's quality. It covers a product's general robustness, dependability, accuracy, ease of use and maintenance, and the worth of other features. Performance, durability, size, and other physical and intangible factors are typically considered

when evaluating a product's quality (aesthetics, serviceability, perceived quality, etc.). Typically, tangible quality is employed to assess the physical characteristics and capture the manufacturing process control ability [Agus et al., 2012]. Additionally, according to [Sun, 2011], a product's or service's quality determines how well it can meet the implicit demands of customers.

Theoretical framework

Strategic choice theory

Jemison established the strategic choice theory (hereinafter SCT) in 1981. According to the theory, there is a connection and interaction between business processes and specific events [Kegoro et al., 2020]. The connection between an organization's internal and external environments is shown in strategic choice theory, along with the impact of senior management choices on a firm's performance [Addae et al., 2019]. Insofar as this mode emphasizes how organizational structure leads to high performance in an environment of scarce resources, it neglected to take into account factors like technology, environment and scale of operation. This relationship between an organization, its actions, and the resulting performance is shown by a strategic choice model by Campling and Micheson [Campling et al., 1998].

According to SCT, managers are the people who work in an organisation and make choices and adjustments [Alshundreh et al., 2019]. These choices impact the attainment of organisational performance and include raw material sources, amounts to be obtained depending on demand, transportation, production scheduling, and planning. Additionally, according to the strategic choice theory, a company employs strategies that will promote success even in complicated and dynamic situations [Ensafiari et al., 2017]. Managers may make choices at the corporate level and get support from different business units as a result of environmental changes. Managerial adjustments are required as a result of the usage of technology such as ERP systems, which vertically connect the company with its suppliers and customers. Understanding production management processes will help in this study's application of strategic choice theory, which demonstrates how management choices affect organisational performance as well as how those choices interact with their surroundings.

Empirical review

Hendijani and Saeidi Saei [2020] carried out a study on supply chain integration and firm performance, with an examination of the moderating effect of demand uncertainty in Iran. The study empirically examined the moderating effect of demand uncertainty on the relationship between SCI and firm performance. A series of hypotheses to address these relationships were developed in the study. SCI was categorized into internal and external integration, with external integration divided into product and process integration. The descriptive research design was adopted in the study. Study sample consists of firms active in automotive parts and steel industries in Iran. In total, 84 firms completed the survey. Questionnaires were used to gather data from the respondents. Hierarchical regression analysis was used to test research hypotheses. Industry type was considered as a control variable. Research findings showed that internal and process dimensions of integration had a positive effect on operational performance. In addition, internal and process dimensions had a positive effect on financial performance. Rather than categorizing external integration into integration with suppliers and customers which was commonly used in previous studies, this study used product and process integration as the categories for external integration.

The effect of supply chain integration on operational performance at Jordanian pharmaceutical manufacturing organizations was studied by Saleh [2015]. The study examined the impact of supply chain integration on the operational performance (hereinafter OP) of Jordanian pharmaceutical manufacturing (hereinafter JPM) organizations. The current study, which examines the impact of SCI components on JPM Organizations' OP, is regarded as a causality study. The 14 JPM Organizations' managers were polled for the research. Out of 235 managers, 121 managers' practical data were gathered using a questionnaire that was created and improved through expert interviews and the panel of judges committee.

Statistical methods such multiple regressions, correlations, and descriptive statistics were used. The study's findings showed a substantial positive association between the OP of JPM organizations and SCI. The findings also showed that managers in JPM organizations preferred internal and external integration indicators over supplier integration indicators, practically on par.

Huo [2012] conducted a research on the effect of supply chain integration on business performance from the standpoint of organizational capabilities. The goal of the article was to concurrently analyze how three different supply chain integration models affected three different business performance models. The research investigated the relationships among internal integration, customer integration, supplier integration, supplier-oriented performance, customer-oriented performance, and financial performance from the perspective of organizational capability using data gathered from 617 companies in China and the structural equation modelling method. The findings demonstrated that internal integration enhances exterior integration and that both internal and external integrations boost business performance. Additionally, complete or partial mediation effects between SCI and business performance are found, which helps to explain the contradictory results of earlier studies on the effects of SCI on performance. By emphasizing organizational capacity theory and SCI practices, the research adds to the field of SCI.

Methodology

The study adopted the descriptive survey research design. The population of the study comprises of consumers of the products of the Nigeria Bottling Company in Ibadan metropolis. Hence, the population is infinite, and the Godin [Godin, 2003] formula was used to determine the sample size for the study:

$$n = \frac{Z^2(P)(1-P)}{C^2},$$

where Z – standard normal deviation (95% confidence level); P – percentage of picking a choice or response; C – confidence level.

$$n = \frac{(1.96)^2(0.5)(1-0.5)}{(0.05)^2},$$

$$n = 384.16,$$

n = 384 respondents.

