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VALUE CHAIN AND PRODUCT INNOVATION IN PALM OIL INDUSTRY IN ANAMBRA STATE

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ABSTRACT
This research center on evaluation of effect of value chain on Product innovation in palm oil industry in Anambra was based on objectives which were to examine the effect of customer focus on Product innovation in palm oil industry in Anambra, evaluate the effect of R&D management on Product innovation in palm oil industry in Anambra, assess the effect of process management on Product innovation in palm oil industry in Anambra and determine the effect of supply management on Product innovation in palm oil industry in Anambra. A cross-sectional survey research design was employed. Structural Equation Modelling (SEM), using SMART-PLS was selected to investigate the effect of value chain on Product innovation in palm oil industry in Anambra. Data was collected through questionnaire from a sample of 265 Palm oil growers in Abuja. The finding shows that there is a positive significant effect of customer focus, R&D management, process management and supply management on Product innovation in palm oil industry in Anambra. It is recommended that, Palm Oil Growers should engage actively in customer focus, Palm Oil Growers should engage actively in R&D management, Palm Oil Growers should engage actively in process management and Palm Oil Growers should engage actively in borrowing from supply management. This will help them to easily improve their product innovation which will in turn lead to performance of their firms.

Key Words: Value chain, Customer focus, R&D management, Process management, supply management, Product innovation.

1.0 INTRODUCTION

Palm oil is the most globally traded vegetable oil in the world, owing to its price competitiveness. It is a vastly fungible product used, to produce biodiesel, food products, industrial chemicals, cosmetics and pharmaceuticals. Because of oil palm's productivity relative to substitute oilseed products, comparatively high supply stability and strong long-term market prospects, many governments, especially in Latin America and Africa, have begun to actively promote oil palm cultivation in their countries.

Nigeria has untapped potentials for immense palm oil production. The critical issue is that policy makers should encourage palm oil production, especially in areas where the potentials for massive production exist. Recall, that palm oil was once a major source of foreign exchange for Nigeria, its importance in the world economy is still revered. In the world today, palm oil remains one of the veritable means of reducing the uncertainties in the oil and gas subsector. This is because in measurable terms, palm oil trade has shown improvement that outstripped it closest alternatives. Phoochinda, (2020) categorized the main stakeholders in the palm

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oil industry as growers and group of growers (*Upstream*); entrepreneurs of oil palm processing and extracting factories who absorbs the total oil palm output from growers, these constitute the *intermediate*; and the pure oil palm extracting factories who absorb raw palm oil from extracting factories for pure refining and sell it to various continuous industries such as pharmaceutical companies, food and beverage companies, biodiesel producing factories which constitute the *downstream*. The value chain of agriculture sector which oil palm is part, consist mainly of three parts namely producer (growers), processors (intermediate) and refiners (downstream).

Anambra State governments has expressed optimism about the prospect of the oil palm industry in boosting employment opportunities and an independent economic base for their state. Anambra state is poised to encourage private investors into the oil palm industry. For demonstration effect, it is disposed to granting large hectares of land to Chicason Group, producer of life vegetable oil and allied products, which targets 135,000 tons of palm oil (Akhaine, (2017).; Onuchuwu 2015). This study intends to scrutinise palm Oil value chain available in the state and understudy leading palm oil economics (Malaysian and Indonesian) in the sector.

The oil palm tree produces high-quality oil used primarily as an edible fat and by manufacturing industries in household products like candles, pharmaceutical products, confectioneries, cosmetics, food products, detergents, cosmetics and, to a small extent, biofuel, also palm oil contain—it's found in lipstick, soaps, detergents and even ice cream. Palm oil is a very productive crop. It offers a far greater yield at a lower cost of production than other vegetable oils. Global production of and demand for palm oil is increasing rapidly. Plantations are spreading across Asia, Africa and Latin America. But such expansion comes at the expense of tropical forests—which form critical habitats for many endangered species and a lifeline for some human communities. There are three (3) oil palm varieties: Dura, Pisifera and Tenera, with the latter being mainly selected for economic production. The oil is concentrated in the fruit bunches, composed of a fresh fruit pulp, and in the fruit kernels. Oil content in the fruit pulp is about 50-60% or 20-22% of bunch weight; oil content in the fruit kernels is 48-52% or 2-3% of bunch weight. Fresh fruit bunches once harvested must be treated in an oil mill within 24 hours to avoid that oil quality decreases.

