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Patrick K.A. LADIPO[1]
Ekpenyong Ekpenyong UDOFIA[2]
Ayodele ONIKU[3]
Jonathan Ehimen EKPUDU[4]

SUPPLIER COLLABORATION PRACTICES AND PRODUCT INNOVATION MANAGEMENT

The study assessed the effect of supplier collaboration on product innovation. In addition, most studies that examine the relationship fail to highlight the effect of the individual practices of supplier collaboration on product innovation, and are on developed nations. A descriptive research design and a cross-sectional survey approach was adopted to distribute questionnaire copies to the respondents. A sample of 29 firms was selected from a population of thirty-eight 38 big manufacturing firms and the analysis was done using descriptive statistics and structural equation model. The results reveal that product innovation is greatly influenced by supplier collaboration, however, only incremental product innovation is influenced. Radical product innovation is not influenced by supplier collaboration, though resource sharing practice influenced it exclusively. The study reveals the effect of exclusive supplier collaboration practices on product innovation and the model could be replicated in other developing nations to see if the outcome will be similar.

Keywords: supplier, supplier collaboration, product, product innovation, manufacturing.

1. INTRODUCTION

There is a growing conversation around product management, specifically in the facet of product innovation management. In an era with reduced product development spans and continued change in preference of the consumer, there a growing need to understanding how to deliver the best product to customers and in record timing. This drives the conversation of product innovation management and its enabling strategies. The world is a global village, competition is higher, technological needs are so dynamic and we are in the era of disruptive technology. Because of the immense pressure from customers to design, develop and launch new innovative products into the market, there is need for

[1] Patrick K.A. Ladipo, PhD, Associate Professor of the Department of Business Administration, Faculty of Management Sciences, University of Lagos, Nigeria, e-mail: pkaladipo@gmail.com.
[2] Ekpenyong Ekpenyong Udofia, M.Sc., PhD student, Department of Business Administration, Faculty of Management Science, University of Lagos, Nigeria, e-mail: solokoko2003@yahoo.com, ORCID: 0000-0001-9154-1483 (corresponding author).
[3] Ayodele Oniku, PhD, Senior Lecturer in the Department of Business Administration, University of Lagos, Nigeria, e-mail: ooniku@unilag.edu.ng, ORCID: 0000-0001-8456-6738.
[4] Jonathan Ehimen Ekpudu, PhD, Senior Lecturer in the Department of Business Administration, University of Lagos, Lagos, Nigeria, e-mail: jekpudu@unilag.edu.ng.

collaboration to meet these ever-demanding needs of the customers. Literature opines that manufacturing organisations rarely innovate exclusively (Luzzini, Amann, Caniato, Essig, Ronchi, 2015), instead, it is powered by a carefully tethered web of committed partners from the supply end to the focal firms.

For a long time in research, the drivers and effect of innovation in product has been debated, raising concerns on how much impact product innovation has on the overall performance (Kim, Kumar, Kumar, 2012). While some researchers believe that product innovation has the capacity to proffer new frontiers for organisations (Teece, 2000; Hurmelinna-Laukkanen, Sainio, Jauhiainen, 2008), others believe the alternative cost of product innovation is steep (Prajogo, Sohal, 2003). The forgone alternatives as cited in literature includes quality and productivity. Prajogo and Sohal (2003) argue that firms in pursuit of being lead innovators are never quality leaders. In addition, there is a debate on how the management of product innovation is hampered by supplier collaboration (Fawcett, Magnan, 2002; Frishammar, Horte, 2005; Antonio, Lau, Richard, 2010). Studies like Fawcett and Magnan (2002) and Antonio et al., (2010) argue that supplier collaboration (SC) is a limitation to innovation because suppliers are usually adamant to change and prefers the status quo to optimise productivity.

There are several conflicts in supplier-buyer relationships (in the manufacturing sphere) that limit their ability to collaborate properly, which includes design disagreements, profit sharing issue, and more commonly, intellectual theft of ideas of the focal firm by collaborating firms (Razmi, Haghighi, 2014). All these bring undesirable outcomes in collaboration. Literature also reveal that supplier collaboration is hard to accomplish in the cases of product innovation for several reasons (Smals, Smits, 2012; Luzzini et al., 2015). Therefore, it is imperative to investigate this relationship in other business environments, such as the Nigerian business environment. Based on the literature above, this study's objective was to explore the role supplier collaboration in product innovation of manufacturing firms in Nigeria.

