

Effect of Technological Innovation on Performance of the Cement Manufacturing Firms in Kenya

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Abstract

Technological innovation is a key factor in a firm's competitiveness. It is unavoidable for firms which want to develop and maintain a competitive advantage and gain entry into new markets. The success of most firms majorly depends on efficient operational processes which result from more investments in technologies that enhance firm internal efficiencies. The objective of the study was to determine whether technological innovation affects the performance of the cement manufacturing firms in Kenya. The study was guided by diffusion of innovation theory. It adopted descriptive research design. The target population was all the department heads in all the nine cement manufacturing firms. The total number of departments in all the firms was 79. All the 79 respondents were included in the study since the target population was small. Primary data was collected through closed-ended questionnaires. Descriptive statistics, specifically frequencies, percentages and means were used. Further, inferential statistics; that included the correlation and regression analysis were also used to assess the relationship between the study variables. The findings revealed that technological innovation positively and significantly affect performance of the cement manufacturing firms in Kenya. The study concluded that technological innovations have a positive and significant effect on performance of the cement manufacturing companies in Kenya. The cement manufacturing firms in Kenya need to strengthen their technological related innovations. It is therefore necessary for the cement manufacturing firms in Kenya to strengthen their technological related innovations. They should adopt integrated manufacturing management information system in their functional operations; embrace inter-organizational processes and collaborations, implement innovative technology in the production processes and come up with deliberate strategy of training and developing staff on technical skills. The results further point out the need for the cement manufacturing firms to automate systems and routine tasks, and need to embark on producing and utilizing online reports in order to reduce costs.

Keywords: *Technological innovation, Performance, cement manufacturing firms*

1.0 Introduction

Technological innovation is defined as the adoption of systems such as Enterprise Resource Planning (ERP) systems that provide capabilities that support and enhance processes

associated with producing. The systems should also help improve firm activities by automating routine tasks such as order management (Valacich & Schneider, 2012). Further, innovation technology is defined by Tornatzky, Fleischer and Chakrabarti (2014) as new invention derived from research developments, technical knowledge and tools independent of product and service initiatives. With reference to the foregoing definition, this study regards technological innovation as the adoption of new systems derived from research and development and technical knowledge in order to support and enhance processes within the cement manufacturing companies.

Technological innovation is a key factor in a firm's competitiveness. It is unavoidable for firms which want to develop and maintain a competitive advantage and gain entry into new markets (Becheikh et al. 2015). The success of most firms majorly depends on efficient operational processes which result from more investments in technologies that enhance firm internal efficiencies (Munyoroku, 2014). Therefore, technological innovation adopted by firms should help to identify and explore new revenue opportunities and improve customer satisfaction through reliable delivery. Technological innovation can be attributed to new technological innovation, automation of routine tasks and adoption of new systems (Zwass, 2013).

The study sought to explore inefficiency among cement producing firms in Kenya. 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. The report further shows that even other cement producing firms including Bamburi Cement, East African Portland Cement, Mombasa Cement, National Cement, Savannah Cement Limited, RAI Cement Limited, Simba Cement and ARM cement limited have been experiencing challenges such as inflated power prices, fuel and coal which ultimately affect production efficiency and cost. Hence, there is inefficiency among the cement producing firms. Further, the report revealed a decline in the amount of cement produced and this implies a production problem. In this research, firm performance will be estimated in terms of profitability, production capacity and customer satisfaction.

Manufacturing firms use appropriate innovations such as product, technology, process and market innovations to enhance effectiveness and efficiency in their production activities (Swart & Robinson, 2014). This is ultimately expected to boost their overall performance. Unfortunately, cement manufacturing firms in Kenya have not performed very well in the past. It is expected that these firms have adopted the various strategic innovations and, therefore, seeks to investigate the role of product, technology, process and market innovations in enhancing performance of cement manufacturing firms in Kenya.