Palm oil can be classified into crude palm oil, palm kernel oil, and others. Crude palm oil is derived from the fruit of the oil palm tree and referred as "red palm oil" because of its rich dark red color in its unprocessed natural state, palm kernel oil is derived from the seed or the kernel of the palm fruit. Palm oil has a high resistance to oxidation and therefore has a long shelf life. Palm oil has for a long time been considered relatively low-value edible oil because of the difficulty in manipulating its fatty acid profile. Recent research has gradually upgraded this perception, and palm oil is now becoming a high-value niche product in the health food sector. Over 50 years ago, Nigeria held the top position as the world's largest palm oil producer with a

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robust global market share of more than 40%, contributing about 82% to the national export revenue. However, by 1966, Malaysia and Indonesia surpassed Nigeria as the world's leading producers and exporters supplying around 85% of palm oil products. It may be tempting to link the rise of Malaysia and Indonesia to World Bank funding. One year before they took over the top positions, the World Bank started playing a major role in supporting the expansion of the palm oil sector, injecting nearly $2bn over 45 projects in Southeast Asia, African countries, and parts of Latin America. Indonesia did receive the highest amount of project funding, receiving $618.8bn, but Nigeria, not Malaysia, was second receiving $451.5bn; Malaysia, came in third with $383.5bn in project funding. Increasing demand for Palm Oil is a major factor driving the growth of the market.

Based on the background of this study, the main aim is to investigate the influence of value chain on product innovation in palm oil industry in Anambra State. While the specific objectives are to examine the direct and combine effect of value chain dimension of customer focus, R&D management, process management and supply management on product innovation in palm oil industry.

2.0 **Background of Literature**

Value-chain analysis includes the whole cycle of the organization, production, and delivery of products from inception to use and recycling. It provides a tool for mapping these crucial domains of private and public policy. But, more than that, by focusing on the dynamic shifting of producer rents through the chain, on the processes whereby key actors provide governance to production that occurs on a global basis, value-chain analysis provides important insights into the policy challenges confronting both private and public actors.

Purnomo, et al (2018) describe value chain as the whole area of activities needed to deliver products or services to the end customer or beyond. Palm Oil Industry is a highly stratified value chain with distinct roles and responsibilities which provides livelihood for a large number of actors and having the capacity to employs a substantial number of the working population. Palm oil value chain encompasses all activities from input supply, actual production, value addition (processing), distribution (wholesale and retail) to the final consumers. Thus, it is the series of activities requisite in bringing merchandise or services from start, over the different production processes, supply to the final consumer and discarding after usage in the palm oil industry. These stratified units include: the palm oil, palm kernel, palm kernel oil, palm wine, brooms, baskets, biofuel, among others; its methods and processes involved in oil palm subunit produce processes.

The value chain in the palm oil consist of smallholder farmers form cooperative plantation, they produce and sell Fresh Fruit Bunches (FFB) under a cooperative scheme to the mill. The mill/processor extracts FFB to take out the palm oil. Then, the palm oil is processed by a refinery/intermediate to become Crude Palm Oil (CPO) and Crude Palm Kernel Oil (CPKO). Processors will be responsible for a further step to process those products into food (margarine and cooking

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oil) and energy (biodiesel) (Lestari, et al., 2013).

Falatehan & Setiawan (2020) investigated the Economic Risk Characteristics of an Indonesian Palm Oil Value Chain and Identifying Sources of Uncertainty in Policy Making. Oil palm plantations produce crude palm oil (CPO) used as raw material by downstream industries to provide many types of derivative products such as in food and oleo chemicals. Research found that some variables show elastic values represented by the world price of CPO, the export price of Indonesian CPO and the exchange rate to the export quantity of Indonesian CPO. Based on our simulation, the export tax policy of palm oil has caused negative impacts both to the small scale (farmers) and the big scale industries in the form of decreasing FFB price and exported quantity of CPO, respectively.

Purnomo, et al (2020). This study Reconciling oil palm economic development and environmental conservation in Indonesia: A value chain dynamic approach. Palm oil makes a significant contribution to the economies of Indonesia and Malaysia through private corporations, state-owned companies and smallholders, with the two countries supplying 85% of the global palm oil. This paper describes palm oil value chains in Indonesia at the national level, using value chain analysis and system dynamics modeling. The model is used to understand how the moratorium, peatland conservation, agrarian reform, and the EU biodiesel ban affect plantation expansion and production, employment, CO2 emissions, smallholder incomes, the private sector, and government. The model provides scenarios to make Indonesian palm oil more sustainable through intensification, no-deforestation, and no-peat strategies, as well as through land swapping. There are trade-offs between economic development and environmental conservation, but win-win solutions are available. Scenarios that build synergies between Indonesian palm oil development and forest conservation can help guide the new frontiers of oil palm development in Asia, South America, and Africa.

Rubinsin, et al (2020). Explored optimization of oil palm empty fruit bunches value chain in Peninsular Malaysia. Empty fruit bunches (EFB) are valuable palm oil mill waste that could be used to produce multiple products in the form of energy, chemicals, and materials. In this study, a decision-support tool is developed to perform economic and environmental analyses of the future expansion of the palm oil industry. The sequential steps in the modeling and optimization of the EFB value chain are discussed. This study consists of four processing stages: converting EFB into intermediates and products, transportation networks, direct sale of products, and further processing of products. The proposed tool includes a mathematical model that considers biomass production, transportation, and emission treatment costs from transportation and production activities. The model is solved with the Advanced Interactive Multidimensional Modeling System to determine the maximum profit and analyze biodiesel production. Peninsular Malaysia is selected as a case study. Results reveal the significant economic benefits of EFB utilization. The most profitable cases of EFB

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utilization are Case A, C, and D, which have the same 47 % profit margin. The maximum profit of the selected utilization pathways in Case A is USD 151,822,904 per year based on different ownerships of all EFB processed, which is 79 % lower than the result of a previous study that ignores the capacity limitations of the respective processing facilities. The environment–food–energy–water nexus is also elaborated in this study. The conclusions are obtained based on the limitation, availability, and parameters or data used in this study.

