EFFECT OF PRODUCT DEVELOPMENT ON CUSTOMER LOYALTY IN PAN NIGERIA LIMITED, KADUNA, NIGERIA

[1]MOHAMMED Jere Yahaya & [2]IGOMU Drisu Mathias, Ph.D
[1,2&3]Department of Business Administration, Nasarawa State University, Keffi

Abstract
Customer loyalty is a critical driver of organizational sustainability in today's competitive business environment, as it ensures repeat patronage and long-term profitability. This study investigates the effect of product development dimensions—product quality, size, line, and design—on customer loyalty in PAN Nigeria Limited, Kaduna. Employing a quantitative research design, the study utilized a structured questionnaire to gather primary data from 384 conveniently selected customers. Data was analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM), which enabled the evaluation of the hypothesized relationships. The findings reveal that product size and product design significantly and positively affect customer loyalty, indicating that flexible sizing options and innovative designs play pivotal roles in retaining customers. Conversely, product quality, though central to customer expectations, showed a less significant impact, suggesting the need for complementary factors like brand perception and pricing. Similarly, product line expansion exhibited an insignificant effect on loyalty, underscoring that customers may prioritize specific core offerings over broad product diversity. To foster customer loyalty comprehensively, the study recommended that PAN Nigeria Limited should integrate a customer-centric product development strategy. This can be achieved by aligning product features with customer preferences through regular feedback, rigorous market analysis, and continuous innovation.
Keywords: Product development, Customer loyalty.

INTRODUCTION

Product development is a critical facet of modern business, serving as a cornerstone for organizational growth, competitive advantage, and customer loyalty. Globally, the imperative for innovative product development has become more pronounced due to the rapidly evolving technological landscape, dynamic customer preferences, and the increasing competition in virtually every industry. In advanced economies, organizations consistently allocate substantial resources to research and development (R&D) to design and launch new products or improve existing ones. Successful product development strategies enable firms to meet emerging market demands, strengthen brand equity, and enhance customer loyalty. For example, companies such as Apple, Toyota, and Procter & Gamble have leveraged robust product development frameworks to maintain industry leadership and foster enduring relationships with their customers.

In Kaduna State, one of Nigeria's industrial hubs, companies such as PAN Nigeria Limited play a pivotal role in driving economic growth through localized product development initiatives. As a leading automobile assembly plant in the country, PAN Nigeria Limited's focus on product development aligns with the need to address local preferences while ensuring quality, affordability, and sustainability. The company's strategies underscore the broader relevance of product development in fostering customer loyalty and market penetration in Kaduna and beyond.

Nwoka et al. (2009) identify four key dimensions of product development—product quality, product size, product lines, and product design—as veritable variables that influence organizational success. Product quality refers to the overall excellence and reliability of a product in meeting customer expectations. It involves factors such as durability, functionality, and consistency, which collectively determine the perceived value of the product. Product size pertains to the physical dimensions or volume of a product, designed to cater to varying customer needs and preferences. For instance, offering different packaging sizes allows businesses to target diverse market segments effectively. Product lines refer to the range of related products a company offers under a single brand, enabling customers to choose from a variety of options while enhancing brand loyalty. Lastly, product design involves the aesthetic and functional aspects of a product, including its appearance, usability, and ergonomic features, which contribute to customer satisfaction and differentiation in competitive markets.

Customer loyalty, a fundamental goal of marketing and business strategy, reflects a customer's consistent preference for a specific brand or company's products and services over competitors. It is a multifaceted construct influenced by factors such as satisfaction, trust, perceived value, and emotional connection. Loyal customers not only ensure repeat business but also serve as brand advocates, recommending the company's offerings to others and contributing to positive word-of-mouth marketing. According to Kotler and Keller (2016), customer loyalty extends beyond transactional behavior to encompass attitudinal commitment, wherein customers develop a deep-rooted affinity for the brand. In today's hyper-competitive business environment, cultivating customer loyalty is vital for sustained profitability, as it is significantly more cost-effective to retain existing customers than to acquire new ones. Moreover, loyal customers are less sensitive to price changes and more likely to provide constructive feedback, enabling companies to refine their products and services.

The relationship between product development and customer loyalty is a symbiotic one. Product development serves as a powerful tool for enhancing customer loyalty, while customer loyalty, in turn, provides valuable insights that inform future product development efforts. At its core, product development is about creating value for customers by delivering products that meet their needs, preferences, and expectations. When customers perceive that a company is committed to innovation and continuous improvement, they are more likely to remain loyal to the brand.