There are nine cement manufacturing companies firms in Kenya. These are: Bamburi Cement, Athi River Mining Cement, East African Portland Cement, Mombasa Cement, National Cement, Savannah Cement Limited, RAI Cement Limited, Simba Cement and ARM Cement Limited (Chesaro, 2013). These firms, according to the Kenya Association of Manufacturers (2016) have been encountering difficulties, for example, high cost of power, fuel and coal which at last influence generation effectiveness and cost. This is on account of, deficient power supply caused by various power outages and power surges that influence the processing frameworks. To ensure cost is under control, these organizations reduce their level of production.

The demand for cement in Kenya is assessed to be around 3.5million tons every year (Ndetto, 2015). The companies deliver around 3.5 million tons, of which Bamburi Cement produces

2.3 million tons. The firms also export cement to other neighboring nations including Somalia, Democratic Republic of Congo, South Sudan, Mozambique, Rwanda and Burundi (Mumero, 2011). Despite such a big a market, the production capacity of Kenyan firms is very low compared to the global standards. For example, while Kenya's production capacity is about 3.5 million tons per year, while the production capacity of United States is around 86.3 million metric tons of cement per year.

1.1 Statement of the Problem

Manufacturing companies adopt appropriate innovation to enhance effectiveness and efficiency in the production process; an action that enables them to improve overall performance. However, 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 and overall performance of firms in this sector (Swart & Robinson, 2014). Porter (2008) advised on the need for companies to develop a sustainable competitive environment, which cannot be easily affected by changes in the environment or replicated by potential and existing competitors. This advice underpins the need for strategic innovation.

In Kenya, 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 evolution. The quantity demanded for example 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 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). This means that there is a problem of poor performance among the cement manufacturing firms.

If the problem is not addressed, the further decline in supply of cement will be experienced and risks the shutdown of some firms which may negatively affect the achievement of Kenya's development agenda of affordable housing in the next five years. Previous studies conducted have not examined the role of strategic innovation in influencing the performance of the cement manufacturing companies in Kenya. Majority of these studies, for example, Mbongwe (2014), Otido (2011) and Obiero (2008) focused on competitive strategies negating the role of strategic innovation in revitalizing production and operations in organizations. It is based on this research gap that the study sought to investigate the effect of technological innovation on the performance of the cement manufacturing firms in Kenya. The hypothesis to be tested is;

H₀₁: Technological 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 Framework

This study was guided by the diffusion of innovation theory which was progressed by Everett Rogers in 1962. The hypothesis brings up the how, why, and at what rate new thought and innovation spread. Rogers contends that diffusion is the procedure by which advancement is imparted after some time among the members in a social framework (Rogers, 1962). Rogers additionally attests that four primary components impact the spread of another thought: the development itself, correspondence channels, time, and a social framework and this procedure depend intensely on human capital (Rogers, 1983). The innovation must be widely applied in order to be sustainable. The classes of adopters according to this theory are innovators, early adopters, early majority, late majority, and laggards (Noel, 2009).

Rogers contends that the qualities and attributes of the advancement itself are critical in deciding the way of its dissemination and the rate of its implementation (Rogers, 1995). Citing from the work of Thomas and Znaniecki (1927) Rogers takes note that it is the thing that potential adopters see to be the qualities of a development that is the vital thing (Kunreuther & Pauly, 2012). Rogers illustrates five essential qualities of an advancement which, he contends, influence its diffusion: relative favorable position, similarity, multifaceted nature, trialability and perceptibility.

In relation to the cement manufacturing industry, normalization and standardization procedures reduce uncertainty and create network effects that increase the profitability of adoption (David, 1985; David & Greenstein, 1990) showing that compatibility standards constitute a factor likely to favour innovation diffusion. Rogers (1995) as cited by Ahmed, Zeng, Sinha, Flavell and Massoumi (2011) suggests that, in almost all cases, a considerable degree of re-invention does occur and therefore, instead of a linear model of communication, a convergence model would be more appropriate.