2. LITERATURE REVIEW

2.1. Theoretical review

2.1.1. Resource Dependence Theory

The origin of the Resource Dependence Theory (RDT) is traced back to the business consultant Jeffrey Pfeffer and Gerald Salancik of the America's prestigious Stanford University in the late 1970s (Pfeffer, Salancik, 1978). The pioneer introduction of the organisational theory to aid the understanding of organisations was seen in the textbook publication by both authors titled "The external control of organisations: A resource dependence perspective" published in 1978. The inspiration for the theory was drawn from earlier works of Emerson (1962) titled power dependence relations. As well as that of Blau (1964) and Jacobs (1974) whose works further focused on inter-firm relationships and control.

The resource dependence theory focuses on posing the organisation as a living organism that feeds to stay alive. While some things are good for consumption, others are of necessity to the organism. This analogy best captures resource dependence theory as the theory says the level of necessity for the resource determines what the firm would do to get and keep such resource, hence, resource-dependence. In other words, the most pivotal resources for survival of the firm have the most influence on the behaviour of the firm. Incorporation of

the business environment was a critical ingredient of the resource dependence theory, as it generally criticizes prior theories that failed to capture the relevance of the external environment and its forces on business outcomes. The notion of the resource dependence theory is that the business environment holds the key to success of the organisation. That is, the environment has the resources needed for survival of the organisation, and the level of need for the resource, decides what the organisation would be willing to part with. The resource dependence theory says that the resources in the environment usually presents itself as the capacity of another firm, and the ability to draw from these other firms influences the survival of the business. Therefore, firms must understand that the environment contains what they need, and an intentional scanning must be done to identify these firms with the resources to create an alliance for survival.

This theory is particularly relevant to this study because supplier collaboration is anchored on the idea of mutual gains through exploitation of the combined resources of partner firm. This is a direct implementation of the concept of resource dependence theory which believes in tapping from the resources in the environment, which is inclusive of other businesses with capacities that complement the business core competences.

2.2. Conceptual Review

2.2.1. Supplier collaboration

Collaboration between and among firms can be seen as an intentional division of responsibilities between firms to meet a goal for the focal firm. These responsibilities are in different capacities, from designing to component subset creation, or even marketing. It is the unification of the competencies of partner firms that would otherwise erode them. In the contemporary business environment, to further foster quality and delivery, many firms; specifically, manufacturers are increasingly letting go of non-core activities in their process to suppliers to handle. The goal is to capitalise on the technology, expertise and competence of the partner firm to reduce inefficiency and sub-standard delivery (Ekpudu, Aigbepue, Olabisi, 2013). As literature posit, competitive advantage is beyond the firm (Puche, Ponte, Costas, Pino, Fuente, 2016), supply chain and the collaboration of suppliers play a vital role in making sure that the chain is competitive. For the purpose of this study, supplier collaboration was measured by the information sharing, joint decision making, joint planning and resource sharing to reflect the most established supplier collaboration practices in industry practice (Kumar, Banerjee, 2012).

2.2.2. Product innovation

The innovation of product is largely referred to as changes in the offering of any product (De Propris, 2002). Product innovation is either incremental or totally radical (Reichstein, Salter, 2006; Kim et al., 2012). Product innovation was assessed by incremental and radical product approaches because they constitute the most widely accepted measurement parameters for product innovation management in contemporary literature (Kim et al., 2012; El Manzani, Sidmou, Cagarra, 2019). Incremental implies that it is improving on what is existing. An incrementally innovative product builds on the existing template of the existing product, it is usually expressed in added features of the product, and in some cases mere aesthetic design may constitute incremental innovation in product. Incremental product innovation seeks to improve the status quo for the benefit and satisfaction of the customers (Chandy, Tellis, 1998; Valle, Vázquez-Bustelo, 2009). While radical product innovation considers the creation of what is not known to the target market, neither is it in

any way similar to the existing products of the brand or industry competitors. It is shrouded in uncertainty of whether the market will accept it or not (Moguilnaia, Vershinin, Sweet, Spulber, De Souza, Narayanan, 2005). That said, when successful, it can be very rewarding.