Purnomo, et al (2018) deliberated on reducing forest and land fires through good palm oil value chain governance. The research took a normative approach to understand whether the current palm oil value chain governance comply with the principle of good governance. The focus was on analyzing options to improve the current governance towards good governance, which is able to reduce fire uses. Focus group discussions, field interviews, and value chain analysis were used. Study found that the palm oil economy distributed enormous value added to those participating in the chain. However, the fire uses in land preparation can be altered by using coercion, dis(incentives) and dominant information that held by district and central governments, growers and mil. The potential benefits from green products, a strengthened growers' association, moving up scenarios can be used to compensate the ‘benefits’ of using fire. Lessons learnt from the palm oil commodity chain in Indonesia, when the economy and the environment are contested, can be used by other countries to reach towards their SDGs.

Trienekens and van Dijk, (2011). This study presents seven case studies of global value chains and two theoretical chapters concerning these chains, plus an introductory chapter. The book explores the following issues: impact of global value chains on local upgrading strategies, the role of governance structures shaping global value chains and the role of buyers in creating, monitoring and enforcing commodity specifications and of international standards in shaping the patterns of chain governance. It also looks at the role of donors, governmental organizations, and civil society in influencing value chains and the importance of partnerships as mechanisms for value chain upgrading

Ajani, Onwubuya and Nwalieji (2012) assessed of oil palm production and processing among rural women in Enugu North agricultural zone of Enugu State, Nigeria. Data for the study was collected from a sample of one hundred (100) respondents through the use of interview schedule. Descriptive statistics such as percentage, mean score and standard deviation were used for presenting the data. The duration of the study was April 2010 and February 2011. Benefits derived from oil palm processing include: additional income (98.4%), purchase of household basic needs (90.1%), payment of children school fees (82.6%), among others. This will in turn increase productivity.

3.0 Materials and Methods

Anambra state is located in the south-eastern part of Nigeria and comprises 21 Local Government Areas. The state is subdivided into four (Onitsha, Aguata, Awka, and

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Anambra) agricultural zones to aid planning and rural development; with twenty (20) local governments registered with the Palm Oil Growers Association Anambra State Chapter. This gives a population of two hundred and sixty-five (265 Growers) registered. The study adopted the cross-sectional survey research design. While the sample size of 265 SMEs Palm Oil Growers were selected based on purposive sampling technique. Value chain (independent variable) dimension (customer focus, R&D management, process management and supply management) were measured using a five-point Likert scale questionnaire adapted from the works of Obigbemi (2015) containing 22 items (customer focus-5 items, R&D management-4 items, process management-4 items & supply management-4 items). Product innovation (dependent variable) was measured as a one-dimensional variable using a five-point Likert scale questionnaire adapted from the works of Santos and Brito (2012) containing 5 items.

The questionnaire was subjected to validity and reliability tests using the average variance extracted (AVE), convergent and discriminant validity and the results of the tests were reported in the next section. Copies of the questionnaire were self-administered to Palm Oil Growers in Anambra State. The study applied the partial least square-structural equation modelling (PLS-SEM) to analyze the data collected from the respondents. The choice of this technique is based on the fact that it absorbs distributional assumption (i.e normality) otherwise required when the ordinary least square (OLS) regression were to be applied. The model for the PLS-SEM is depicted pictorially below:

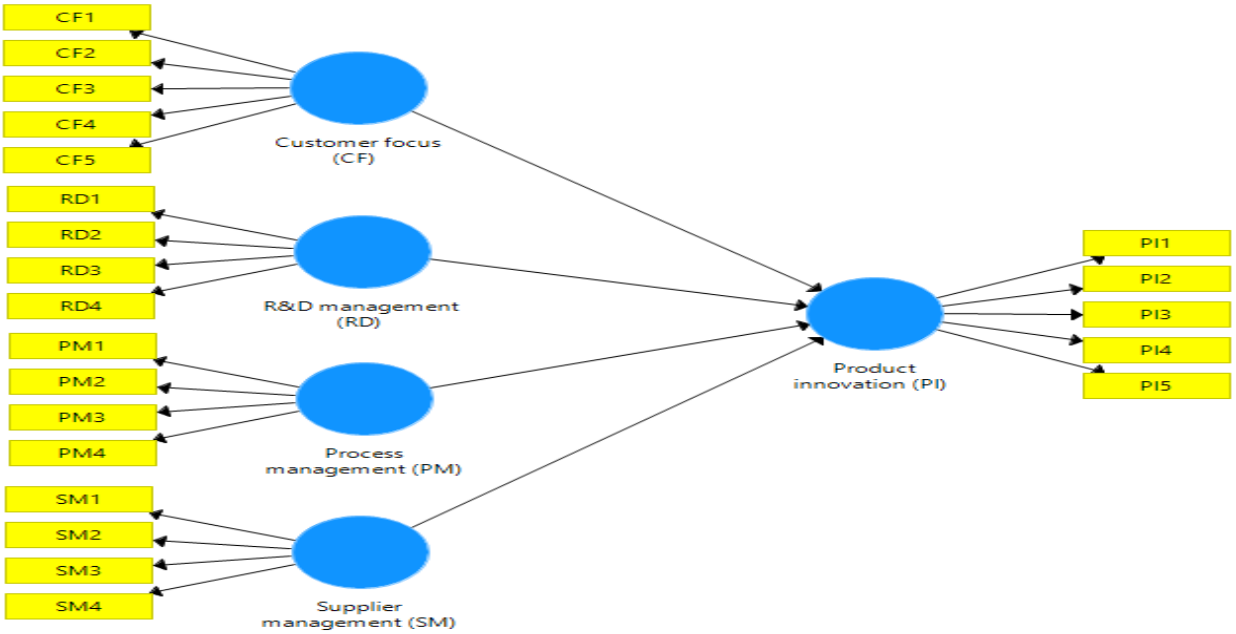


Fig. 1: Conceptual model of the effect of value chain on Product innovation in palm oil industry in Anambra.

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4.0 RESULTS AND DISCUSSIONS

Table 1: *Response Rate*

Category	Frequency	Percentage
Distributed copies of questionnaire	265	100%
Returned copies of questionnaire	243	92%
Unreturned copies of questionnaire	22	8%
Unusable copies of questionnaire	42	16%
Usable copies of questionnaire	201	76%

Source: SmartPLS Output, 2022

As detailed in Table 1, the final usable response rate is 76percent. A 30 percent response rate is acceptable for surveys (Hair *et al.*, 2010). Thus, by complying with the recommended suggestions, the available 201 responses (76percent) qualify the required sample size to further conduct regression analysis.

Table 2 Descriptive Statistics for the Study Variables

Variables	N	Mean	Std. Deviation
Customer focus	201	3.963	0.518
R&D management	201	4.033	0.484
Process management	201	3.899	0.542
Supply management	201	4.023	0.435
Product innovation	201	2.845	0.724

Source: Smart PLS Output, 2022

Based on the descriptive analysis of the constructs presented in table 2, the overall situation with regards to the relationship between value chain, supply management and Product innovation among the Palm Oil Growers in Nigeria could be understood. From the findings generated in Table 2, the mean score reported for the value chain dimensions ranged from 3.899 (process management) to 4.033 (R&D management), revealing that the value chain among Palm Oil Growers in Nigeria is relatively high. The highest mean score reported among the value chain dimensions is R&D management, with standard deviation value reported at 0.484. This implies that most of the Palm Oil Growers have the tendency to prefer R&D management to bulk contribution due to their previous difficulties experience. Meanwhile, the mean score reported of process management is the lowest among value chain dimensions, with standard deviation value reported at 0.542. This implies that process management is less utilized by Palm Oil Growers in raising funds, is the weakest among the four value chain dimensions. Nevertheless, the mean score of 3.899 reported of process management is still well above average, which indicates that process management are still implemented at a strong level among the Palm Oil Growers in Nigeria.

Assessment of Measurement Model

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This study used PLS Structural Equation Modelling (SEM) to calculate its theoretical model using the software application Smart PLS (Hair *et al.*, 2013). In PLS analysis, the first step is to evaluate the measurement model, or the outer model. The measurement model assessment includes defining reliability of individual item, reliability of internal consistency, convergent validity and validity of discriminant (Hair *et al.*, 2013).

