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Abstract

This study examined the effect of product innovation on performance of the cement manufacturing firms in Kenya. It adopted a descriptive research design. The target population was all the department heads in all the cement manufacturing firms in Kenya. All the 79 department heads participated in the study. The response rate was 74%. Primary data was collected through closed-ended questionnaires. Questionnaire validity was ensured while reliability was determined using Cronbach's Alpha. Descriptive statistics; frequencies, percentages and means were used. Further, inferential statistics; correlation and regression analysis were used to assess relationship between variables. The correlation results indicated that there is a significant positive association between product innovation and performance of the cement manufacturing companies in Kenya, ($r = 0.544$, $P = 0.000$). Regression results also indicated a significant relationship, ($R^2 = 29.6\%$, $P = 0.000$). The null hypothesis (H_0) was rejected since the p-value was $0.000 < 0.05$. The study concluded that there is a positive and significant effect of product innovation on performance of the cement manufacturing firms in Kenya. Results have implications on technical specifications of products, product research and development, customer-centric product features, and enhancement of the existing products in all the cement manufacturing firms in Kenya.

Keywords: *product innovation, performance of cement firms, cement manufacturing firms*

1.0 Introduction

1.1 Background of the Study

Product innovation is defined as the presentation of a decent or a service that is new to the market or has been altogether enhanced in connection to its attributes or features. These incorporate critical enhancements in mechanical determinations, segments and materials, joined, or ease of use among different capacities (De Massis, Frattini, Pizzurno & Cassia, 2015). Further, De Medeiros, Ribeiro and Cortimiglia (2014) define product innovation as the result of bringing to life a new way to solve the customer's problem through new products or services development.

Product innovation plays a significant role in enhancing a firm's growth, through new and improved products, which results to overall improvement in the performance of the firm. Nybakk and Jenssen (2012) observed that innovation has tremendous business value since it is able to boost organizations' profitability. As such, innovativeness is critical in the creation of performance and in the way firms compete in the regions, nationally and globally. According to Fabre and Grumbach (2012), the Chinese authorities have designed a strategic innovation to face new economic and social challenges. In Nigeria, Ibidunni, Iyiola and Ibidunni (2014) observed that product innovation had tremendously improved profitability and the survival of small and medium businesses. The conclusion from the investigation demonstrated that there is requirement for SMEs to complete research on product advancement keeping in mind the end goal to take care of and satisfy the demand and desires of all buyers.

According to the Kenya Association of Manufacturers report of (2016), the profit before tax for Athi River Mining decreased from KES 2 billion in year 2014 to a loss of KES 3.5 billion in 2015. Furthermore, other cement producing companies including Bamburi Cement, East African Portland Cement, Mombasa Cement, National Cement, Savannah Cement Limited, RAI Cement Limited, Simba Cement and ARM Cement Limited have also been experiencing challenges such as inflated power prices, fuel and coal which ultimately affect the production efficiency and cost. Hence, there is inefficiency among the cement producing companies. Further, the report revealed a decline in the amount of cement produced and this implies a production-related problem.

1.2 Statement of the Problem

The business environment within which the cement manufacturing firms operate has been very volatile. Further, social reforms, political anxieties, technological advancements, competition from new entrants and effects of globalization are some of the challenges that have caused this volatility, and have greatly affected the growth of firms in this sector (Swart & Robinson, 2014). Currently, there is growing interest in the cement sector and new players are coming in after a long period of dormancy. The emergence of new players is witnessed by growth in Kenyan cement supply/demand. The quantity demanded on cement has rose from 1.6 million tons per annum progressively since 1994 to 3.2 million tons in 2008, (Kenya Association of Manufacturers, 2008).

Despite the increasing rise in demand for cement products, the firms in the industry are unable to meet this demand (Chesaro, 2013). As such, customers have raised concerns over the shortage of cement in the market. The low production could largely be linked to the lack of innovativeness in the product lines and also in the production process to scale down the high cost of manufacturing at both the firm and industry level. Consequently, the profitability of some of the cement firms has continued to decline, for example, the profit before tax for Athi River Mining decreased from KES 2 billion in year 2014 to a loss of KES 3.5 billion in 2015 (Kenya Association of Manufacturers, 2016). Previous studies have failed to address the role of product innovation in influencing the performance of the cement manufacturing companies in Kenya, thus, the current study sought to fill this research gap.