2.2.3. Supplier Collaboration and Product Innovation

Valk and Wynstra (2005) focused on supplier involvement and product development in the food and beverage industry. The study revealed that supplier involvement does have significant impact on product development in the food and beverage industry in Dutch firms. The study called for more empirical studies into the supplier-product innovation relationship. McIvor, Humphreys, and Cadden (2006) studied the involvement of suppliers into the creation of innovation in products and revealed several impediments that make it rarely functional. In other words, the product innovation management was not improved by supplier collaboration practices. According to Kähkönen, Lintukangas, Ritala, and Hallikas (2017), though there are some studies that attempt to understand product innovation, very limited studies have attempted testing the relationship between collaborative practices and the extent to which it could assist in the management of innovativeness in products. The study of Kähkönen et al. (2017) equally revealed that not all collaboration practices influence product innovation in manufacturing firms. It is interesting to replicate the SC and product innovation relationship test in a developing business environment. Perhaps, the contrast of McIvor et al. (2006) and Kähkönen et al. (2017) is anchored on the changes in business environment and industry focus. It is the interest of this study to investigate this relationship across multiple industries and in a different business environment, other than the previous studies. Luzzini et al. (2015) investigated the relationship between supplier collaboration and product innovation performance and the test proved significant and positive. The study did not isolate the various practices of supplier collaboration to emphasise their independent impact on product innovation. It will be of equal interest to highlight the effect of supplier collaboration and product innovation, while highlighting the effect of the individual supplier collaboration practices from the Nigerian business environment context. Literature reveals that most innovative products fail when introduced into the market, which is an indication that the innovation was not rightly done. Fifty percent of new products fail and seventy percent of those that eventually survive introduction fail in sales (Yuan, Zelong, 2009). Also highlighted by Luzzini et al. (2015) is that most of the studies on supplier collaboration are domiciled in big firms and the results are contradictory.

2.3. Conceptual model

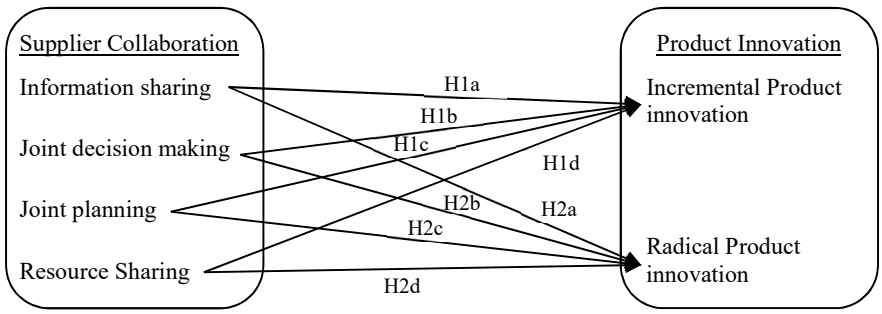

Figure 1. The relationship between supplier collaboration and product innovation
Source: Authors, 2022.

2.4. Empirical review

Lau, Tang, and Richard (2010) studied supplier-buyer integration and product innovation in Hong Kong firms. Using the survey of two hundred and fifty-one (251) firms in Hong Kong, it revealed a significantly positive relationship. McIvor et al. (2006) examined supplier collaboration and product innovation with a focus on the electronics industry in Asia. The result of their study proves that supplier collaboration does have an effect on the development of innovative products in the electronics industry in Asia. Jajja, Brah, Hassan, and Kannan (2014) tested the collaboration of supplier and buyers and how much capacity it had to influence the outcomes in the management of product innovation in manufacturing firms in Pakistan. Using one hundred and ninety-one (191) manufacturing firms for the survey, the study revealed that buyer-supplier collaboration had the capacity to influence product innovation in manufacturing firms in Pakistan. Among others tested by Luzzini et al. (2015), supplier collaboration and innovation revealed a significantly positive relationship. Kähkönen et al. (2017) equally investigated SC and innovation. The study was anchored on the Finnish manufacturing sector involving one hundred and sixty--five (165) firms. The result revealed that some practices including green supply chain practice and systemic purchasing had a positive and significant effect on innovation. Other practices including earlier supplier involvement as well as inter-firm learning did not significantly impact innovation. Patrucco, Luzzini, and Ronchi (2017) assessed the relationship between supplier collaboration and innovation in products on an international scale. Consisting of five hundred and twenty-four (524) manufacturing firms spread across developed nation of Europe and North America, the study result shows that product innovation was positively and significantly predicted by supplier collaboration