In the current study, the theory was used to explain the importance of technological innovation on performance of cement manufacturing firms in Kenya. This is in line with Rogers's diffusion theory where Noel (2009) asserts that technological innovation; the rate of its usage is important for organizational growth and development. Therefore, the diffusion theory was used to support objective number two, which is technological innovation and performance of organizations.

The Rogers diffusion theory of innovation has been criticized for omitting a set of adopters. According to Lundblad (2003), Rogers didn't realize that some adopters may have the features of innovators/early adopters but may not quickly adopt an innovation. For example, a lady may not adopt a new innovation that has to do with jewelries, not because she is a laggard but because of a belief about jewelries probably because of religion. The critics are of the opinion that an adopter may be young, venturesome, financially stable (features of early adopters/innovators), and yet delay in adopting an innovation. Rogers's theory does not consider such category of adopters and therefore, no name is given. This weakness by Rogers's diffusion theory of innovation does not affect its applicability in the current study. The current study focused on early adopters of innovation.

2.2 Empirical Review

There exist several studies that have explored technological innovation across several sectors, for example, Tajuddin, Ibrahım and Ismail (2015) investigated the influence of innovation on performance of construction firms in Malaysia. Their results indicated that innovation has a significant impact on performance. However, the study focused on innovation in general and failed to address specific aspects of innovation such as product, process, technological and market innovations and how they influence performance.

Claudio, Teresa and Cristina (2013) examined the effect of technological innovation efficiency on firm performance among Spanish manufacturing firms. The research used the Survey of Business Strategy (SBS), which is a firm-level panel data set of Spanish manufacturing firms covering the period from 1990 to 2005. The study found that the use of the innovation without considering the effort needed to achieve them might be overestimating their effect on firm performance. The results show that there are few efficient firms in the Spanish manufacturing sector indicating that there is much room for improving the efficiency of the technological innovation process. The results also show the importance of measuring the technological innovation efficiency as determinants of firm performance rather than the merely inclusion of innovation inputs or outputs. Nonetheless, this study used a panel data set while the current study used a cross-sectional data set.

Didier and Olsson (2014) focused on micro insurance where they investigated the importance of an inclusive approach in service innovation, understood the important role of process improvements with the help of technology to achieve service innovation by analyzing the innovation. They mainly observed the endogenous and exogenous drivers that lead to innovation. The findings enabled the articulation of the main advantage of technological innovation, which is, that stakeholders do not start from zero, they do not start with nothing. Every firm has its own base of knowledge, which they share to achieve a common goal. In the case of micro insurance for instance, a success factor was the ability to reuse an existing platform of payment. The high penetration of mobile technology on emerging markets was particularly important here due to the lack of infrastructure and the search for cost reduction.

Nidumolu, Prahalad and Rangaswami (2013) observed that the European cement industry is continuously researching ways to improve the quality of its products and reducing its environmental impact. It dedicates significant time and resources to innovation projects across a broad range of areas. The aim of the innovation projects is to improve their environmental performance, reduce CO₂ emissions and improve energy efficiency. The projects range from carbon capture and reuse in clinker manufacturing development of low carbon cements, new binders and innovation in both concrete production and applications. The focus on innovation is because the cement industry strongly believes that innovation drives competitiveness and contributes to sustainable growth and job creation.

The African cement, concrete and construction business is growing at rapid pace (Schmidt et al, 2018). The cement sales are expected to grow rapidly until 2050. The number of newly built cement plants increases dramatically and in addition more cements are being imported from outside the continent. This causes a high number of potentials and challenges at the same time. Newly built cement plants can operate directly at best technological state of the art and thus incorporate more sustainable technologies as well as produce new and more sustainable products. This puts pressure on the quality control regulations and institutions to

ensure safety of construction, healthy application, and environmental safety for the population. Schmidt et al's paper provided possible solutions to build up the rapidly increasing African cement production more sustainably than in the rest of the world as well as the related challenges and obstacles that need to be overcome.