Therefore, a sample of 384 consumers is selected as the sample size for the study, which is selected using a random sampling technique. Primary data were gathered directly from the respondents through the use of a questionnaire. The questionnaire comprised of typed questions to which respondents provided answers, based on the option provided by the researcher. Closed-ended questions were formulated using the Likert scale principle. Data gathered were analysed. Multiple regression techniques were used to test the hypothesis formulated in the study. The study adapted Zhang and Huo [Zhang, Huo, 2012] model; the model for the study is specified as:

$$(\text{PPERF}) = f(\text{SCI}),$$

$$(\text{PPERF}) = \beta o + \beta_1 \text{CI} + \beta_2 \text{IS} + \beta_3 \text{CSI} + e,$$

where PPERF – product performance; SCI – supply chain integration; CI – customer integration; IS – information sharing; CSI – coordination of supply chain; β_o – constant; β_1 – coefficient; e – error term.

Result and discussion

Socio-demographic characteristics of respondents

Table 1 shows the socio-demographic characteristics of respondents. The result showed that 143 (37.2%) were females and 241 (62.8%) were males. This depicts that more males were captured than females in the study, this can also mean that the male gender consumes Coca-Cola products than the female gender (see Fig. 1).

More so, analysis age of the respondents revealed that 64 (16.7%) of them are between 18–25 years, 153 (39.8%) are between 26–35 years, 133 (34.6%) are between 36–45 years, and 34 (8.9%) are between 46 years and above (see Table 1). This result showed that the majority of the consumers of Coca-Cola product are in their middle age, i.e., Consumers of Coca-Cola are majorly younger folks. The standard deviation .861 being less than the mean 2.36 means there is no variation in the age (see Fig. 2).

Table 1. **Frequency distribution analysis of demographic characteristics of respondents**

Variable	Frequency (n = 384)	Percentage, %
Gender		
Female	143	37.2
Male	241	62.8
Age in years		
Mean age, SD	2.36 ± .861	
18–25 years	64	16.7
26–35 years	153	39.8
36–45 years	133	34.6
46 years and above	34	8.9
Marital status		
Mean age, SD	1.61 ± .684	
Single	194	50.5
Married	146	38.0
Divorced/Separated	44	11.5
Years of patronage		
Mean age, SD	2.44 ± .660	
Less than 5 years	18	4.7
6–10 years	196	51.0
11–20 years	152	39.6
21 years and above	18	4.7

Note. Source: authors' computation (2022).

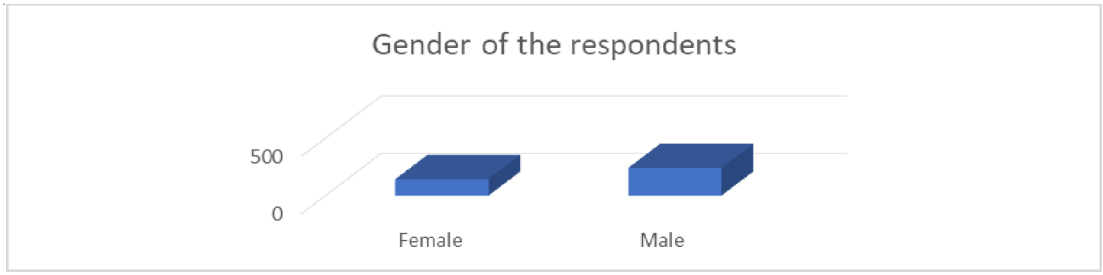

Fig 1. Graphical representation of gender of the respondents

Note. Source: authors' computation (2022).

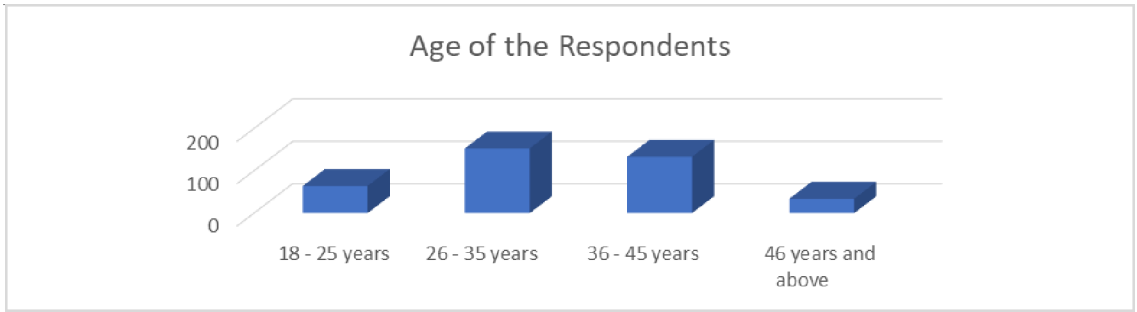

Fig 2. Graphical Representation of age of the respondents

Note. Source: authors' computation (2022).