3. METHODOLOGY

3.1. Research Design, Sampling Technique and Sample Size

This study adopts a descriptive research design, specifically, the cross-sectional survey method was employed to capture respondents' opinions on the variables under study. Data were obtained from manufacturing firms domiciled in Lagos, Nigeria. A questionnaire developed using existing scales from Cao et al. (2010), Kumar and Banerjee (2012), Simatupang and Sridharan (2004) and Kim et al. (2012) was administered on employees of selected manufacturing firms in Lagos. The population of the study was made up of all thirty-eight (38) big (above 149 employees) manufacturing firms in Nigeria. The firms were selected from the Nigerian Exchange Group (formerly Nigerian Stock Exchange) database. Twenty-nine (29) Lagos based big manufacturing firms made the sample of the study using stratified sampling to isolate Lagos based firms for their accessibility for data collection. An initial pilot study was conducted on the research instrument via the distribution of twenty-five copies to professionals to assess its language clarity. Modifications were recommended, and they were implemented accordingly. The Cronbach Alpha reliability score of the instrument was .81, which confirmed the reliability of the study instrument.

The study had a total sample of twenty-nine manufacturing firms. Employing a stratified sampling procedure, the sampling was limited to only managers, assistant managers and two supervisors of the operations, marketing, production, and supply chain departments of the chosen firms (considering their expertise and their privilege to information other members of the department are not privy to). This means that each firm had sixteen (16)

respondents, leading to four hundred and sixty-four (464) respondents. The study's questionnaire copies were administered on the 464 respondents. It had a return rate of 53.66%, that is, 249 questionnaire copies returned in usable form. The data were analysed using descriptive statistics (frequency) and structural equation model (SEM).

3.2. Hypotheses

Following the discussion in the literature review section, the following hypotheses were formulated in the null form and tested.

H1: Supplier collaboration has no significant effect on incremental product innovation

H2: Supplier collaboration has no significant effect on radical product innovation

3.3. Measurement Items for Supplier Collaboration and Product Innovation

Table 1. Measurement items

SUPPLY COLLABORATION DIMENSIONS	
Information sharing (IS)	
IS1 My company and its supply partners exchange relevant and timely information	Cao et al. (2010)
IS2 My company and its supply partners exchange accurate and complete information	Cao et al. (2010)
IS3 My company and its supply partners exchange information on inventory levels, delivery schedules, and cost of inventory warehousing	Kumar, Banerjee (2012)
IS4My company and its supply partners exchange information on users' feedback on products and services	Kumar, Banerjee (2012)
Joint decision making (JDM)	
JDM1 Joint decision on optimal order quantity	Simatupang, Sridharan (2004)
JDM2 Joint decision on product quality and market segmentation	Simatupang, Sridharan (2004)
JDM3 Joint decision in resolving production related problems	Simatupang, Sridharan (2004)
JDM4 Joint decision on goals, objectives, and reward for good performance	Kumar, Banerjee (2012)
Joint planning (JP)	
JP1 My company makes plan to purchase raw materials and other required goods with good quality, and maintain relationships with suppliers.	Kumar, Banerjee (2012)
JP2 New Product Development in my company integrates suppliers into its planning	Kumar, Banerjee (2012)
JP3 My company jointly plan demand forecasts with its suppliers	Kumar, Banerjee (2012)
JP4 My company develops promotional and advertising strategies of product lines in conjunction with suppliers	Kumar, Banerjee (2012)