Statement of the Problem

The relationship between product development and customer loyalty is inherently symbiotic, as each influences the other in a continuous cycle of mutual reinforcement. Effective product development enhances customer satisfaction and fosters loyalty by addressing evolving needs, preferences, and market dynamics. Conversely, loyal customers provide valuable insights and feedback that guide future product innovations, ensuring sustained relevance and competitiveness. Despite this well-established link, this study has observed that PAN Nigeria Limited has not fully tapped into the potential benefits of product development. This shortfall has resulted in frequent customer switches, a phenomenon that mirrors the broader trends in the Nigerian business environment, as opined by Ejika et al. (2022) and Nwoka et al. (2009). Inadequate attention to key aspects of product development, such as product quality, size, design, and lines, has left the company vulnerable to losing customers to competitors who better cater to local preferences and expectations. This situation underscores the pressing need for a deeper exploration of how targeted product development strategies can enhance customer loyalty in the context of PAN Nigeria Limited.

Previous studies, such as Gojali (2021) and Kusuman (2014), have extensively highlighted the importance of product development in organizational settings. These works emphasize the critical role of innovation, quality, and design in driving customer satisfaction and loyalty. However, their findings may have been rendered less relevant over time due to shifts in market dynamics, technological advancements, and the unique challenges of specific business environments. Additionally, the methodological approaches adopted in these studies often fail to account for the distinctions of the Nigerian market. This environmental dichotomy and methodological gap necessitate a current study to provide fresh insights into the interplay between product development and customer loyalty.

Research Objectives

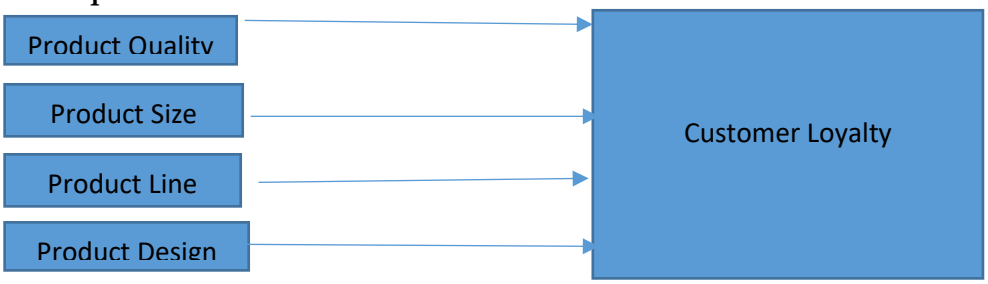
The main objective of this study is to evaluate the effect of product development on customer loyalty in PAN Nigeria Limited, Kaduna, Nigeria, however, the specific objectives are to;

(i) examine the effect of product quality on customer loyalty in PAN Nigeria Limited, Kaduna Nigeria.
(ii) assess the effect of product size on customer loyalty in PAN Nigeria Limited, Kaduna Nigeria.
(iii) investigate the effect of product lines on customer loyalty in PAN Nigeria Limited, Kaduna Nigeria.

(iv) Dissect the effect of product design on customer loyalty in PAN Nigeria Limited, Kaduna Nigeria.

LITERATURE REVIEW

Conceptual Framework



Concept of Product Development

Product development has been conceptualized as a multifaceted process that involves designing, creating, and launching new or improved products to meet market demands and enhance organizational competitiveness. Scholars in recent years have emphasized various dimensions of product development, reflecting its dynamic and evolving nature. According to Johnson and Chang (2017), product development is a systematic approach to identifying customer needs, translating them into product features, and deploying these solutions in ways that align with organizational goals. This definition highlights the integration of customer-centricity and strategic alignment as essential components of product development.

Similarly, Alston et al. (2018) define product development as the process of innovation and refinement through which organizations seek to differentiate themselves in competitive markets. This definition underscores the innovative aspect of product development, positioning it as a tool for achieving a sustainable competitive advantage. Moreover, Adekunle and Abubakar (2019) describe product development as an iterative process that incorporates market research, prototyping, and continuous improvement to create value for both the organization and its customers. Their perspective emphasizes the iterative nature of product development, suggesting that it is not a one-time endeavor but a continuous cycle of improvement.

Martins et al. (2020) view product development as a collaborative effort that involves cross-functional teams working together to bring products from conception to commercialization. This definition highlights the importance of teamwork and collaboration across various organizational units in achieving product development goals. Okeke and Ibe (2022) conceptualize product development as an adaptive strategy that responds to market trends, technological advancements, and customer expectations, thereby ensuring organizational relevance in dynamic environments. Their perspective introduces adaptability as a key element of product development, reflecting the need for businesses to remain agile in the face of changing market conditions.