Muita (2013) explored the relationship between strategic innovations and competitiveness telecommunication industry and used descriptive research design. The examination results showed that strategic innovations were developed to meet buyers' needs. Muita (2018) study is very informative as it points out methods and data analysis techniques that were considered in the current study. Odhiambo (2014) evaluated innovation strategies adopted by Standard Chartered Bank in Kenya. The study revealed that Standard Chartered Bank in Kenya has adopted technological innovation strategies to help in the advent of globalization and to enhance their methods for working together keeping in mind the end goal to draw in and keep up existing clients. The techniques under investigation were received since they concentrated on all parts of the business operations extending from client mind, mechanical progression to better items in the market. Although Odhiambo's study looked at technological innovation in the banking industry, it revealed areas of application in service industry, whose magnitude and relevance can be tested on the cement manufacturing firms especially in the business operations and processes.

Wason and Bichanga (2014) assessed the innovation practices embraced by small and medium venture of Nairobi Region because of worldwide rivalry. They established that SMEs in Nairobi County use technological innovation as a strategy in global entrepreneurship to a moderate extent. The study looked at technological innovation as an entry strategy to global entrepreneurship. The current study examined the effects that technological innovation has on firm's performance. By embracing technology, the cement manufacturing firms are expected to enjoy economies of scale which impacts the overall firm's performance. Mutua and Kiruthu (2014) examined the Quality Management Practices (QMP) adopted by cement producing companies in Kenya and their impact on profitability. The research used cross sectional research design. The results indicated that firms that used QMP registered high sales volume leading to increased profitability. Mutua and Kiruthu's study focused on quality management practices with an aim of improving organizational financial performance through increased sales. Technological innovation was however not part of quality management and therefore the study did not address the role of technological innovation in enhancing performance. In the current study, technological innovation was considered as one of the factors that influences performance of cement manufacturing firms in Kenya.

3.0 Research Methodology

A descriptive research design was used in this research. The study involved all the 9 cement manufacturing firms in Kenya. The target respondents were 79 department heads or their equivalents in all the cement manufacturing firms. The study adopted a census approach since the target population was small. Therefore, all the 79 department heads from all the 9 firms were selected. Purposive sampling technique was employed in selecting the respondents. Questionnaires were used to collect primary data from the selected respondents. The questionnaire tool consisted of closed-ended questions. Descriptive statistics such as mean and percentage were computed to capture the characteristics of the variables under study while inferential statistics, specifically the Pearson correlation and regression analysis were used to assess the relationship of the variables.

4.0 Results and Discussion

4.1 Performance of Cement Manufacturing Firms in Kenya

The performance of cement manufacturing firms in Kenya was the dependent variable in this study. The issue of performance of a firm is usually regarded as highly sensitive and confidential and hence not many companies can avail their financial data for scrutiny and analysis unless it is for formal audit purposes. As a result, this study was unable to obtain the actual performance figures and therefore relied on those items that intended to capture performance of the firm based on the perceptions of the heads of departments from each firm that participated in the study. The results are provided in Table 1.

Table 1: Descriptive Statistics on Performance of Cement Manufacturing Firms in Kenya

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
Our company's sale volumes have increased due to adoption of strategic innovations.	2(3.2%)	2(3.2%)	2(3.2%)	22(35.5%)	34(54.8%)	4.35
Due to interaction with strategic innovations, our employees are fully equipped with the necessary skills to enhance productivity.	1(1.6%)	1(1.6%)	9(14.5%)	23(37.1%)	28(45.2%)	4.23
Through strategic innovations, our company's cost of production has reduced significantly	1(1.6%)	3(4.8%)	5(8.1%)	26(41.9%)	27(43.5%)	4.21
Through market innovation, our customers' base has widened.	2(3.2%)	2(3.2%)	12(19.4%)	19(30.6%)	27(43.5%)	4.08
Through process innovation, our company's operational efficiency has improved.	2(3.2%)	4(6.5%)	9(14.5%)	21(33.9%)	26(41.9%)	4.05
Through technological innovation, our company's productive capacity has improved.	2(3.2%)	1(1.6%)	13(21.0%)	24(38.7%)	22(35.5%)	4.02
Through product innovation, our company's profitability has increased.	5(8.1%)	3(4.8%)	14(22.6%)	12(19.4%)	28(45.2%)	3.89
Aggregate mean score						4.12