Table 1 (cont.). Measurement items

SUPPLY COLLABORATION DIMENSIONS	
Resource Sharing (RS)	
RS1 We have shared all required technology and machinery with our partners	Kumar, Banerjee (2012)
RS2 Use cross-organisational teams frequently for process design and improvement	Cao et al. (2010)
RS3 We offer technical support to our suppliers	Cao et al. (2010)
RS4 We offer financial and non-financial resources to supply partners to enable them meet deliveries.	Cao et al. (2010)
PRODUCT INNOVATION DIMENSIONS	
Incremental product innovation	
IPI1 Our supply chain members have the information for monitoring and changing operations strategy	Kim et al. (2012).
IPI2 Our supply chain members have access to inventory, order status information for forecasting	Kim et al. (2012).
IPI3 Our supply chain members have the necessary information system for tracking goods	Kim et al. (2012).
IPI4 We get information from various sources to understand the changing market conditions	Kim et al., (2012).
Radical product innovation	
RPI1 Our new products differ substantially from our existing products	Kim et al. (2012).
RPI2 Our percentage of radical product innovations in the product range is significantly higher compared to the competition	Kim et al. (2012).
RPI3 We are well known by our customers for radical product innovations	Kim et al. (2012).
RPI4 We introduce radical product innovations into the market more frequently than our competitors	Kim et al. (2012).

Source: Literature Review, 2022.

The measurement scales of the research instrument were all adapted from existing literature. The study had two main variables (supplier collaboration and product innovation). Supplier collaboration was measured by information sharing, joint decision making, joint planning and resource sharing. Items for information sharing were adapted from Cao, Vonderembse, Zhang, and Ragu-Nathan (2010) and Kumar and Banerjee (2012). Items for joint decision making were adapted from Simatupang and Sridharan (2004) and Kumar and Banerjee (2012). Items for joint planning were adapted from Kumar and Banerjee (2012). Items for resource sharing were adapted from Kumar and Banerjee (2012) and Cao et al. (2010). Product innovation management was measured by incremental product innovation and radical product innovation. Items for both incremental product innovation and radical product innovation were adapted from Kim et al. (2012).

4. DATA ANALYSIS AND RESULTS

4.1. Measurement model

For the measurement model to be certified as fit, a few tests were conducted on the measurement model. These included multivariate normality, multicollinearity, unidimensionality, reliability, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Multivariate normality was satisfied by conducting a Mahalanobis test to reveal a Mahalanobis range of 11.843-121.140. The critical value was calculated to be 67.32, thus, eliminating 9 respondents from the survey because their Mahalanobis values were higher than the critical value. Unidimensionality was tested to examine the factor loadings of the items of the major constructs. While constraining the highest factor loading of the measurement items to 1, the loadings were good, as revealed in Table 2. The reliability assessment of major constructs was conducted and all constructs had values above .70 (see Table 2.), thereby, acceptable (Fornell, Larcker, 1981). Multicollinearity was assessed through the Tolerance and VIF figures of the items. The items had Tolerance values above 2 and VIF values below 5.

Table 2. Construct assessment

Construct	items	Factor loading	CFI	RFI	RMR	NFI	*p*	Cronbach α	AVE	CR
Information Sharing	IS1	.901	.912	.971	.031	.922	.047	.888	.801	.900
	IS2	.896								
	IS3	.832								
	IS4	.890								
Joint Decision Making	JDM1	.956	.988	.961	.021	.987	.110	.813	.825	.879
	JDM2	.848								
	JDM3	.971								
	JDM4	.921								
Joint Planning	JP1	.720	.997	.985	.010	.995	.050	.853	.812	.890
	JP2	.815								
	JP3	.837								
	JP4	.818								
Resource Sharing	RS1	.901	.994	.980	.033	.993	.002	.875	.890	.948
	RS2	.923								
	RS3	.944								
	RS4	.941								
Incremental Product innovation	IPI1	.981	.937	.813	.110	.905	.021	.901	.823	.911
	IPI2	.974								
	IPI3	.912								
	IPI4	.923								
Radical Product innovation	RPI1	.720	.899	.827	.035	.931	.051	.881	.813	.897
	RPI2	.870								
	RPI3	.923								
	RPI4	.889								

Source: Field Survey, 2022.