Scholars have identified various dimensions of product development, each contributing to the overall success of the process. For instance, Smith and Johnson (2018) emphasize the importance of market analysis, design, quality, prototyping, size and testing as key components of product development. Similarly, Lee et al. (2020) highlights the iterative nature of the process, involving continuous innovation, product lines and strategic planning. Patel and Singh (2019) focus on the multidisciplinary approach, involving collaboration among various stakeholders such as engineers, marketers, and customers. Additionally, Zhang et al. (2021) underscore the role of advanced technologies, such as artificial intelligence and machine learning, in enhancing the efficiency and effectiveness of product development. However, this study primarily focuses on the work of Nwoka et al. (2009), who identified four critical dimensions of product development: product quality, product size, product lines, and product design. These dimensions are considered the most veritable variables that significantly influence the success of

product development and, by extension, customer loyalty. The following sections provide detailed definitions of these variables, drawing on the insights of Nwoka et al. (2009) and other relevant scholars.

Product Quality

Product quality has been defined by various scholars as the extent to which a product meets or exceeds customer expectations in terms of performance, durability, and reliability. Smith and Taylor (2017) define product quality as the degree of excellence inherent in a product, determined by its ability to satisfy stated or implied needs. This definition underscores the subjective nature of quality, as it is largely dependent on customer perceptions. Meanwhile, Jamal et al. (2018) describes product quality as the sum of attributes and characteristics that make a product fit for its intended purpose. This perspective emphasizes functionality and usability as core components of quality.

Further, Goyal and Mehta (2019) argue that product quality encompasses both tangible and intangible elements, including design, material, and brand reputation, that collectively influence customer satisfaction. Their definition broadens the scope of quality to include non-physical aspects that shape customer experiences. Oluwaseun and Fatima (2021) define product quality as a multidimensional construct that reflects the interplay of manufacturing standards, product design, and customer expectations. This definition highlights the interconnected nature of various factors that contribute to the overall perception of quality.

Product Size

Product size refers to the physical dimensions, volume, or packaging of a product, tailored to meet diverse customer needs and preferences. According to Tanaka et al. (2018), product size is a strategic element of product development that influences customer convenience and satisfaction. Their definition aligns product size with its practical implications for storage, transportation, and usage. Similarly, Kusi and Boateng (2019) define product size as a variable designed to offer customers choices that align with their consumption patterns and purchasing power. This perspective underscores the role of size in catering to diverse market segments.

Furthermore, Bamidele and Adeniran (2020) describe product size as a marketing tool used to segment customers based on preferences for quantity or volume, thereby enhancing market reach. This definition situates product size within the broader framework of market segmentation strategies. Lastly, Ortega et al. (2021) conceptualize product size as an adaptive response to customer feedback and market trends, ensuring that products remain relevant and competitive. Their perspective highlights the dynamic nature of size as a variable that evolves with customer demands.

Product Lines

Product lines refer to a group of related products offered by a company under a single brand, designed to cater to different customer needs within the same market category. Roberts and Green (2017) define product lines as a collection of complementary products that share common features, branding, and positioning, aimed at maximizing customer choice and organizational revenue. This definition emphasizes the strategic role of product lines in enhancing customer loyalty through increased variety.
Chukwu and Adebayo (2018) describe product lines as a structured approach to product diversification, enabling firms to target specific market niches while leveraging existing brand equity. This definition aligns product lines with diversification strategies aimed at reducing market risks. Moreover, Karanja and Mwangi (2019) argue that product lines create opportunities for cross-selling and up-selling, as customers often prefer to purchase products from brands they already trust. Their perspective highlights the synergistic effects of product lines on customer relationships.

Han and Kim (2021) conceptualize product lines as a dynamic portfolio that evolves in response to technological advancements and shifting consumer preferences. This definition underscores the need for continuous innovation and adaptation within product lines to maintain market relevance.

Product Design

Product design refers to the aesthetic and functional attributes of a product that enhance its usability, appeal, and marketability. According to Evans and Carter (2018), product design is the process of creating products that are visually appealing, user-friendly, and aligned with brand identity. Their definition emphasizes the dual importance of aesthetics and functionality in driving customer satisfaction. Similarly, Obiora and Nnadi (2019) define product design as a creative process that integrates customer insights, technological advancements, and ergonomic principles to deliver superior products. This perspective highlights the interdisciplinary nature of design as a variable of product development. Further, Singh and Patel (2020) describe product design as a competitive tool that differentiates a company's offerings in saturated markets, fostering brand loyalty and customer retention. Their definition situates design within the broader context of competitive strategy. Finally, Arjun and Priya (2022) conceptualize product design as a blend of form and function that addresses both emotional and practical customer needs. This definition captures the holistic nature of design as a key determinant of product success.