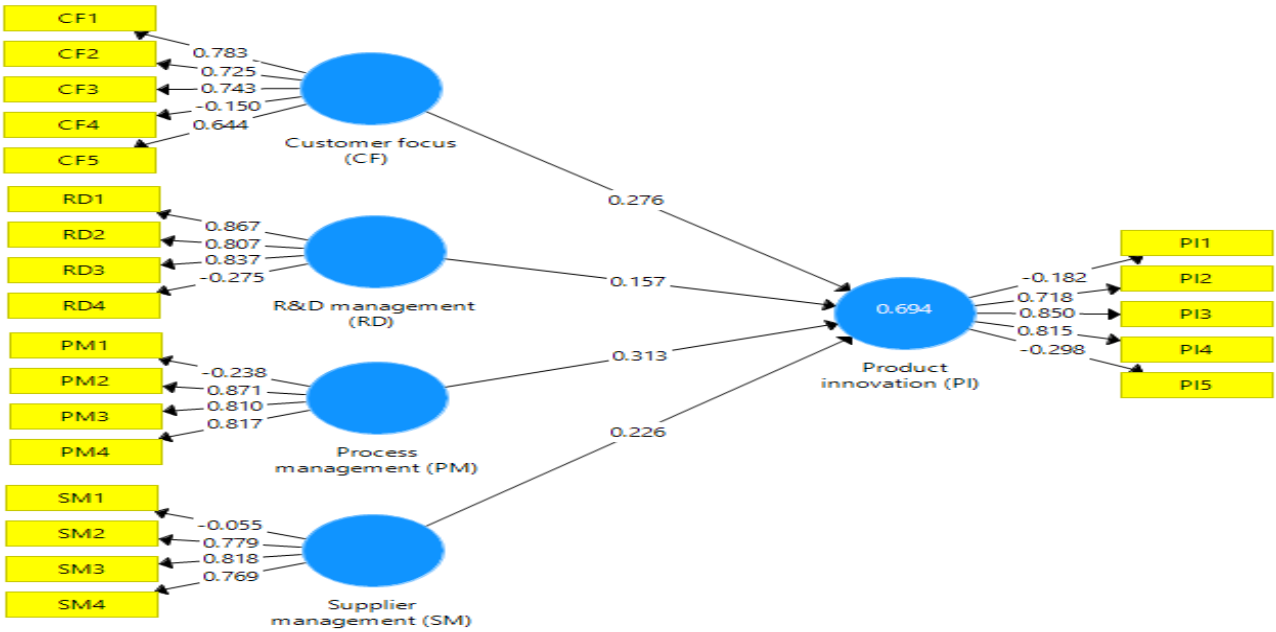


Figure 2: Initial *Measurement Model*

The figure 2 above shows the initial measurement model. It can be seen that not all the outer loadings of each variable's measure items meet up with the Hair *et al.* (2014) recommendation of 0.70 or above. Six items did not load up to 0.7, that is 1 measurement items of customer focus, 1 measurement items of R&D management, 1 measurement item of process management, 1 measurement items of supply management and 2 measurement items of Product innovation.

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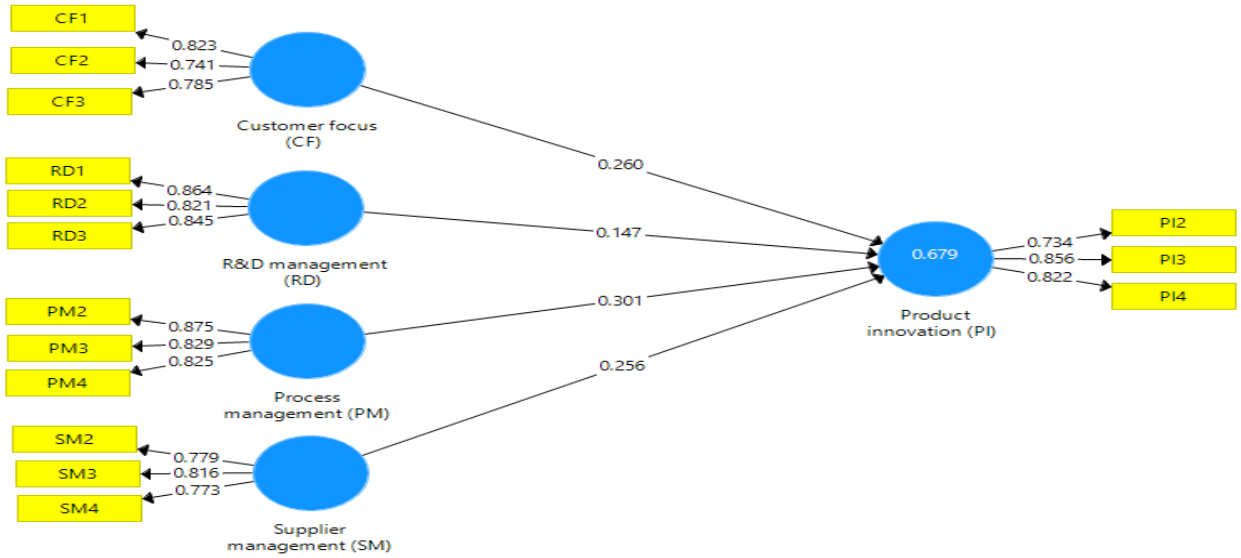


Figure 3: *Modified Measurement Model*

The figure 3 above shows the modified measurement model. It can be seen that all the outer loadings of each variable's measure items meet up with the Hair *et al.* (2010) recommendation of 0.70 or above.

Individual Item Reliability

The first criterion for the reflective measurement model is the assessment of individual item reliability which is usually measured by assessing the outer loadings of each variable's measure (Hair *et al.*, 2013). Based on Hair *et al.* (2013) rule of thumb, an indicator with 0.70 outer loading is reliable and acceptable for previously developed scale.