Table 2 highlights the factor loadings of the items adapted for this study, as well as the model fit for the independent sub variables of the of the study. Supplier collaboration was measured by information sharing, joint decision making, joint planning and resource sharing. The model fit for each of these exclusive sub variables of supplier collaboration are highlighted in Table 2. It reveals that beyond the major variables having model fit, the sub variables all have good model fit going by the CFI, RFI, RMR, and NFI values of the measurement constructs. In addition, product innovation was measured by incremental and radical product innovation. Both measurement constructs had good model fit going the observed values. Table 2. also reveals that no item was dropped because the factor loadings were good for all items used in the research instrument.

Table 3. Correlation of major constructs and squared AVE values for Discriminant Validity

Constructs	Mean	SD	IS	JDM	JP	RS	IPI	RPI
Information Sharing	4.23	.37	***.895***					
Joint Decision Making	4.11	.63	.554**	***.908***				
Joint Planning	3.95	.32	.392**	.713**	***.901***			
Resource Sharing	4.10	.61	.593**	.720**	.619**	***.943***		
Incremental Product Innovation	3.98	.21	.619**	.612**	.632**	.611**	***.907***	
Radical Product Innovation	4.07	.59	.129*	.396**	.329*	.134*	.324**	***.902***

Source: Field Survey, 2022.

The EFA was conducted to examine if there is a violation of the assumption of positive definiteness. EFA was conducted with factor extraction set at 7 to reflect the number of major constructs, while varimax rotation was employed and coefficients suppressed was set at 0.3. Positive definiteness was confirmed since 1.140 was the determinant value which is above 0 (Lowry, Gaskin, 2014). In addition, Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity (BTS) values were within desired range, that is 0.872 and .003 respectively. KMO value above 0.5 is considered good and indicates an adequate sample size (Hair, Anderson, Tatham, Black, 1998). The test of CFA through convergent validity and discriminant validity was done. The AVE values for each construct were above 0.50; revealing a presence of convergent validity (Fornell, Larcker, 1981; Flynn, Huo, Zhao, 2010). The CR values of each construct were above 0.70, this further emphasises the presence of convergent validity (Fornell, Larcker, 1981; Dubey, Gunasekaran, Childe, Wamba, Roubaud, Foropon, 2021). The discriminant validity of the construct was assessed via a comparison of the squared root AVE values and the squared correlation values of all major constructs. When the Squared AVE value is higher than all squared correlation values, it supports the existence of discriminant validity (Fornell, Larcker, 1981).

Table 4. presents the analysis of the respondents' social demographic characteristics' data. It shows that the male respondents of the study were one hundred and ninety-three (193) while female were fifty-six (56), constituting 77.5 percent and 22.5 percent respectively. Staff positions analysis revealed that forty-three (43) respondents were managers (representing 17.3 percent), while ninety-six (96) respondents were assistant managers (representing 38.6 percent). Supervisors in the study were one hundred and ten (110) and they constitute a 44.1 percent of the respondents. Finally, the bio data revealed that eighty-two (82) respondents were from the production unit, respondents from the marketing unit were forty-seven (47), forty-nine (49) respondents belong to the supply chain

unit, and seventy-one (71) respondents belong to the operations unit. These constitute 32.9, 18.9, 19.7 and 28.5 percent respectively.

Table 4. Description of respondents' bio-data

		Frequency	Valid Percent	Cumulative %
Gender	Male	193	77.5	77.5
	Female	56	22.5	100
	Total	249	100	
Staff position	Manager	43	17.3	17.3
	Ass. Manager	96	38.6	55.9
	Supervisor	110	44.1	100
	Total	249	100	
Department	Production	82	32.9	32.9
	Marketing	47	18.9	51.8
	Supply chain	49	19.7	71.5
	Operations	71	28.5	100
	Total	249	100	

Source: Field Survey, 2022.