For the purposes of this study, product development is defined as an adaptive, iterative process involving innovation, quality enhancement, and strategic alignment to create products that meet customer needs and drive organizational growth (Adekunle & Abubakar, 2019). This definition is adopted due to its comprehensive nature, encompassing the core elements of innovation, quality, and customer-centricity. It aligns closely with the objectives of this study, which seeks to explore how product development strategies can enhance customer loyalty at PAN Nigeria Limited.

Concept of Customer Loyalty

Customer loyalty is a fundamental concept in business and marketing, representing the extent to which a customer consistently prefers and supports a brand or company over its competitors.

Oliver (2019) defines customer loyalty as "a deeply held commitment to rebuy or repatronize a preferred product or service consistently in the future, despite situational influences and marketing efforts that could cause switching behavior." This definition underscores loyalty as both a behavioural outcome and an emotional attachment, where customers resist external pressures to switch brands.

Kotler and Keller (2020) conceptualize customer loyalty as the "result of consistently positive emotional experiences, physical attribute-based satisfaction, and perceived value of an experience, which include product or service attributes." Here, the definition highlights the interplay between satisfaction and loyalty, emphasizing how customer perceptions shape repeat patronage.

Reichheld (2018) approaches loyalty through the lens of advocacy, defining it as "the willingness of customers to recommend a company's products or services to others." This perspective links loyalty to word-of-mouth behavior, suggesting that loyal customers are also brand advocates.

In their study, Kumar and Kaushik (2021) describe customer loyalty as "the enduring preference and patronage exhibited by customers based on their satisfaction and trust in the company's offerings." This definition emphasizes trust as a critical antecedent of loyalty, reflecting the relational dynamics between businesses and their customers.

Dick and Basu (2017) present a framework that combines attitudinal and behavioral components. They define loyalty as "the strength of the relationship between relative attitude and repeat patronage." This definition highlights the dual dimensions of loyalty, where both positive attitudes and frequent purchases are necessary to classify a customer as truly loyal.

Zhang et al. (2022) offer a technology-focused perspective, arguing that customer loyalty in digital contexts is "the persistent preference for a platform or service, shaped by the user experience, perceived

trustworthiness, and ongoing engagement strategies." Their definition reflects the increasing role of digitalization in cultivating loyalty, especially in e-commerce and online services.

Similarly, Cheng and Wang (2020) conceptualize loyalty as "a multi-dimensional construct that includes cognitive, emotional, and conative elements, manifesting in repeat purchases and advocacy behavior." Their definition aligns with modern customer behavior theories, acknowledging that loyalty extends beyond simple repeat buying to include emotional engagement and brand advocacy.

Alvarez and Galan (2019) emphasize experiential dimensions, defining loyalty as "consistent repeat purchase behavior driven by exceptional customer experiences, emotional connection, and perceived exclusivity." Their work highlights the role of customer experiences in building lasting relationships.

For the purpose of this study, the definition by Oliver (2019) is adopted: "Customer loyalty is a deeply held commitment to rebuy or repatronize a preferred product or service consistently in the future, despite situational influences and marketing efforts that could cause switching behavior." This definition is preferred because it encapsulates the behavioural, emotional, and attitudinal dimensions of loyalty while recognizing the challenges of situational factors and competitive marketing.

Empirical Review

Product Quality and Customer Loyalty

Opara and Eze (2022) conducted a study aimed at investigating the impact of product quality on customer loyalty within the Nigerian manufacturing sector. The study involved a sample of 320 customers from various manufacturing companies and employed a mixed-methods approach for data collection, including surveys and interviews. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM. The findings revealed a significant positive relationship, indicating that customers who perceived products as durable and reliable were more likely to remain loyal. A key critique of the study is that its focus on the manufacturing sector may limit the generalizability of its findings to other industries.

Smith and Johnson (2018) explored the relationship between product quality and customer loyalty in the retail sector. The objective was to assess whether product quality influenced loyalty among retail customers. The study sampled 271 retail customers and utilized structured questionnaires for data collection. Data analysis was conducted through regression analysis.The findings revealed an insignificant relationship between product quality and customer loyalty, suggesting that other factors, such as price and brand image, might play more significant roles. A major critique of the study is that it failed to account for other potentially confounding variables, which may have impacted the results.

Product Size and Customer Loyalty

Nwoka et al. (2009) examined the effect of product size on customer loyalty in Nigeria's consumer goods industry. The study aimed to understand how the alignment of product size with customer needs influenced loyalty. Using in-depth interviews with customers and industry experts, the study adopted a qualitative approach to data collection from 354 customers, and thematic analysis was used to analyze the data. The findings showed that customers preferred product sizes that met their specific needs, with suitable sizes positively influencing loyalty. The study emphasized the importance of offering diverse product sizes to cater to varying customer preferences. A critique of the study is its reliance solely on qualitative data, which does not establish statistical causality between product size and loyalty.