1.3 Purpose of the Study

The purpose of this study was to examine the effect of product innovation on the performance of cement manufacturing firms in Kenya.

1.4 Hypothesis of the Study

H₀: Product innovation does not have a positive and significant influence on the performance of cement manufacturing firms in Kenya.

2.0 Literature Review

2.1 Theoretical Review

This study was guided by the resource based theory which was advanced by Penrose in 1959 which postulates that competitiveness emerges from firm's assets and underlying abilities which further defines an organization's ability to be innovative. Firm assets are those benefits associated with a firm and incorporate human, social, innovative, learning, physical and money related (Ernst & Young, 2012). The availability of various firm resources influences the development procedure and ability of firms (Yang, 2011).

As postulated by Trott (2008), when firms have resources that are valuable, rare and not easily copied, they achieve a sustainable competitive advantage mostly in the form of innovative new products. As such, the availability of resources in an organization creates an opportunity for the organization to develop new products, thus achieving sustainable competitiveness in the market. This argument is also supported by Ellul and Yerramilli (2010) who posits that a firm's own resource provides a much more stable context in which to develop its innovation activity and shape its market. Therefore, the resource based theory provided link between product innovation and performance of firms.

2.2 Empirical Review

Product innovation is expected to enhance firms' performance through increased customer satisfaction, market share, sales revenue, production capacity and profitability. Pishgar, Dezhkam, Ghanbarpoor, Shabani and Ashoori (2013) assessed the effect of product innovation on customer satisfaction and customer loyalty in the construction industry in Iran. The study found that the efficient allocation of limited resources to maximize value requires focusing on relationship oriented customers and strong, long-lasting customer retention. Pishgar et al. (2013) further observed that customer orientation has typically been measured by self-reports from service employees. Customer orientation has also been shown to have a positive impact on performance of construction firms. The study concluded that innovation management and customer orientation have been widely recognized as key factors in enhancing customer satisfaction. However, the study by Pishgar et al. (2013) focused on customer satisfactions as opposed to organizational performance, thus revealing a conceptual gap.

Karanja (2014) evaluated the effect of strategic innovation on performance of commercial banks in Kenya. The study looked at product, process, market and stimulus strategic innovations. The research employed a descriptive survey design and used a census method. The study collected primary data on the variables using a questionnaire. The findings showed that strategic innovation influenced profitability of commercial banks to a very great extent. The research concluded that strategic innovations are important to banks future growth and sustainability. The study by Karanja (2014), gave insight on the importance of strategic innovation in enhancing organizational performance. Nonetheless, the banking sector has different success factors from those of cement manufacturing firms.

Mutegi (2018) assessed the role of innovation strategy on insurance penetration in Kenya. The research reviewed four variables including product innovation strategy, market innovation strategy, technological innovation strategy, and scenario plan strategy. The study adopted a descriptive research design. Based on the findings, a large number of the respondents thought product innovation analyzes and identifies what customers want. The study concluded that all the independent variables (product innovation, market innovation, technological innovation and scenerio planning contribute significantly to insurance penetration. Although Mutegi's study focused on insurance firms in Kenya, it is very informative as it points out methods that can be considered in the current study.

3.0 Research Methodology

This study report parts of results of a big study that was conducted between January and June 2018. The study adopted a descriptive research design. It targeted all the department heads in all the cement manufacturing firms. The total number of departments in all the firms was 79. Primary data was collected through closed-ended questionnaires which were pre-tested to ensure validity and reliability. Descriptive statistics that included frequencies, percentages and means were computed. Further, inferential statistics, specifically, the correlation and regression analysis were also used to assess the relationship between the independent and the dependent variables. Information was presented using tables and chart.

4.0 Results and Discussion

4.1 Reliability Statistics

Reliability of data was done using of Cronbach’s Alpha whose result is presented in Table 1. A reliability coefficient indicates the goodness of the items in the data for carrying out statistical analysis. According to Sekaran and Bougie (2010), testing goodness of data is a pre-requisite for data analysis.

Table 1: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.954	.952	43

As indicated in Table 1, this study computed the reliability of the collected data where Cronbach’s alpha coefficient of .952 was found. This indicated a 95.2% reliability level. Bryan and Bell (2011) noted that a Cronbach alpha coefficient of 0.7 and above is adequate in social and business research.

