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Product Innovation and the Competitive Advantage of Telecommunication Companies in Kenya

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ABSTRACT

The rapid expansion of the global market in the telecommunications industry has created intense competition that necessitates active market innovations. To survive, organizations must have a competitive advantage to stay ahead of the competition. Product innovation encourages business effectiveness and organizations are increasingly being compelled to create new products, upgrade, or improve existing product features to fulfill their clients' needs and remain competitive. It is from this background that this study sought to establish the influence of product innovation on the competitive advantage of telecommunication companies in Kenya. Using a positivist philosophy, this study adopted an explanatory research design. The main data collection instrument was a structured questionnaire where 247 responses from mid- and top-level managers in a total of 26 active telecommunication companies in Kenya. The study used both descriptive and inferential statistics to interpret the data. From the study findings, it was established that new products, products upgrading, and improved product features have a significant influence on the competitive advantage of telecommunication companies in Kenya. This led to the conclusion that product innovation has a significant influence on the competitive advantage of telecommunication companies in Kenya. The study recommends a need to increase government funding and research missions to support product innovation.

Keywords: Competitive advantage, Product, Innovation, Telecommunications industry, Kenya.

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I. INTRODUCTION

Competitive advantage, popularized by Porter (1985), happens when a firm develops or acquires an attribute or asset that enables it to perform far better than the competition in the same market (Wang, Lin & Chu, 2011). To maintain competitive advantage, firms establish competitive sustainability to make it difficult for rival firms to neutralize the advantage on a specific market (Ben-Hassine, 2019). Innovation involves producing enhanced or fresh products along with new approaches in production methods (Medrano & Olarte-Pascual, 2016). Consequently, organizations have to refurbish, develop, and even transform their products to remain in business (Aghion et al., 2019). Innovations give a springboard to cost and differentiation strategies as used by the most competitive players, including those in the telecommunications sector. Product innovation is the presentation of new services or products with noticeable improved changes compared to current services or products (Leeuwen, Mohnen, Polder & Raymond, 2010).

II. THE PROBLEM

Liberalization of the telecommunication sector, the extension of services by international conglomerates, and the active competition experienced currently in the sector, have all lead to the telecommunications revolution globally (Nawal & Cherif, 2019). Kenya's telecommunications industry is competitive (Madsen & Leiblein, 2015). Telecommunication companies are enthusiastic about emerging disruptive innovation, but many do not have a clear strategy and mission for managing disruption (KPMG, 2017).

When Telkom Kenya lost its dominance in the fixed-line and international bandwidth sectors in 2004, this marked a significant change in the competitive scene for telecommunications services across the country (CAK, 2018). The Communications Authority of Kenya licensed and accredited three major firms to roll out their mobile network operations: Safaricom Plc, Airtel Kenya, and Telkom. The continuous growth in the telecommunications sector is a vibrant indication of the increased focus by operators to provide innovative and competitive products and services that attract consumers (Gituma & Gachunga, 2016). Such innovations include Mpesa, Airtel money, banking services, connections through e-commerce in the transport sector, and acquisition of the latest telecommunications equipment and software by leading companies in the country. Subsequently, the increasing competitive situation has meant that firms must employ various innovative and competitive strategies to survive (David, 2019). This study thus aimed at establishing the influence of product innovation on the competitive advantage of telecommunication companies in Kenya.

III. OBJECTIVES

Firms must come up with innovative products to remain ahead of the competition (Ole et al., 2019). The purpose of this study was to investigate the influence of product innovation on the competitive advantage of telecommunication companies in Kenya. The specific objectives guiding the study were:

1. To establish whether new products influence the competitive advantage of telecommunication companies in Kenya.
2. To determine the extent to which products upgrading influence the competitive advantage of telecommunication companies in Kenya.
3. To ascertain how improved product features influence the competitive advantage of telecommunication companies in Kenya.