Ahmed et al. (2022) analyzed the relationship between product size and customer loyalty in the fast-moving consumer goods (FMCG) industry. The study aimed to determine whether flexible product sizing influenced consumer loyalty. A sample of FMCG customers was surveyed, and data were analyzed using PLS-SEM. The findings indicated a significant positive relationship, as flexible sizing options allowed customers to choose products that matched their consumption patterns, enhancing loyalty. A

critique of the study is its narrow focus on FMCG products, limiting its generalizability to industries with less frequent purchases or entirely different consumption dynamics.

Product Line and Customer Loyalty

Lee et al. (2020) investigated the impact of product lines on customer loyalty in the fashion industry. The study sampled customers of prominent fashion brands, combining survey data with focus group discussions to explore their preferences. PLS-SEM was utilized for data analysis, revealing a positive correlation between diverse product lines and customer loyalty. Customers with access to a wide range of product options were more likely to remain loyal. The study highlighted the importance of aligning product lines with customer preferences to maintain loyalty. A limitation is its concentration on the fashion industry, which may not reflect customer behavior in industries with less dynamic product offerings.

Gojali and Hartono (2021) studied the influence of product lines on customer loyalty in the consumer electronics sector. The study sampled 411 customers of major electronics brands and used surveys to collect data. PLS-SEM was applied for data analysis, revealing that product line diversity indirectly influenced customer loyalty by enhancing satisfaction and perceived value. The study emphasized the importance of modular product strategies to appeal to a wide range of consumer needs. However, its focus on consumer electronics may limit its broader applicability across other industries with different operational contexts.

Product Design and Customer Loyalty

Smith and Johnson (2018) explored the role of product design in driving customer loyalty in the furniture industry. The study sampled customers of various furniture brands, utilizing structured questionnaires for data collection and regression analysis for data interpretation.The findings indicated no significant relationship between product design and customer loyalty, suggesting that price and brand reputation held more substantial sway over loyalty decisions. The study failed to examine the mediating roles of satisfaction and perceived value, which might have provided deeper insights.

Kusuman and Wijaya (2020) examined the impact of product design on customer loyalty in the cosmetics industry. The study sampled customers of prominent cosmetics brands and collected data using surveys. PLS-SEM was applied to analyze the data, revealing that innovative packaging and ergonomic designs significantly enhanced customer satisfaction, which in turn fostered loyalty. The study called for continuous innovation in design to meet evolving customer preferences. A limitation of the study is its focus on a highly niche industry, which may not generalize well to other sectors

Expectancy-Disconfirmation Theory (EDT)

This theory was propounded by Richard L. Oliver in 1977. EDT posits that customer satisfaction and loyalty are influenced by the gap between prior expectations and the actual performance of a product or service. If the product or service meets or exceeds expectations (positive disconfirmation), satisfaction and loyalty increase. Conversely, if it falls short of expectations (negative disconfirmation), dissatisfaction arises, potentially reducing loyalty.

Scholars have extensively argued in favor of EDT, highlighting its utility in understanding customer perceptions and behavior. For instance, Tse and Wilton (1988) expanded the theory by demonstrating that customer satisfaction, influenced by expectations and perceived performance, directly affects loyalty in both goods and services contexts. More recently, Bhattacherjee (2001) argued that EDT is particularly effective in predicting customer retention in technology adoption scenarios, emphasizing that meeting or exceeding expectations is critical to fostering ongoing loyalty. Oliver (2010) also refined EDT by integrating psychological and emotional components, underscoring the comprehensive nature of the theory in explaining loyalty.

Critics, however, have raised concerns about EDT's limitations. Spreng and Page (2003) argued that the theory is overly reliant on rational cognitive evaluations, neglecting the emotional aspects of customer satisfaction and loyalty. They posited that emotions often play a more significant role than cognition in determining loyalty, especially in contexts like luxury goods or personal services. Similarly, Vroom and Jago (2016) criticized EDT for its inability to account for external factors, such as price, competition, or social influences, which may affect loyalty independently of customer expectations. Furthermore, Patterson et al. (2006) contended that the theory's assumption of a linear relationship between expectations and satisfaction does not hold in all cases, as cultural and individual differences can mediate the disconfirmation process.

In relation to the current study, EDT provides a robust theoretical framework for understanding how product-related variables influence customer loyalty. Product quality, for instance, aligns with the theory as customers form expectations about durability, reliability, and performance, which are either confirmed or disconfirmed upon use. Similarly, product size and product lines cater to customer preferences and expectations, with disconfirmation occurring if the offered options fail to meet their practical or aesthetic needs. Product design also directly connects to EDT, as customers may expect designs that are functional, visually appealing, and user-friendly. Meeting these expectations leads to positive disconfirmation, fostering satisfaction and loyalty.