Table 3 and figure 3 show that after deleting 6 items, had outer loading values of 0.70 and above. Based on the suggestions of Hulland (1999) and Hair, *et al.* (2011) to delete items that substantially increase composite reliability and average variance extracted (AVE), only 6 outer loading items that had below 0.70 loadings was dropped, making it 15 items retained for further analysis (refer to Figure 3 above and table 3 below).

Table 3 Measurement Model: Reliability and Convergent Validity

Construct	Item	Loadings	AVE	CR
Product innovation	PI2	0.734	0.649	0.847
	PI3	0.856		
	PI4	0.822		
R&D management	RD1	0.864	0.712	0.881
	RD2	0.821		
	RD3	0.842		

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Process management	PM2	0.875	0.711	0.881
	PM3	0.829		
	PM4	0.825		
Customer focus	CF1	0.823	0.614	0.827
	CF2	0.741		
	CF3	0.785		
Supply management	SM3	0.779	0.623	0.832
	SM4	0.816		
	SM5	0.773		

Source: Smart PLS Output, 2022

Multi-collinearity Test

Multi-collinearity is a problem that occurs when the independents variables are extremely interrelated to as high as 0.9 and above (Tabachnick & Fidell, 2007). For this study Multicollinearity test was conducted using correlation matrixes for the independent variables, tolerance values and variance inflation factors (VIF). According to Hair, Hult, Ringle and Sarstedt (2014), a tolerance level of 0.20 and below or a VIF value of 5 and above indicates the presence of multi-collinearity among variables. From the Table 4 it clearly shows that tolerance ranges between 0.311 – 0.439 considerably > 0.20. Similarly, VIF ranges from 1.709 – 2.730, and, thus, is good enough as being < 5. Consequently, it is concluded that there is no multi-collinearity problem among the exogenous variables.

Table *4* Multicollinearity Test*:* Tolerance and VIF (n=201)

Exogenous Variables	**Collinearity Statistics**	
	Tolerance	**VIF**
Customer focus	0.379	1.709
R&D management	0.311	2.730
Process management	0.439	2.452
Supply management	0.326	2.652

Source: Smart PLS Output, 2022

Assessment of the Structural Model

Having confirmed that this study's measurement models (inner model) are reliable and valid, this section evaluated the structural model. This research used the standard bootstrapping technique with a number of 5000 bootstrap samples and 201 cases to evaluate significance of the path coefficients (Hair *et al.*, 2013). The structural model of this study is composed of five latent constructs, namely; customer focus, R&D management and process management as independent variables and Product innovation as the dependent variable (see Figure 4). The structural model usually confirms the level to which the empirical data collected support the existing theories (Hair *et al.*, 2014). That is, its evaluation is mainly used to determine the explanatory power of the research model and to test the developed hypotheses. Hair *et al.* (2014) recommended that the structural model can be generally assessed through test

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for collinearity issues, significance of relationships among the constructs, evaluation of the R^2, effect sizes and assessment of the predictive relevance Q^2. Notably, the key assessment tests of the structural model are the R^2 values of endogenous constructs and the level and significance of the path coefficients.