IV. LITERATURE REVIEW

The disruptive innovation theory by Clayton Christensen in 1995 presented a supporting theory for this study. It describes growth, which is driven by innovation. Christensen defines innovation as a procedure through which a product or service flourishes at the bottom level of a relatively mature market and then persistently moves up the market level, eventually dislodging established competitors in the process (Vecchiato, 2017). The theory explains the phenomenon by which an innovation transforms an existing market or sector by introducing simplicity, convenience, accessibility, and affordability where complication and high cost are the status quo (Christensen, McDonald, Altman, & Palmer, 2018). This study specifically chose the disruptive theory as it resonates with product innovations that have defined the market in the telecommunications industry.

A. *Product Innovation and Competitive Advantage*

Product innovation refers to market introduction of new services and goods that give a representation of verifiable enhancements. Typically, such innovation on products indicates a visibly modified nature of the product where many features and identifiable parts make sensible application to the users, at least, in the immediate or existing market (Leeuwen et al., 2010). According to OECD (2015) product innovation refers to a change in blueprint that brings considerable change in the anticipated use or distinctiveness of a product. For product development to happen, products should either be new or extensively enhanced with respect to current features, and easy to use parts and materials (Leeuwen et al., 2010). Product innovation encourages business effectiveness and organizations are increasingly being compelled to create new products to fulfil their clients' needs and remain competitive (Polemis & Tselekounis, 2019).Few meta-examinations have upheld the beneficial outcome of product development on firm execution (Sarpong & Teirlinck, 2018). Alegre et al. (2006) show that the measurements of product innovation (proficiency and viability) are emphatically and unequivocally related to hierarchical execution. Atalay et al. (2013) in a study to determine the best administration of 113 associations in the Turkey car industry, the results demonstrate that product development had a positive and critical impact on association execution. In examining the main advancements and innovations contextualized in Malaysia, Rosli and Sidek (2013) focused on car assembly entrepreneurship.

Oke et al. (2013) led an investigation of 207 associations in Australia which concluded that product development and product quality execution were emphatically connected with firm performance (Jayateertha et al., 2014). Similarly, results by Hall (2011) established a positive relationship in the links between performance and innovative products. Study results by Augusto et al. (2014) utilized relapse investigation and factor examination systems to weigh in on the relationship between firm execution and the diverse sorts of development and presumed that product innovation presented key steps in developing markets where competitive advantage was a viable possibility (Hall, 2011; Omachonu & Einspruch, 2010). Additional studies by Ar and Baki (2011) show that the key results for innovation as demonstrated by the Turkish Science and Technology Parks (STPs), revealed that product development had a positive and solid association with firm performance. There are specific cases carried out in Kenya: a study by Karanja (2011) focused on the United Bank of Africa (UBA) and hypothesized that product innovation procedures led to improved competitive advantage in the banking sector. Ngirigacha and Bwisa's (2013) study on the significance of entrepreneurial developments in key SMEs in Thika, a local industrial town in Kenya, indicated a positive relationship between innovation and new product development with good performance.

Similarly, Arunda (2015) focused on the advancements in Mpesa, a key innovation of the leading telecommunication firm, Safaricom Plc, where the key findings showed the positive impact of technological developments. Soi (2016) focused on the impact of development techniques on execution of associations in the media industry in Kenya. The results revealed that product innovation enhanced business execution of media transmission organizations in Kenya (*Figure 1: Conceptual Framework of Product Innovation and the Competitive Advantage of Telecommunication Companies in Kenya Source:* Author, 2020). In order to achieve the expected outcome, this study sought to find out how new products, products upgrading, and improved product features influence the competitive advantage of telecommunications companies in Kenya as conceptualized in *(See Figure 1 in Appendices).*

V. METHODOLOGY

For the purpose of testing the study hypothesis, the variables were operationalized with various dimensions and indicators as shown in *Table 1 (Operationalization of Product Innovation Variables and Hypothesis Testing) Source: Author, 2020*

A. *Philosophical approach*

Research philosophy deals with the methodology of collecting, storing and analyzing data for any given phenomenon or subject matter in the society (Creswell & Poth, 2018). Positivists separate themselves from the world they study, and the inputs of the observer are not put into account (Dougherty et al., 2019).

B. *Research design*

Kothari (2014) describes a research design as the conceptual structure within which research is conducted. This study utilized explanatory research design (Cooper and Schindler, 2014), since it is useful in establishing the relationship between variables.