METHODOLOGY

This study adopted a quantitative research design to systematically examine the effect of product development on customer loyalty in PAN Nigeria Limited. The population of the study consisted of all customers of PAN Nigeria Limited in Kaduna, Nigeria. Due to the lack of accessible comprehensive records detailing the organization's customer base, it was not possible to determine the population size precisely. Consequently, Cochran's (1977) formula was utilized to calculate a representative sample size, making it suitable for studies with indeterminate populations. Assuming maximum variability of 50% ($p = 0.5$) at a 95% confidence level with a ±5% margin of error, the sample size was derived using the formula:

taking the maximum variability of 50% ($p = 0.5$) at a 95% confidence level with a ±5% margin of error, the formula yields

$no = (z^2 * p * q)/e^2$,

where $p = 0.5$,

$q = 1 - p$,

$e = 0.05$, and

$z = 1.96$.

$n = 1.96^2 * 0.05* (1-0.5)/0.05^2$

$n = 3.8416 * 0.5 *0.5/0.0025$

$n = 0.9604/ 0.0025$

$n = 384.16$

To facilitate data collection, a convenience sampling technique was employed, targeting easily accessible participants. This non-probability method was appropriate for the study as it enabled timely access to customer feedback, a critical factor for evaluating customer attitudes toward PAN Nigeria Limited.

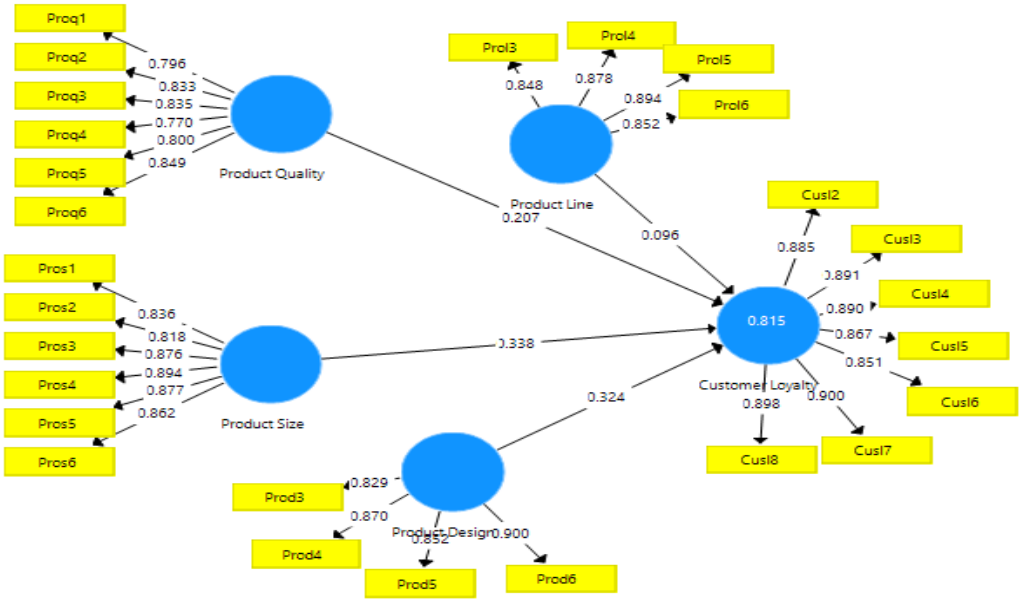
Primary data was gathered using a structured questionnaire designed with a 5-point Likert scale, ranging from "strongly agree" to "strongly disagree," to capture respondents' perceptions accurately. The questionnaire, developed and administered via Google Forms, was distributed through WhatsApp to maximize response rates and ensure cost-effective and efficient data collection.

The validity of the research instrument was established through face and content validity. Experts in the field and academic supervisors reviewed the questionnaire to ensure its relevance and adequacy in

measuring the constructs of interest. Reliability was further confirmed through rigorous consistency checks, including pilot testing, to ensure the instrument's precision and effectiveness in capturing the intended variables.