4.2 Response Rate

A total of 79 questionnaires were distributed to the department heads drawn from the nine cement manufacturing firms in Kenya. Out of the 79 administered questionnaires, 64 were returned. However, two questionnaires had incomplete answers, and hence were not included in the analysis. This resulted to 62 valid questionnaires which indicate a 78% response rate as shown in Table 2.

Table 2: Overall Response Rate

Firms	Administered questionnaires	Returned	Response rate (%)
1. Savannah Cement Ltd	8	7	88%
2. Bamburi Cement Ltd	10	8	80%
3. ARM Cement Ltd	10	6	60%
4. EAPCC Ltd	10	8	80%
5. National Cement Ltd	7	6	86%
6. Mombasa Cement	8	4	50%
7. River Mining Cement Ltd	9	8	89%
8. RAI Cement ltd	7	6	86%
9. Simba Cement	10	9	90%
Total	79	62	78%

The response rate of 78% was regarded very significant to proceed with data analysis. Saunders, Lewis and Thornhill (2009) noted that a response rate above 70% is gainfully high. The high response rate in this study was attributed to good data administration techniques.

4.3 Relationship of Product Innovation and Performance of Cement Manufacturing Firms in Kenya

The objective of the study was to determine whether product innovation affects the performance of the cement manufacturing firms in Kenya. Respondents were asked to indicate their level of agreement with the various statements in a 5-level likert scale. The statements largely focused on: new product development, enhancement of the existing products, quality improvement, customer-centric product features, technical specifications, products portfolio, and product research and development. The descriptive results are shown in Table 3.

Table 3: Descriptive Statistics of Product Innovation and Performance of Cement Manufacturing Firms in Kenya

Statements N= 62	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
Through enhanced technical specification, our firm has been able to achieve product innovation.	3(4.8%)	0	11(17.7%)	20(32.3%)	28(45.2%)	4.13
Our company has invested heavily in product research and development	3(4.8%)	1(1.6%)	9(14.5%)	21(33.9%)	28(45.2%)	4.13
Through product innovation, our firm has managed to provide customer friendly products.	3(4.8%)	1(1.6%)	11(17.7%)	23(37.1%)	24(38.7)	4.03
Our company undertakes improvement of existing products.	3(4.8%)	7(11.3%)	7(11.3%)	16(25.8%)	29(46.8%)	3.98
Development of new products is essential for the growth of our company	2(3.2%)	10(16.1%)	18(29%)	20(32.3%)	12(19.4%)	3.48
The management meets regularly to discuss on how to improve our products	2(3.2%)	10(16.1%)	18(29.0%)	20(32.3%)	12(19.4%)	3.48
Our company is involved in improving the quality of our products.	2(3.2%)	10(16.1%)	26(41.9%)	14(22.6%)	10(16.1%)	3.32
Through product innovation, our company has increased its product portfolio.	6(9.7%)	15(24.2%)	20(32.3%)	15(24.2%)	6(9.7%)	3.00
Aggregate mean score						3.69

The results in Table 3 shows that the majority of respondents, (46, 73.9%), with a mean aggregate score of 3.69, agreed with the various assertions that aimed to assess the effects of product innovation on the performance of cement manufacturing firms in Kenya. It is clear that the respondents agreed with the following top four statements (the ones with highest mean scores) in describing the influence of product innovation on performance: through enhanced technical specification, our firm has been able to achieve product innovation (mean, 4.13), our company has invested heavily in product research and development (mean, 4.13), through product innovation, our firm has managed to provide customer friendly products (mean, 4.03), and our company undertakes improvement of existing products (mean, 3.98). Two statements had the lowest mean score (neutral mean score of 3.16).

These are; our company is involved in improving the quality of our products (mean, 3.32) through product innovation; our company has increased its product portfolio (mean, 3.00).

With a need to confirm these findings, the respondents were further asked to indicate the extent to which they think product innovation influences the performance of their firm to which most of the respondents responded in affirmative, where 39 (63%) indicated to large extent, 19 (31%) moderate extent, and 4 (6%) small extent as shown in Figure 1.