4.2. Hypotheses Testing

The recommendations for model fit includes CFI ≥ .90, NFI ≥ .90 IFI ≥ .90, RFI ≥ .90, RMSEA ≤ .08 and x^2/df ≤ 5 (Ahmadi, 2019; Bagozzi, Yi, 1988; Guimaraes et al., 2016). These thresholds were not violated because the model fitness of the model (Figure 2.) was CFI = .932, NFI = .899, IFI = .962, RFI = .922, RMSEA = .023, and x^2/df = 4.213.

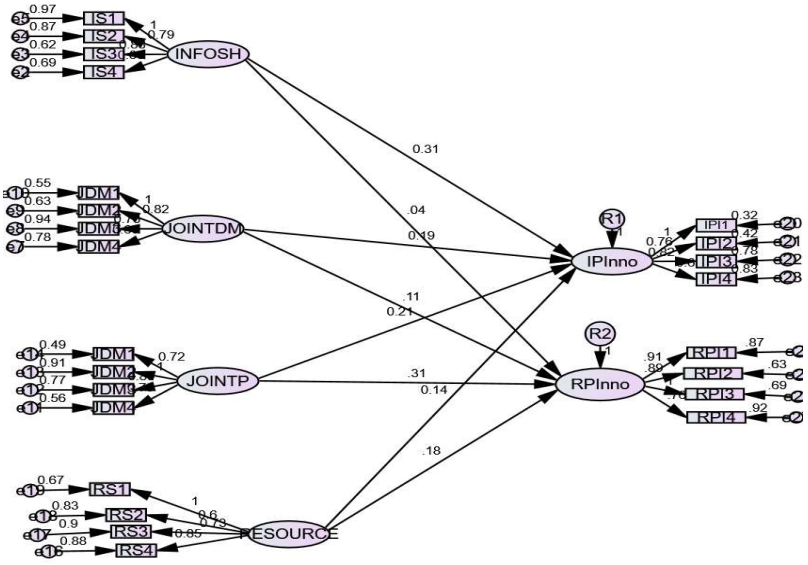

Figure 2. SEM Result

Source: Field Survey, 2022.

Table 5. Results of Hypotheses tested

Hypothesis	Path	Standardised Coefficient	t-values	Result
H1	SC ⟶ IPI	.423*		Supported
H1a	IS ⟶ IPI	.313**	3.105	Supported
H1b	JDM ⟶ IPI	.190*	4.235	Supported
H1c	JP ⟶ IPI	.210**	6.173	Supported
H1d	RS ⟶ IPI	.140**	2.735	Supported
H2	SC ⟶ RPI	$.218^{ns}$		Not Supported
H2a	IS ⟶ RPI	$.042^{ns}$	6.121	Not Supported
H2b	JDM ⟶ RPI	$.112^{ns}$	5.127	Not Supported
H2c	JP ⟶ RPI	$.310^{ns}$	4.874	Not Supported
H2d	RS ⟶ RPI	.181**	2.315	Supported

Source: Field Survey, 2022.

The study tested two hypotheses. It focused on the effect of supplier collaboration on incremental product innovation and its effect on supplier collaboration on radical product innovation. The result of the study shows that on overall supplier collaboration had a positive and significant effect on incremental product innovation. The study showed that 42.3 percent of the variation in incremental product innovation was predicted by supplier collaboration. Specifically, the exclusive practices of supplier collaboration also proved to have had positive and significant effect on incremental product innovation. The test revealed that information sharing had a positive effect on incremental product innovation, predicting 31.3 percent of the change in incremental product innovation; joint decision--making practice had a 19 percent effect on the change in incremental product innovation. Joint planning exclusively had a 21 percent effect on incremental product innovation; the relationship was a positive and significant one; while resource sharing had a significant and positive effect on incremental product innovation, as it influences 14 percent of the outcome in incremental product innovation.

However, the result revealed that supplier collaboration had no significant relationship with radical product innovation. Analysing the exclusive practices of supplier collaboration on radical product innovation revealed that individual practices of supplier collaboration equally had a non-significant relationship resource sharing influenced 18.1 percent of the outcome in radical product innovation.