C. *Population and sample selection*

The study's target population comprised of all 26 telecommunication companies licensed by the Communications Authority in 2018. Based on the market share, ten companies had a market share of more than 97.5%, while the remaining ones had less than 2.5% of the telecommunications market share in Kenya. The sampling frame comprised 26 telecommunication companies targeting their management employees. In 2019, the total number of employees in the telecommunications industry in Kenya was 8,689 (CA Report, 2019; KNBS Report, 2020).

The total number of managers in each company varied and the company with a clear percentage of managers was Safaricom at 17.6% (Safaricom Report, 2019). The researcher worked with 30% of the total population and the sample size of 311 was calculated using the Cochran formula in two steps.

$$n_0 = \frac{Z^2 pq}{e^2} \qquad \text{(i)}$$

where:

n_0 – Cochran's sample size;
e – the desired level of precision (5% margin of error);
p – the (estimated) proportion of the managers to the population = 30%;
q – (1–p).

In this case, Cochran's sample size:

$$n_0 = \frac{1.96^2 * 0.3 * 0.7}{0.05^2} = 322.69 \quad \text{(ii)}$$

To obtain a higher confidence level, this equation was used to modify the sample size:

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}} \quad \text{(iii)}$$

where:
n_0 – Cochran's sample size (322.69)
N – the population size of the telecommunication industry (8,689)
n – the adjusted sample size.

In our case, adjusted sample size: (iv)

$$n = \frac{322.69}{1 + \frac{(322.69 - 1)}{8689}} = 311$$

D. *Data collection tools*

The study used semi-structured questionnaires with open-ended and closed questions. The closed-ended questions were on a 5-point Likert scale addressing the constructs.

E. *Pilot study*

The study conducted a pilot survey prior to the full field visit in which 14 respondents from the companies participated and were subsequently removed from the main field study. This pilot study ensured the test of reliability and validity. The reliability test had a Cronbach Alpha of >0.9 indicating good reliability (Cooper & Schindler, 2014). Content validity was attained by subject experts who evaluated the questionnaire and were satisfied with the content while construct validity was attained by Average Variance Extracted (AVE) test which had >0.5 threshold indicating the constructs account for at least fifty per cent of the variance in the items. A linear regression analysis model was used to test the research hypothesis.

Main hypothesis:

H_0: Product innovations have no significant influence on the competitive advantage of telecommunication companies in Kenya.

The three sub-hypotheses as outlined on the conceptual framework are:

H_{01a}: New products have no significant influence on the competitive advantage of telecommunication companies in Kenya.

H_{01b}: Products upgrading have no significant influence on the competitive advantage of telecommunication companies in Kenya.

H_{01c}: Improved product features have no significant influence on the competitive advantage of telecommunication companies in Kenya.

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VI. RESULTS

The results of the findings are summarized below.

A. *Demographic information*

Proportionate sampling yielded 247 responses, out of the 311 questionnaires sampled, from mid- and top-level managers in 26 telecommunication companies in Kenya. That was 79.4% of the target respondents. The total respondents were 56% male participants and 44% female participants.

B. Descriptive statistics

As indicated on Table 2, the mean (M), standard deviation (SD) and skewness (Skw) of each of the product innovation constructs: new products, products upgrading, and improved product features are articulated as follows: new products (M=3.72, SD =.627 and Skw -.428), products upgrading (M=3.85, SD =.583 and Skw -.694) and lastly, improved product features (M=3.76, SD =.679 and Skw -.532. This shows all the constructs were rated as 'agreed' with a rounded mean of 4 (M=4), and they were all negatively skewed. Further, the respondents had a higher level of agreement based on the SD<1.

Table 2: Mean and Standard Deviation of Product Innovation Constructs

Product Innovation	N	Mean	Std. Deviation	Skewness	Std. Error of Skewness
New products	247	3.7166	.62685	-.428	.155
Products upgrading	247	3.8465	.58316	-.694	.155
Improved product features	247	3.7584	.67918	-.532	.155

C. *Inferential statistics*

The main focus of inferential statistics is to cement the findings in the initial analysis using descriptive statistics. This enables further insights into the analytical approach to the study findings thus necessitating inferential statistics. It also provides real predictability of the population and in particular the determination of occurrence of a phenomenon by chance or design. This study in particular, heavily relied upon the inferential statistics since the nature of innovation and product development plays a big role in the basic design of disruptive changes.