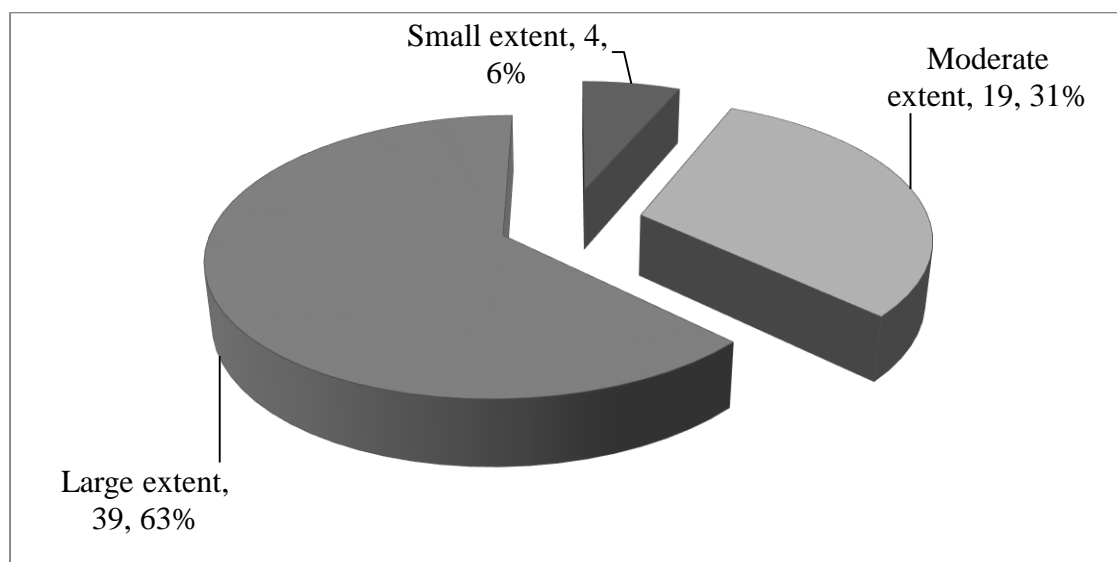


Figure 1: Extent to which Product innovation influences the performance of a firm

The findings in Table 3 and in Figure 1 have provided four most essential aspects of product innovation that are significant in driving the performance of cement manufacturing companies in Kenya. These are: technical specifications, product research and development, customer-centric product features, and the enhancement of the existing products.

This finding mirror those of De Medeiros, Ribeiro and Cortimiglia (2014) who noted that product innovation provides new ways of solving customers' problems through development of new products and services. This is beneficial to both the customer (quality products/services) and the firm (improved productivity and profitability). Similarly, Story and Easingwood (2012) observed that product development gives the clearest method of creating incomes.

4.4 Test of Hypothesis

In order to confirm the foregoing results, an inferential statistical analysis was conducted. This helped to test the null hypothesis which stated, H_{01} : product innovation does not have a positive and significant influence on the performance of cement manufacturing firms in Kenya. To test

this hypothesis, a bivariate linear correlation between X1 (product innovation and dependent variable Y (performance of manufacturing firms) was conducted. This aimed to investigate the relationship between these two variables. The results are presented in Table 4.

Table 4: Bivariate linear correlations between product innovation and firm performance

Model		X1	Y
X1	Pearson Correlation	1	.544**
	Sig. (2-tailed)		.000
	N	62	62
Y	Pearson Correlation	.544**	1
	Sig. (2-tailed)	.000	
	N	62	62

** . Correlation is significant at the 0.01 level (2-tailed).

The result in Table 4 shows statistical evidence that product innovation positively and significantly influences the performance of the cement manufacturing firms in Kenya where $r = .544^{**}$, and $P = .000$. This finding is consistent with the works of Ibidunni, Iyiola and Ibidunni (2014) who found a direct and significant relationship between product innovation and performance of organizations.

Data on product innovation was further subjected to a regression analysis to test its effect /impact on the performance of cement manufacturing firms in Kenya. The results are presented in Table 5, 6 and 7.

Table 5: Product Innovations and firms performance: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.544 ^a	.296	.284	.52583	.296	25.254	1	60	.000	2.282

a. Predictors: (Constant), X1

b. Dependent Variable: Y

Results in Table 5 indicate that product innovation accounts for 29.6% of the total variations in the performance of the cement manufacturing firms in Kenya ($R^2 = 0.296$). These results confirm the correlations output in Table 4, that a positive and significant effect exists between product innovation and the performance of cement manufacturing firms ($\beta_1 = .449$, $P = .000$) as also shown in Table 6.