4.3. Discussion of Findings

The study tested two hypotheses; supplier collaboration on incremental product innovation and supplier collaboration on radical product innovation. The first hypothesis proved positive and significant, aligning with McIvor et al. (2006) and Lau et al. (2010), as both studies opine that supplier collaboration has the capacity to influence significant positive change in product innovation. The similar findings may be explained by the similarity in the practices employed in measuring the independent variable (collaboration) in the studies. Putting spotlight on the individual practices, it showed that information sharing had the most impact on incremental product innovation management. This therefore implies that information sharing should be taken more seriously for the achievement of effective product innovation management. Though other practices had good effect on incremental product innovation, deliberate investments should be channeled to creating

a comprehensive information system with the capacity to incorporate suppliers to improve innovation.

The result of supplier collaboration and radical product innovation proved insignificant. This further validates the claim of Kähkönen et al. (2017) that supplier collaboration practices do not always deliver any sort of innovation improvement. As seen in this study, three practices adopted to test supplier collaboration and radical product innovation management had no significant effect on product innovation management, while one of the practices of supplier collaboration had a significant effect on product innovation management. The similarity in the non-significant relationship between supplier collaboration and radical product innovation in this study and Kähkönen et al. (2017) is possibly embodied in their methodology similarity. This stems from the fact that both studies selected only big firms in their respective business environments. This finding however negates Jajja et al. (2014) whose study claimed that supplier collaboration had the potency to manage and improve product innovation in manufacturing firms. The study also disagrees with the finding of Patrucco et al. (2017) because their finding revealed that supplier collaboration intensity positively influences product innovation. The study could record contrast in findings with these studies because of some fundamental differences. For instance, Jajja et al. (2014) conducted their study across all manufacturing firms in their business environment. Thus, examining these different firm sizes together can mask the relationship between one size (for instance big firms) and product innovation tendencies. On the other hand, Patrucco et al. (2017) conducted a study spanning several European and North American nations. Having such a wide data collection span can alter the overall relationship effect. In addition, the study was also not concerned about a particular cadre in size, it covered all firms in the manufacturing sectors of the multiple countries.

5. CONCLUSION AND RECOMMENDATION

Supplier collaboration and product innovation within big manufacturing firms in Nigeria has been tested in this study. Two hypotheses were tested and one was supported while the other was not. From the findings of this study, it concludes that supplier collaboration had an effect on incremental product innovation. All four measurement constructs of supplier collaboration (information sharing, joint decision making, joint planning and resource sharing) have significant effects on incremental product innovation exclusively. It also concludes that supplier collaboration has no effect on radical product innovation. That said, resource sharing practice exclusively had a significant effect on radical product innovation.

The study therefore recommends that firms pursuing incremental product innovation should invest in supplier collaboration to achieve their goal. However, other strategies should be implemented to achieve radical product innovation. To the industry practitioners, the study suggests a model to delivering improvements in incremental product innovation in developing nations. Specifically, results reveal that investments must be made intentionally in establishing robust comprehensive information system, incorporating strategic suppliers to reap the most benefit from it. This is a response to information sharing having the most effect on product innovation on an incremental basis. Finally, managers of manufacturing firms in developing nations might consider pursuing incremental product innovation strategy rather than radical, as the model supports achieving incremental product innovation through supplier collaboration strengthening.

Significant contribution to the literature on supplier collaboration and product innovation was presented by the study. Specifically, the study adds a conceptual model explicitly highlighting the relationship between individual practices of supplier collaboration on product innovation. The study adds to the limited literature on supplier collaboration and production innovation from a developing nation in the Sub-Saharan African business environment, as well as strategies to deliver product innovation in the Sub-Saharan region of Africa. While the study aligns with some prior studies on the subject, it also contrasts the findings of some studies, thus, creating a platform for more studies to explore clarity on the role of supplier collaboration in the attainment and management of product innovation. The study suggests that further investigations be made into the relationship between supplier collaboration and product innovation as contrasting views on its effect continue to exist. The study also had the limitation of being focused on big manufacturing firms domiciled in Lagos. Further studies should consider expanding the study's focus to all tiers of manufacturing firms in Lagos, or perhaps all of Nigeria to give the study's findings more credibility of generalisation.

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