Factor analysis on product innovation

The most appropriate factor analysis type applicable to the current study was exploratory factor analysis (EFA) with specific focus on principle component analysis. This kind of factor analysis was performed to extract the pattern matrix that informed the viability of constructs included in the study. Similarly, the extraction helped identify the questions on each matrix while also determining the strength of the sampling adequacy. The questions that did not fit the matrix were dropped. As indicated in Table 3, the Kaiser-Meyer-Olkin of sampling adequacy was 0.620. The Bartlett's test of Sphericity was significant at X^2 (36, N=247) = 590.188, p<.05.

This output shows the independent variable factors were adequate for extraction since Kaiser-Meyer-Olkin measure was greater than 0.6 and the Bartlett's test was significant ($p<.05$).

Table 3: KMO Measure and Bartlett's Test for Sphericity on Product Innovation

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.620
Bartlett's Test of Sphericity	Approx. Chi-Square	590.188
	Df	36
	Sig.	.000

Correlation analysis

The correlation test is conducted to test the significant relationship between product innovations as the independent variable and competitive advantage as the dependent variable. As indicated in Table 4 *(Appendices)*, there was no significant correlation between the independent variable constructs; new products and products upgrading r (247) =.851, $p>.05$, new products and improved products features r (247) =.812, $p>.05$, and lastly, products upgrading and improved products features(247) =.320, $p>.05$.On the relationship between the independent variable constructs and the dependent variable, there was significant relationship between new products and competitive advantage r (247) =.147, $p<.05$; products upgrading and competitive advantage r (247) =.241, $p<.05$. However, there was no significant correlation between improved product features and competitive advantage r (247) =.643, $p>.05$ *(See table 4 in Appendices).*

Heteroskedasticity test of product innovation and competitive advantage

As indicated on Figure 2, the scatter plot output shows the spots are concentrated within a specific area forming a pattern. This shows a higher level of similarity on the distribution of product innovation as independent variable and competitive advantage as dependent variable, hence homogenous. Thus, on the regression model, product innovation fits to predict competitive advantage *(See figure 2 in Appendices).*

Table 5 shows the model summary results. The output indicates that the effect of product innovation on the competitive advantage of telecommunication companies in Kenya is statistically significant, R^2 = 0.078 F (1, 245) =21.863, p-value <.05. This shows 7.8% of competitive advantage of telecommunication companies in Kenya is attributed to product innovation while the remaining 92.2% can be attributed to other factors not included in the study and the error term.

Table 5: Model Summary of Product Innovation on Competitive Advantage

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.286[a]	.082	.078	.41002	.082	21.863	1	245	.000

a. Predictors: (Constant), Product innovation
b. Dependent Variable: Competitive advantage

D. *Regression coefficient of product innovation on competitive advantage*

The results of the regression coefficient of the product innovation constructs are presented in Table 6. The output indicates that each of the constructs for product innovation had significant influence on the competitive advantage of telecommunication companies in Kenya ($p<.05$). New products ($\beta = .162$ $t = 2.652$, $p<.05$), products upgrading ($\beta = .236$ $t = 3.856$, $p<.05$) and new product features ($\beta = .121$ $t = 1.976$, $p<.05$). This shows on the product innovation constructs, products upgrading had a greater effect on the competitive advantage of telecommunication companies in Kenya with a beta of 0.236 followed by new products with a beta of 0.162 and least, was new product features with a beta of 0.121.