An analysis of marital status showed that 194 (50.5%) respondents are single, 146 (38.0%) are married and 44 (11.5%) are divorced/separated. This shows that more single was represented in the study than the married or divorce/separated. From the result it can also mean that, consumers of Coca-Cola products are more of singles. Result, further showed that there is no variation in the marital status data, following the standard deviation value lesser that the mean (see Fig. 3).

Finally, an analysis of demographic characteristics of the respondents revealed that

18 (4.7%) of them have been patronizing Coca-Cola products for less than 5 years, 196 (51.0%) have been patronizing for 6–10 years, 152 (39.6%) for 11–20 years and only 18 (4.7%) for 21 years and above. This depicts that the majority of the respondents have been patronizing the company within the space of 6–20 years. There is also no variation, following the fact the standard deviation is lesser that the mean (Fig. 4).

Test of hypothesis

H_0: There is no significant influence of supply chain integration on product performance of the Nigeria Bottling Company.

The model summary Table 2 shows the regression result, which reveals overall significant influence of the supply chain integration variables identified in the study (customer integration, coordination of a supply chain and customer integration) on product performance of the Nigeria Bottling Company. The result shows an *r* value of 0.645[a] (64.5%), this denotes a 64.5% significant role of supply chain integration to product performance. According to the R Square value of 0.416, supply chain integration explains or accounts for 41.6% of variations in product performance. While other factors or variables that are not part of this model but are included in the stochastic error term are responsible for the remaining 58.4% of changes. The Durbin Watson statistics result was almost two, or (2.224). This demonstrates that the autocorrelation is absent from the model (see Table 3).

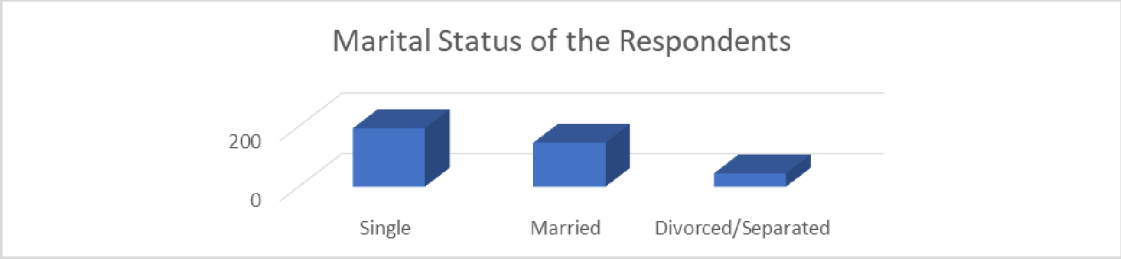

Fig 3. Graphical representation of marital status of the respondents

Note. Source: authors' computation (2022).

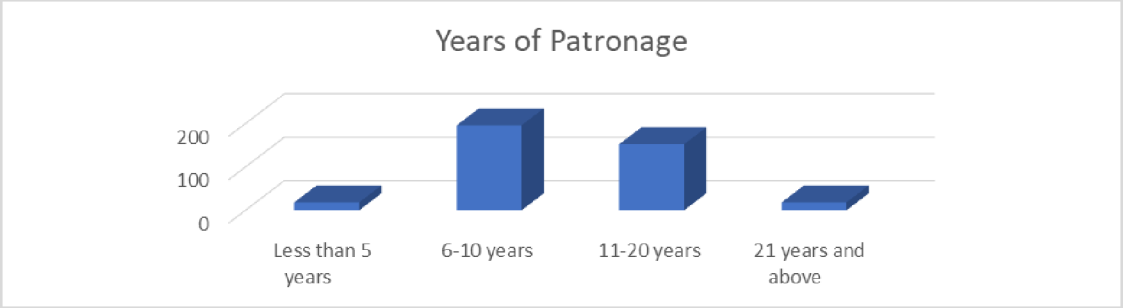

Fig 4. Graphical representation of years of patronage of the respondents

Note. Source: authors' computation (2022).

Table 2. **Summary of the regression analysis showing the impact of supply chain integration on product performance of Nigeria Bottling Company**

Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate	Durbin-Watson
1	.645	.416	.411	2.566	2.224
a. Predictors: (constant), customer integration, coordination of supply chain and information sharing					
b. Dependent variable: product performance					

Note. Source: authors' computation (2022).