RESULTS AND DISCUSSION

Figure 1: Factor Loadings



Source: Smart PLS Output, 2024

Figure 1 presents the factor loadings of the study, highlighting the strength of observed variables in measuring their respective latent constructs. According to Hair et al. (2018), a factor loading threshold of 0.7 is required to ensure reliability and validity, and variables falling below this level should be eliminated. In this study, Prol1 & Prol2 (Product Line), Prod1 & Prod2 (Product Design), and Cusl1 (Customer Loyalty) were removed for failing to meet this benchmark. The retained variables displayed strong loadings: Product Quality ranged between 0.770 and 0.849, Product Size between 0.818 and 0.894, Product Line between 0.848 and 0.894, Product Design between 0.829 and 0.900, and Customer Loyalty between 0.851 and 0.900. These results indicate strong convergent validity and reliability, as the retained items adequately explain their respective constructs. Scholars such as Fornell and Larcker (1981) and Henseler et al. (2015) emphasize that eliminating weak loadings enhances model robustness, ensuring discriminant validity and the accuracy of construct measurement. The results confirm that the study's measurement model is both valid and reliable, supporting the robustness of the findings.

Table 1: Construct Reliability and Validity

Constructs	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Product Quality	**0.898**	**0.900**	**0.922**	**0.663**
Product Size	**0.930**	**0.931**	**0.945**	**0.741**
Product Line	**0.891**	**0.891**	**0.924**	**0.754**
Product Design	**0.886**	**0.892**	**0.921**	**0.745**
Customer Loyalty	**0.953**	**0.953**	**0.961**	**0.780**

Source: Smart PLS Output, 2024

Table 1 demonstrates the reliability and validity of the study's constructs, with all metrics meeting recommended thresholds. Cronbach's Alpha and rho_A values, ranging from 0.886 to 0.953, confirm strong internal consistency, aligning with Hair et al. (2018) and Henseler et al. (2015). Composite Reliability (CR) values between 0.921 and 0.961 further validate high reliability, while Average Variance Extracted (AVE) values, ranging from 0.663 to 0.780, indicate sufficient convergent validity as per

Fornell and Larcker (1981). These results confirm the constructs' robustness and suitability for further analysis.

Table 2: Discriminant Validity

Variables	Product Quality	Product Size	Product Line	Product Design	Customer Loyalty
Product Quality					
Product Size	0.725				
Product Line	0.804	0.709			
Product Design	0.748	0.818	0.817		
Customer Loyalty	0.815	0.824	0.813	0.756	

Source: Smart PLS Output, 2024

Table 2 presents the discriminant validity of the constructs, demonstrating that each construct is distinct from the others. According to Fornell and Larcker's (1981) criterion, the square root of the Average Variance Extracted (AVE) for each construct (diagonal values) must be higher than its correlations with other constructs (off-diagonal values). Here, the diagonal values for Product Quality, Product Size, Product Line, Product Design, and Customer Loyalty exceed their respective inter-construct correlations, confirming adequate discriminant validity. This indicates that the constructs are unique and measure distinct theoretical concepts, ensuring the robustness of the model.

Table 3: R Square

	R Square
Customer Loyalty	0.815

Source: Smart PLS Output, 2024

Table 3 shows the R Square value for Customer Loyalty, which is 0.815. This indicates that 81.5% of the variance in Customer Loyalty is explained by the independent variables—Product Quality, Product Size, Product Line, and Product Design. According to Chin (1998), an R Square value above 0.67 is considered substantial in structural equation modeling, demonstrating that the model has strong explanatory power. This high R Square value signifies that the predictors collectively provide a robust explanation for Customer Loyalty, further validating the strength and relevance of the study's model.

Table 4: Fit Summary

	Saturated Model	**Estimated Model**
SRMR	0.046	0.046
d_ULS	0.788	0.788
d_G	0.739	0.739
Chi-Square	1469.682	1469.682
NFI	0.854	0.854

Source: Smart PLS Output, 2024

Table 4 presents the model fit summary, demonstrating that the model meets key fit criteria. The Standardized Root Mean Square Residual (SRMR) value of 0.046 is well below the 0.08 threshold recommended by Hu and Bentler (1999), indicating a good model fit. Both the d_ULS (0.788) and d_G (0.739) values are within acceptable ranges, suggesting minimal discrepancies between the observed and model-implied covariance matrices. The Chi-Square value of 1469.682, although significant, is typical for large sample sizes and complex models (Hair et al., 2018). The Normed Fit Index (NFI) value of 0.854, close to the acceptable 0.9 threshold, shows reasonable fit (Bentler & Bonett, 1980). Collectively, these indicators confirm that the model achieves an adequate fit for the data.

Table 5: Path Coefficients

Variables	Beta	T Statistics (|O/STDEV|)	P Values	Decision
Product Quality -> Customer Loyalty	0.207	2.387	0.017	Rejected
Product Size -> Customer Loyalty	0.338	3.302	0.001	Rejected
Product Line -> Customer Loyalty	0.096	1.715	0.087	Accepted
Product Design -> Customer Loyalty	0.324	4.898	0.000	Rejected

Source: Smart PLS Output, 2024

Table 5 presents the path coefficients showing the effect of product development variables on customer loyalty. The effect of Product Quality on Customer Loyalty reveals a beta value of 0.207, a T-statistic of 2.387, and a p-value of 0.017. This result indicates a significant but modest positive effect, suggesting that while product quality influences customer loyalty, its effect is relatively weaker compared to other factors.