The results in Table 1 indicate that the majority of respondents, (51, 82%), with a mean aggregate score of 4.12, agreed with the various assertions that aimed to determine the performance of the cement manufacturing firms in Kenya. Specifically, the respondents agreed with the following top three statements (the ones with highest mean scores) in describing the performance of the cement manufacturing firms: our company's sale volumes have increased due to adoption of strategic innovations (mean, 4.35), due to interaction with strategic innovations, our employees are fully equipped with the necessary skills to enhance productivity (mean, 4.23), through strategic innovations, and our company's cost of production has reduced significantly (mean, 4.21). The statement that had the lowest mean score was; through product innovation, our company's profitability has increased (mean, 3.89) although this score is also high.

These results are showing that the performance of the cement manufacturing firms is characterized by sale volumes, customers' base and profitability. It is also clear that the performance is dependent on operational efficiency, reduction of cost of production and the presence of skills that enhances productivity. According to Atalay, Anafarta and Sarvan (2013), innovation is a fundamental source of long run competitiveness, since it prompts product and process enhancements, makes advances that encourages firms to survive, enables firms to develop more rapidly, be more productive, and be more beneficial.

This point out the need for the cement manufacturing firms to focus on the manufacturing processes (process strategies) with a view to enhancing efficiency, and the need to embark on measures that help to reduce the costs of production (technological strategies), increase sales

(marketing strategies) and enlarge the number of customers (products strategies) that are consuming firm’s products. These measures help to improve the overall profit of a firm.

This finding supports the results by Veugelers (2012) who concluded that both process and product innovations significantly enhance the organizations’ growth. Further, Baraev (2015) found that process innovation enhances efficiency of the firms. In addition, Munyoroku (2014) noted that technological innovation adopted by firms helps them to identify and explore new revenue opportunities and improve customer satisfaction through reliable delivery. Hollanders and Evangelista (2013) observed that market innovation enhances competitiveness, which translates into increased profits.

4.2 Technological Innovation

Respondents were asked to indicate their level of agreement with the various statements relating to technological innovation. Some of the aspects that were assessed included: integrated manufacturing management information system, inter-organizational processes and collaborations, innovative technology in the production processes, automation of systems and routine tasks, training of staff on technical skills and generation of online reports. The descriptive results are shown in Table 2.

Table 2: Descriptive Statistics of Technological Innovation

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
Our company has acquired integrated manufacturing management information system	4(6.5%)	4(6.5%)	16(25.8%)	24(38.7%)	12(19.4%)	3.71
Our company enjoys inter-organizational processes and collaboration	2(3.2%)	8(12.9%)	16(25.8%)	24(38.7%)	12(19.4%)	3.58
Our firm has invested heavily in innovative technology	2(3.2%)	8(12.9%)	22(35.5%)	16(25.8%)	14(22.6%)	3.52
Our organization has invested in training our staff on technical skills to be able to embrace technological innovation	2(3.2%)	6(9.7%)	22(35.5%)	22(35.5%)	10(16.1%)	3.52
Our firm has adopted new innovative technology	2(3.2%)	10(16.1%)	18(29.0%)	20(32.3%)	12(19.4%)	3.48
Our company has automated its systems and routine tasks	4(6.5%)	6(9.7%)	24(38.7%)	20(32.3%)	8(12.9%)	3.35
Our company is able generate online reports	4(6.5%)	12(19.4%)	22(35.5%)	12(19.4%)	12(19.4%)	3.26
Aggregate mean score						3.49

The results in Table 2 show that the majority of respondents (43, 69.77%), with a mean aggregate score of 3.49, agreed with the various assertions that aimed to assess the effects of technological innovation on the performance of the cement manufacturing firms in Kenya. With a need to confirm these findings, the respondents were further asked to indicate the extent to which they think technological innovation influences the performance of their firm to which most of the respondents responded in affirmative, where 33 (53%) indicated to a large extent and 29 (47%) moderate extent as shown in Figure 1.