In order to examine the overall importance of the independent variables in explaining the criterion variable, the F-statistics value for the regression model is shown in Table 3. Figures from the table demonstrate that supply chain integration strongly predicted product performance, with an *F* statistic of 90.027 and a *P*-value or sig value of 0.05 (Sig 0.000). Given that there is a less than 95% chance that the null hypothesis is true, this suggests strong evidence against it. Since the value of F_{tab} (3,382) > F_{cal} (90.027), the total regression model is highly statistically significant in terms of its goodness of fit.

Table 4 shows the regression coefficients of the contribution of each independent variable to criterion variable. The reveals the individual influence of the dimensions of supply chain integration identified in the study. CI (customer integration) reveals the beta coefficient value of 0.240 (24%), i.e., customer integration has 24% influence on PP (Product performance), this explains that 1% increase in customer integration will increase product performance by 24%. Sig value showed (0.002 < 0.05), which denotes statistical significance of customer integration in the regression model at 95% confidence level. CSI (coordination of a supply chain) shows the beta coefficient value of 0.369 (36.9%), i.e., a 1% increase in Coordination of supply chain led to 36.9% increase in product performance. Sig value (0.000 < 0.05), explains that coordination of a supply chain is statistically significant at 95% confidence. IS (information sharing) showed a beta coefficient value of 0.381 (38.1%), i.e., a 1% increase in information sharing led to 38.1% increase in product performance. Sig value (0.000 < 0.05), explains that information sharing is statistically significant at 95% confidence. Sig value for the constant is shown (0.000 < 0.05), this reveals the evidence against the null hypothesis as there is less than 95% confidence that the null hypothesis is correct. As a result, the study rejects the null hypothesis and accepts the alternative hypothesis that the Nigeria Bottling Company's supply chain integration has a substantial impact on product performance.

Discussion of finding

The study examined the effect of supply chain integration on product performance of the Nigeria Bottling Company. The hypothesis testing result revealed that supply chain integration (customer integration, coordination of a supply

Table 3. **Regression showing significance of supply chain integration on product performance of the Nigeria Bottling Company**

Model		Sum of Squares	*df*	Mean Square	*F*	Sig
1	Regression	1778.350	3	592.783	90.027	.000
	Residual	2495.525	379	6.584	–	–
	Total	4273.875	382	–	–	–
a. Dependent variable: product performance						
b. Predictors: (constant), customer integration, coordination of supply chain and information sharing						

Note. Source: authors' computation (2022).

Table 4. **Coefficient of regression model of supply chain integration on product performance of the Nigeria Bottling Company**

Model		Unstandardized coefficients		Standardized coefficients	*t*	Sig
		B	Std. Error	Beta		
1	(Constant)	6.449	.881	–	7.323	.000
	Customer integration	.235	.049	.240	4.707	.002
	Coordination of supply chain partners	.339	.045	.369	7.575	.000
	Information sharing	.325	.041	.381	7.846	.000
a. Dependent variable: product performance						

Note. Source: authors' computation (2022).

chain and customer integration) has a strong positive influence of 64.5% on product performance of the Nigeria Bottling company. The finding is revealed by the result of the *r* value showing 0.645 in Table 2. More so, the result showed that the downstream components of supply chain integration identified in the study is relevant to the regression model, as the F-statistics value showed 90.027. The findings further revealed that information sharing among the components of supply chain integration had the highest impact on product performance following the beta coefficient value of 0.381; coordination of a supply chain has the next highest with 0.369 as its beta coefficient value and customer integration has the least impact with the beta coefficient of 0.240. It was also revealed in the finding, that strong evidence against the null hypothesis exists as the sig level showed 0.000 < .005, i.e., there is less than 95% confidence that the null hypothesis is correct. The study therefore rejected the null hypothesis and accepted the alternate hypothesis, that there is a significant influence of supply chain integration on product performance of the Nigeria Bottling Company.

This result is consistent with that of Rono and Nganga [2014], who looked at the impact of supply chain integration on organisational performance in western Kenyan water and sanitation enterprises. Descriptive statistics, however, were utilised to analyse the data. The findings showed that respondents believed customer integration had a significant impact on organisational success in WSCWK.

Conclusion and recommendation

The study concluded that there was a strong significant influence of supply chain integration on product performance of the Nigeria Bottling Company, in Ibadan. The quality of a product is the utmost concern of consumers; product performance is key to meeting the needs of consumers and equally gaining competitive advantage in the brewery market. Product performance is greatly influenced by the information sharing as a component of supply chain integration. Effective feedback from customers and consumers is essential to the improvement of product performance of the Nigeria Bottling Company. The study therefore recommended that Managers of Nigeria Bottling Company should establish an effective and efficient feedback system from consumers of the company's product.

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