A unit increases in products upgrading increases the competitive advantage of telecommunication companies in Kenya by 0.236. A unit increase in new product increases the competitive advantage of telecommunication companies in Kenya by 0.162 and lastly, a unit increase in improved product features increases the competitive advantage of telecommunication companies in Kenya by 0.121 *(See table 6 in Appendices).*

As indicated in Table 7, the product innovation significantly predicted the competitive advantage of telecommunication companies in Kenya ($\beta = .286$ $t = 4.676$, $p<.05$). This led to the rejection of the null hypothesis and acceptance of the alternative hypothesis concluding that product innovation has a significant influence on the competitive advantage of telecommunication companies in Kenya *(See Table 7 in Appendices).*

The study derived the model for product innovation and competitive advantage based on a simple regression model:

$$Y = \beta_0 + \beta_i x_i + \varepsilon \quad \text{(v)}$$

Where:

Y =competitive advantage

β_0 = Constant

β_i = product innovation

ε= Error term

$$Y= 2.176+ .286X + .073 \quad \text{(vi)}$$

The regression model showed that product innovation significantly predicted the competitive advantage of telecommunication companies in Kenya ($\beta = .286$ $t = 4.676$, $p<.05$). This shows that a unit increase in product innovation increases the competitive advantage of telecommunication companies in Kenya by 0.286. It is from this final analysis that the null hypothesis of the study was rejected, the alternative hypothesis was accepted and a conclusion that product innovation has a significant influence on the competitive advantage of telecommunication companies in Kenya.

VII. DISCUSSION

The key research question produced results that rejected the hypothesis *H_0: product innovation has no significant influence on the competitive advantage of telecommunication companies in Kenya*. These study findings are in line with several scholars who have previously dealt with the topic on different levels. Jajja et al. (2017) demonstrate that the buyer-seller relationship is key in maintaining the competitive advantage of a telecommunications market as new products provide better performance features attracting several customers, providing clear competitive advantage in terms of customer numbers and

market share. Similarly, Markovic and Bagherzadeh (2018) observe that the best way to protect such an innovative product on the competitive market is to keep making advancements that leave the competition not able to replicate the product. David (2019) observes that the amount of resources used to maintain a product innovation would determine the sustainability of the firm to remain competitive. On the contrary, there are scholars who are against the idea that innovative products can help influence the competitive advantage of telecommunication companies. Jajja et al. (2018) contend that no amount of new product innovation can be of any advantage unless there is strategic alignment of that product. Mudogo (2019) cites poor research and lack of marketing study as the key to failed innovative products. The study results are clearly in line with the theory of disruptive change as it has demonstrated how both established and newly-companies can keep ahead of the competition with proper adaptation of changes introduced in the environment. As demonstrated by Christensen et al. (2018), the need to have features in a company ready to accommodate or deal with innovative changes becomes clear. Roy (2018) agrees and cites leadership and control of innovation as being key to the survival of an entity in the face of such disruptive changes.

VIII. Recommendations and Areas for Further Study

Findings on product innovation from this study have indicated that there is a significant influence on the competitive advantage front in telecommunication companies. The firms in the telecommunication industry thus have a rivalry that could be well-managed if some of the study findings are adopted through benchmarking against each other or in other firms from different industry sectors.

There could also be better inspection of product innovation by government policy makers in order to encourage more product innovation both jointly and in single approach. The study recommends government sponsorship of scholars or trainees in technology-related courses. Similarly, there is need to increase funding and research missions in upcoming firms with government support. NACOSTI and other research firms should support all researchers involved in product innovation while at the same time tap into existing telecommunication companies for experimental purposes. Even though there is need for protection of innovations by respective inventors, the government could go a step further by supporting such innovators even if they are operating from a specific telecommunication firm. This would mean that the Kenyan government for example, recognizes and awards those creative and innovative employees of Safaricom, Airtel, Telkom, and others who have regularly come up with innovations, but whose efforts are swallowed in the larger company outlook.

From the product innovation findings, the strong linkage of this variable to competitive advantage is an indication that more studies should be carried out not just in the telecommunication companies of the country, but in related companies and other sectors. For example, a deep dive into the health and medical sector would provide new product innovations to curb the inefficiencies in the contact tracing, quarantine management, and home follow ups for COVID-19 patients.

IX. Conclusion

This study sought to establish the influence of product innovation on the competitive advantage of telecommunication companies in Kenya. The findings reveal that product innovation had a significant influence, which implies that the telecommunication companies' market in Kenya leads in product innovation with specific products that create sustainable competitive advantage.