Durbin-Watson value of 2.282 in Table 5 is higher than 1. According to Bryman (2012) and Singh (2007), the Durbin-Watson value indicates the likelihood that the deviation (error) values for the regression have an auto regression component. An ideal regression model assumes that the error deviations are not correlated. A Durbin-Watson value that is less than 0.80 usually shows that autocorrelation is likely to be present (Bryman, 2012). The Durbin-Watson value of 2.282 confirms that no autocorrelation of data was detected hence the model is reliable.

Table 7 further shows absence of multicollinearity among the variables where Variance Inflation Factor (VIF) is 1.000. VIF assesses how much the variance of an estimated regression coefficient increases if the predictors are correlated. Salmerón Gómez, García Pérez, López Martín, and García (2016) noted that, if the VIF goes above 10, one can assume that the regression coefficients are poorly estimated due to multicollinearity. The regression model was therefore valid since no multicollinearity was detected. Table 6 also indicates that the model is valid (a good fit of the data), ($F_{(1, 60)} = 25.254$), ($P = .000$) which implies that product innovation is a statistically significant predictor of the performance of the cement manufacturing firms in Kenya.

Table 6: Product Innovations and firms performance: ANOVA Summary

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.983	1	6.983	25.254	.000 ^b
	Residual	16.590	60	.276		
	Total	23.572	61			

a. Dependent Variable: Y

b. Predictors: (Constant), X1

Since all the valuables of the product innovation predictor (X1) had identical (Likert) scales, the study preferred interpreting the B-coefficients rather than the beta coefficients. Consequently, the value of regression weights shown in Table 7 indicate that product innovation will always exists in the cement manufacturing firms at a certain significant minimum ($\beta_0=2.457$, $P < .000$).

Table 7: Product Innovations and firms performance: Regression Weights

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.457	.337		7.288	.000		
	X1	.449	.089	.544	5.025	.000	1.000	1.000

a. Dependent Variable: Y

In reference to the foregoing results and discussion, the first null hypothesis (H_01) predicted no positive and significant effects of product innovation on the performance of cement manufacturing firms. The findings from bivariate correlation in Table 4 ($r = .544^{**}$, $P = .000$) and from regression weights in Table 7 ($\beta_1 = .449$, $P = .000$) indicates that a positive and significant effect exists between the two variables. Therefore, the null hypothesis (H_01) is rejected in favour of H_1a hence the study concludes that a positive and significant effect exists between product innovation and the performance of the cement manufacturing firms in Kenya.

This finding is similar to the work of Karanja (2014), who found that strategic innovation and particularly, product innovation influenced profitability of firms to a very great extent. This result indicates the great need for cement manufacturing firms in Kenya to strengthen their product related innovations whose aspects are identified in Table 3.

5.0 Conclusion and Recommendations

5.1 Conclusion

The study sought to examine the whether product innovation affects the performance of the cement manufacturing firms in Kenya. The correlation results indicated that there was a significantly positive association between product innovation and performance of cement manufacturing companies in Kenya. This was supported by a correlation value of 0.544 and p value of 0.000. Further, regression results indicated a positive and significant relationship between product innovation and performance of cement manufacturing companies in Kenya. This was supported by an R squared of 29.6% and a p value of 0.000. The null hypothesis (H_{01}) that there is no positive and significant effect of product innovation on the performance of cement manufacturing firms was rejected since the p value was $0.000 < 0.05$. Therefore, the alternative hypothesis (H_{1a}) that there is a positive and significant effect of product innovation on the performance of cement manufacturing firms was accepted. Based on the findings, the study concluded that product innovation has a positive and significant effect on the performance of cement manufacturing companies in Kenya. In particular, the most essential aspects of product innovation that are significant in driving the performance of cement manufacturing firms in Kenya are: technical specifications, product research and development, customer-centric product features, and the enhancement of the existing products.

5.2 Recommendations

Findings from this study indicate that product innovation has enormous influence on performance of the cement manufacturing firms in Kenya. The implication of this finding is that any cement manufacturing firm that adopts product innovation will always experience a significant improvement in its performance. As such, this study recommends the need for cement manufacturing firms in Kenya to strengthen their product related innovations. In particular, the firms should focus on the following aspects; technical specifications of products, product research and development, customer-centric product features, and enhancement of the existing products.

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