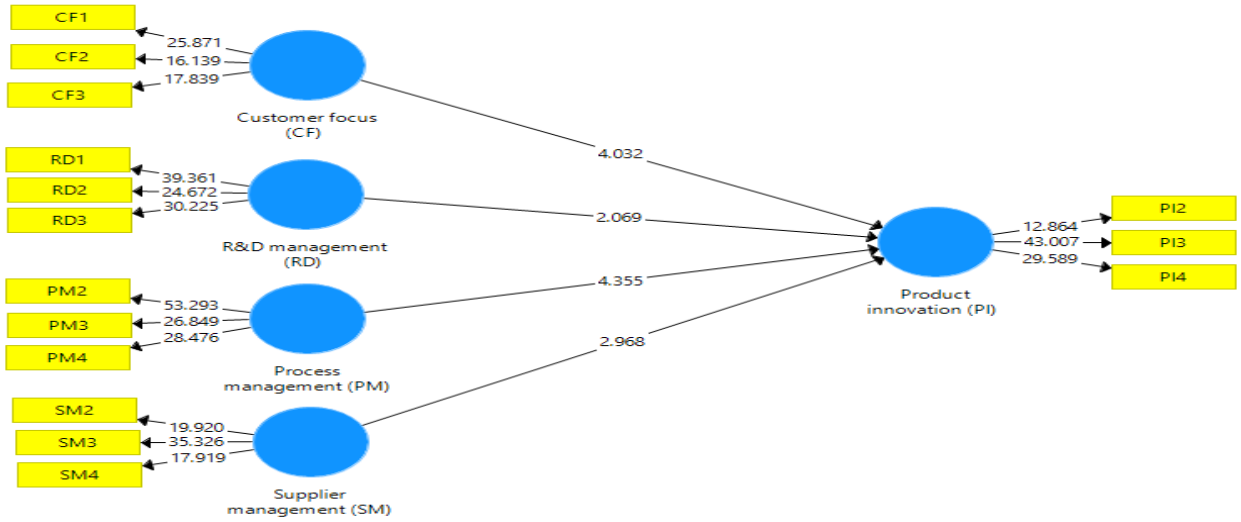


Figure 4: *Bootstrapping (Direct Relationships)*

Table 5 Structural Model: Test of Significance for Direct Relationships

H_0	Relationship	Beta	SE	T Statistics	P-Value	Statistically Significant	Decision
$H0_1$	CF -> PI	0.26	0.064	4.032	0.000	Yes	Rejected
$H0_2$	RD -> PI	0.14	0.071	2.069	0.039	Yes	Rejected
$H0_3$	PM -> PI	0.30	0.069	4.355	0.000	Yes	Rejected
$H0_4$	SM -> PI	0.26	0.086	2.968	0.003	Yes	Rejected

t- Value >; 1.96; p-value < 0.05; CF = Customer focus, RD = R&D management, PM = Process management, SM = Supply management and PI = Product innovation
Source: Smart PLS Output, 2022

The result of bootstrapping has shown that H_{01}, H_{02} and H_{03} are statistically significant and the relationship is positive. From the Table 5, the statistical analysis has proved that customer focus is significantly affects Product innovation (β= 0.26, T Statistics >

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1.96), R&D management significantly affects Product innovation (β= 0.14, T Statistics > 1.96), process management also significantly affects Product innovation (β= 0.30, T Statistics > 1.96) and supply management significantly affects Product innovation (β= 0.26, T Statistics > 1.96). In summary, all the direct relationships between the independent variables and dependent variable are all significant based on the statistical data of this study and all the four null hypotheses were rejected while the four alternate hypotheses were accepted.

Predictive Relevance for Direct Relationships

The predictive power (Q^2 values) of each exogenous variable on the endogenous variables was computed using the suggestions of Stone (1974) and Geisser (1974) through blindfolding procedures (Chin, 2010; Hair, *et al.*, 2014) (see Figure 6). According to Chin (2010) the value of Q^2 of a particular construct greater than zero indicates that the model has properly reproduced the manifest values specifying its predictive relevance.

Table 6 Predictive Relevance Q^2 Value for Direct Relationships

Endogenous Construct	SSO	SSE	Q^2 (=1-SSE/SSO)
Product innovation	603.000	349.127	0.421

Source: Smart PLS Output, 2022

The predictive relevance of this model was assessed for the endogenous variable (i.e. Product innovation that was reflectively measured using the blindfolding procedures following the suggestions of scholarly experts (Chin, 2010; Hair, *et al.*, 2012). The Q^2 result of Product innovation as shown in Table 6 above was 0.421. This value is above the threshold value of zero, confirming the predictive power of the model.

R-Squared Coefficient of determination for Direct Relationship

The determination of the coefficient R^2 provides the percentage of variation in exogenous variable explained by endogenous variables (Chin, 2010). Moreover, R^2 represents the level of latent variables explained variance and consequently measures the regression function (Hair et al., 2019). Its value essentially ranges from 0 to 1. Essentially, the value of R^2 varies according to the number of measuring exogenous variables, i.e. a higher number of such variables mostly produce a higher value of R^2 and vice-versa. According to Wong (2019), models having R^2 as 0.67, 0.33 and 0.19 are considered as significant, moderate and weak respectively. In this case, if the inner path model structures explicate endogenous latent variables by a few (e.g. one or two) exogenous latent variables, moderate R^2 would be acceptable (Wong, 2019). If there are a good number of exogenous variables then the value of R^2 must exhibit a significant level.

Table 4.11 Coefficient of Determination for Direct Relationships: R-Squared

Construct	R-Squared Value (R^2)
Product innovation	0.679

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As shown in Table 4.11, the exogenous latent constructs of this study (i.e customer focus, R&D management, process management and supply management) explain 67.9 percent variance of product innovation. Following Wong (2019) recommendation, the R^2 value explained by the exogenous constructs on the endogenous construct in their direct relationships is significant.

5.0 CONCLUSION AND RECOMMENDATIONS

The primary objective of this study is to investigate the effect of value chain on Product innovation in palm oil industry in Anambra. The empirical findings supported all the hypotheses developed; thereby answering all the research questions and also supported the key theoretical positions upon which this study has been drawn. In addition, the research findings are consistent with a number of previous empirical studies conducted in the domain of current research underpinning theory. More specifically, the study concludes that there is positively and significant effect of customer focus on Product innovation, R&D management on Product innovation, process management on Product innovation and supply management on Product innovation implying that value chain will affect Product innovation positively.