It also means that leading telecommunication companies in Kenya have strong teams of product innovators and are linked to reputable international firms with strong innovative products. The study concludes that there is an effort to increase the number of products in the market by telecommunication companies. However, the findings suggest that there are a limited number of products that can be produced competitively in the market.

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APPENDICES

APPENDIX I: FIGURES

Figure 1: Conceptual Framework of Product Innovation and the Competitive Advantage of Telecommunication Companies in Kenya *(Source*: *Author)*

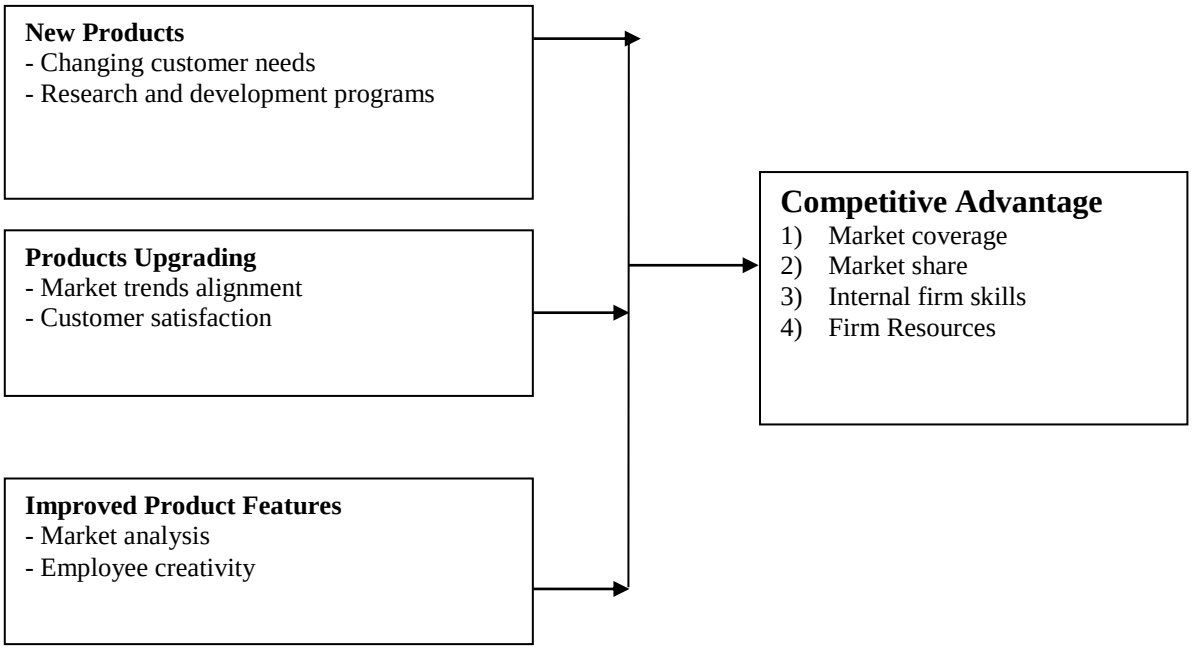
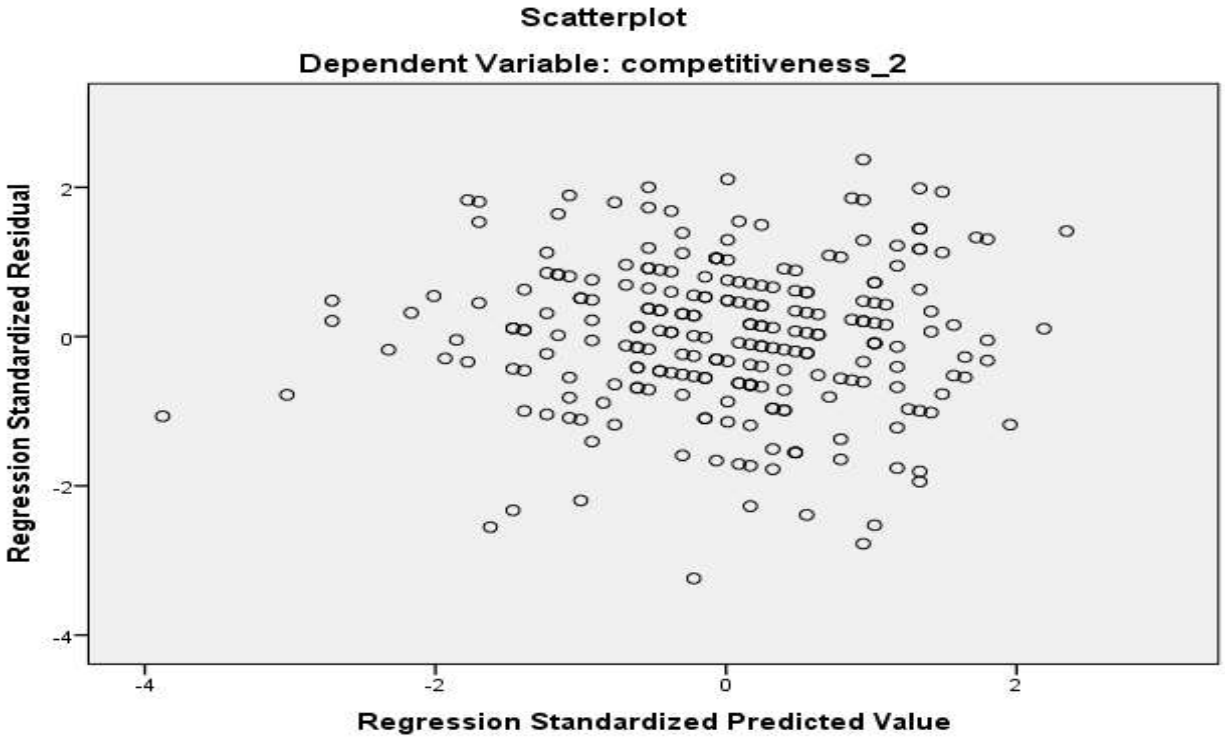