The effect of Product Size on Customer Loyalty demonstrates a beta value of 0.338, a T-statistic of 3.302, and a p-value of 0.001. This highlights a significant and positive effect, showing that product size plays an essential role in driving customer loyalty as customers appreciate size options that meet their preferences and needs.

For the Product Line on Customer Loyalty, the beta value is 0.096, with a T-statistic of 1.715 and a p-value of 0.087. This result indicates an insignificant effect, as the p-value exceeds the 5% threshold. Therefore, product line variations do not exert a meaningful influence on customer loyalty compared to other variables in the study.

The effect of Product Design on Customer Loyalty shows a beta value of 0.324, a T-statistic of 4.898, and a p-value of 0.000. This result signifies a strong and significant positive effect, emphasizing that product design substantially contributes to customer loyalty by enhancing customer satisfaction and brand attachment.

Discussion of Findings

The results presented in Table 5 indicate the effect of product development variables and customer loyalty, which align or deviate from the empirical studies earlier reviewed, as well as the theoretical framework guiding the study.

The effect of Product Quality on Customer Loyalty revealed a significant but moderate positive relationship, which aligns with Opara and Eze (2022), who found a strong positive relationship between durable product quality and customer loyalty in the Nigerian manufacturing sector. However, it contrasts with Smith and Johnson (2018), who found no significant relationship in the retail sector, arguing that factors like price and brand image had more impact on loyalty. The study's findings align with the theoretical framework, as product quality satisfies key components of customer expectations, fostering loyalty in line with Expectation-Confirmation Theory (Oliver, 1980).

For the effect of Product Size on Customer Loyalty, the findings showed a significant positive relationship, supporting the studies by Nwoka et al. (2009) and Ahmed et al. (2022). Both studies established that product sizes tailored to customer needs and consumption preferences enhance loyalty by improving satisfaction. Ahmed et al.'s use of quantitative methods aligns more closely with this study, reinforcing the importance of flexible product sizing. The result is also consistent with the theoretical framework, as meeting customer needs with appropriately sized products reinforces satisfaction and loyalty, further validating the Expectation-Confirmation Theory.

The effect of Product Line on Customer Loyalty was insignificant, contradicting the findings of Lee et al. (2020) and Gojali and Hartono (2021), who reported a positive relationship between product line diversity and loyalty. Lee et al. highlighted that broader product offerings promote customer retention, especially in dynamic industries like fashion. However, the insignificant result in this study may be attributed to the nature of the product line in the examined sector, where diversity does not necessarily enhance loyalty. This deviation suggests that other factors, such as customer preferences for specific product designs or quality, might exert a stronger influence.

The effect of Product Design on Customer Loyalty demonstrated a significant and strong positive relationship, supporting the findings of Kusuman and Wijaya (2020), who established that innovative and ergonomic product designs foster customer satisfaction and loyalty in the cosmetics industry. This result contrasts with Smith and Johnson (2018), who found no significant relationship in the furniture sector, suggesting that price and brand reputation mattered more. The current study's findings align with the theoretical framework, as innovative and aesthetically pleasing product designs satisfy customer expectations, contributing to loyalty, which reinforces the Expectation-Confirmation Theory.

CONCLUSION AND RECOMMENDATIONS

Based on the results of the study, it is concluded that product development has significant effect on customer loyalty in PAN, Limited, Kaduna Nigeria.

(i) PAN Nigeria Limited should focus on improving product quality to enhance customer loyalty. This can be accomplished by implementing strict quality control measures throughout the production process to ensure high durability and reliability. Additionally, gathering regular customer feedback will help identify areas for improvement and align product features with consumer expectations.

(ii) The company should also consider offering a variety of product sizes to accommodate diverse customer needs and consumption habits. Conducting market segmentation will provide insights into different customer preferences, allowing the company to introduce a range of sizes that meet varying demands. Collaborating with distributors and retailers can further refine this approach by gathering real-world insights into consumer choices.

(iii) While the study found product line diversity to be insignificant, PAN Nigeria Limited should still explore the advantages of expanding its product offerings. Introducing complementary products or variations can attract a wider customer base and boost overall satisfaction. Conducting thorough market research will help identify gaps in the current product lineup and uncover opportunities for innovation.

(iv) Lastly, the company should prioritize innovative product designs to enhance customer loyalty. Investing in research and development will enable the creation of designs that are not only functional but also visually appealing, ensuring that products stand out in the marketplace.

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