Based on the findings, the following recommendations are made:

i. Customer focus was found to have significant positive effect on Product innovation in palm oil industry in Anambra. Based on this finding, this study recommends that Palm Oil Growers should engage actively in customer focus. This will help them to easily improve their product innovation which will in turn lead to performance of their firms.

ii. R&D management was found to have significant positive effect on Product innovation in palm oil industry in Anambra. Based on this finding, this study recommends that Palm Oil Growers should engage actively in R&D management. This will help them to easily improve their product innovation which will in turn lead to performance of their firms.

iii. Process management was found to have significant positive effect on Product innovation in palm oil industry in Anambra. Based on this finding, this study recommends that Palm Oil Growers should engage actively in process management. This will help them to easily improve their product innovation which will in turn lead to performance of their firms.

iv. Supply management was found to have significant positive effect on Product innovation in palm oil industry in Anambra. Based on this finding, this study recommends that Palm Oil Growers should engage actively in borrowing from supply management. This will help them to easily improve their product innovation which will in turn lead to performance of their firms.

REFERENCE

Ajani, E. N., Onwubuya, E. A., & Nwalieji, H. U. (2012). Assessment of oil

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DOI: https://10.57233/gujeds.v3i1.22 Vol. 3(1) July 2023

palm production and processing among rural women in Enugu North agricultural zone of Enugu State, Nigeria. *International Journal of Agricultural Sciences*, *2*(12), 322-329.

Akhaine, S. O. (2017). Background review. Oil palm plantations in forest landscapes: impacts, aspirations and ways forward in Nigeria, 32.

Brandão, F., & Schoneveld, G. (2015). *The state of oil palm development in the Brazilian Amazon: Trends, value chain dynamics, and business models* (Vol. 198). CIFOR.

Falatehan A.F., Setiawan B.I. (2020) Economic Risk Characteristics of an Indonesian Palm Oil Value Chain and Identifying Sources of Uncertainty in Policy Making. In: Anbumozhi V., Kimura F., Thangavelu S. (eds) Supply Chain Resilience. Springer, Singapore. https://doi.org/10.1007/978-981-15-2870-5_5

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Thousand Oaks: Sage Publications.

Hair, J. F., Jr., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2019). *Multivariate Data Analysis (7th edition)*: Upper Saddle River, N.J: Pearson Prentice Hall.

Hair, J. F., Ringle, C. M. & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. *Journal of Marketing Theory and Practice*, 18, 139-152.

Henseler, J., Ringle, C. M. & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In R. R. Sinkovics & P. N. Ghauri (Eds.), *Advances in International Marketing*, 20, 277-320. Bingley: Emerald.

Lestari, F., Ismail, K., Hamid, A. B., & Sutopo, W. (2013). Logistic of Palm Oil Industry in Agricultures Supply Chain Using Simulation Softaware: State of the Art and Research Directions. *Journal Heading Tear Vol DOI: 10.5923/j. xxx*, 153-1888.

Onuchuwu B, 2015. Anambra releases land to grow palm trees. Daily Trust, 23 July. www.dailytrust.com.ng/ news/agriculture/anambra-releases-l

Phoochinda, W. (2020). Assessment of Social Return on Investment from the Utilisation of Oil Palm'S Residues. *Journal of Oil Palm Research*, *32*(1), 145-151.

PIND (Foundation for Partnership Initiatives in the Niger Delta). (2011). A Report on Palm Oil Value Chain Analysis in the Niger Delta.

Purnomo, H., Okarda, B., Dermawan, A., Ilham, Q. P., Pacheco, P.,

ISSN: 2786-9695
DOI: https://10.57233/gujeds.v3i1.22 **Vol. 3(1) July 2023**

Nurfatriani, F., & Suhendang, E. (2020). Reconciling oil palm economic development and environmental conservation in Indonesia: A value chain dynamic approach. *Forest Policy and Economics*, *111*, 102089.

Purnomo, H., Okarda, B., Dewayani, A. A., Ali, M., Achdiawan, R., Kartodihardjo, H., ... & Juniwaty, K. S. (2018). Reducing forest and land fires through good palm oil value chain governance. *Forest policy and economics*, *91*, 94-106.

Purnomo, H., Okarda, B., Dewayani, A. A., Ali, M., Achdiawan, R., Kartodihardjo, H., ... & Juniwaty, K. S. (2018). Reducing forest and land fires through good palm oil value chain governance. *Forest policy and economics, 91*, 94-106.

Rubinsin, N. J., Daud, W. R. W., Kamarudin, S. K., Masdar, M. S., Rosli, M. I., Samsatli, S., & Lim, K. L. (2020). Optimization of oil palm empty fruit bunches value chain in Peninsular Malaysia. *Food and Bioproducts Processing*, *119*, 179-194.

Santos, J. B., & Brito, L. A. (2012). Toward a subjective measurement model for firm performance. *BAR-Brazilian Administration Review, 9, 95-117.*

Trienekens, J., & van Dijk, M. P. (2011). *Global value chains: Linking local producers from developing countries to international markets* (p. 280). Amsterdam University Press.

Wood, B. A., Blair, H. T., Gray, D. I., Kemp, P. D., Kenyon, P. R., Morris, S. T., & Sewell, A. M. (2014). Agricultural science in the wild: A social network analysis of farmer knowledge exchange. *PLOS One, 9(8), e105203.doi:10.1371/journal.pone.0105203*