Figure 2: Product Innovation Heteroskedasticity on Competitive Advantage



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APPENDIX II: TABLES

Table 1: Operationalization of Product Innovation Variables and Hypothesis Testing (Source: Author)

Independent Variables	**Dimension**	**Indicator**	**Key Authors**
New Products (X1)	- Newness	Changing customer needs Research and development programs	David (2019)
Products Upgrading (X2)	- Trends	Market trends alignment Customer satisfaction	Markovic & Bagherzadeh (2018)
Improved Product Features (X3)	- Procedural	Market analysis Employee creativity	Jajja et al. (2017)
Dependent Variable (Y)			
Competitive Advantage	- Cost leadership & differentiation	Market coverage Market share Internal firm skills Firm resources	May & Schedelik (2019)

Table 4: Correlation Analysis in Product Innovation and Competitive Advantage

		New Products	**Products Upgrading**	**Improved Pdt Features**	**Competitive Advantage**
New Products	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	247			
Products Upgrading	Pearson Correlation	-.012	1		
	Sig. (2-tailed)	.851			
	N	247	247		
Improved Products Features	Pearson Correlation	.015	-.064	1	
	Sig. (2-tailed)	.812	.320		
	N	247	247	247	
Competitive Advantage	Pearson Correlation	.147*	.241**	.030	1
	Sig. (2-tailed)	.021	.000	.643	
	N	247	247	247	247
*. Correlation is significant at the 0.05 level (2-tailed).					
**. Correlation is significant at the 0.01 level (2-tailed).					

Table 6: Coefficients for Product Innovation on Competitive Advantage

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	2.106	.280		7.521	.000
New products	.110	.042	.162	2.652	.009
Product upgrading	.173	.045	.236	3.856	.000
New product features	.076	.039	.121	1.976	.049

a. Dependent Variable: competitive advantage
b. Predictors: (Constant), product innovation (New products, product upgrading, new product features)

Table 7: Regression coefficient of product innovation on competitive advantage

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.176	.277		7.843	.000
	Product innovation	.342	.073	.286	4.676	.000

a. Dependent Variable: competitive advantage
b. Predictors: (Constant), product innovation