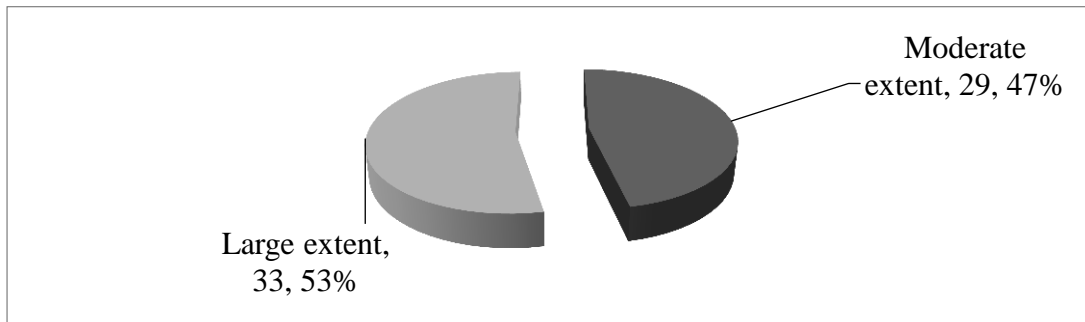


Figure 1: Extent to which technological innovation influences the performance of a firm

According to Table 2, it is clear that the respondents agreed with the following top four statements (the ones with highest mean scores) in describing the influence of technological innovation on performance: our company has acquired integrated manufacturing management information system (mean, 3.71), our company enjoys inter-organizational processes and collaboration (mean, 3.58), our firm has invested heavily in innovative technology (mean, 3.52), and our organization has invested in training our staff on technical skills to be able to embrace technological innovation (mean, 3.52). Two statements had the lowest mean score (neutral mean score). These are; our company has automated its systems and routine tasks (mean, 3.35), and our company is able generate online reports (mean, 3.26).

These findings have provided four most essential aspects of technological innovation that are significant in driving the performance of cement manufacturing companies in Kenya. These are: integrated manufacturing management information system, inter-organizational processes and collaborations, innovative technology in the production processes and training of staff on technical skills. The results further point out the need for cement manufacturing firms to automate systems and routine tasks, and need to embark on online reports to reduce costs.

The finding agrees with the work of Becheikh et al. (2015) who observed that technological innovation is a key factor in a firm's competitiveness. It is unavoidable for firms which want to develop and maintain a competitive advantage and gain entry into new markets. Similarly, the success of most firms majorly depends on efficient operational processes which result from more investments in technologies that enhance firm internal efficiencies (Munyoroku, 2014).

4.3 Test of Hypothesis

An inferential statistical analysis was conducted to further investigate the relationship between the two variables. This helped to test the second null hypothesis which stated, H_{01} : technological innovation does not have a positive and significant influence on the performance of cement manufacturing firms in Kenya. To test this hypothesis, a univariate linear correlation between technological innovation and performance of manufacturing firms was conducted. The results are presented in Table 3.

Table 3: correlations between technological innovation and firm performance

Model		Y	X
Y	Pearson Correlation	1	.499**
	Sig. (2-tailed)		.000
	N	62	62
X	Pearson Correlation	.499**	1
	Sig. (2-tailed)	.000	
	N	62	62

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

The result in Table 3 shows statistical evidence that technological innovation positively and significantly influences the performance of the cement manufacturing firms in Kenya where $r = .499^{**}$, and $P = .000$. This finding is consistent with the works of Tajuddin, Ibrahima and Ismail (2015) who found that technological innovation positively influences performance in a manufacturing organization.

Technological innovation variable was further subjected to a regression to test its effect on the performance of manufacturing firms in Kenya. The results are presented in Table 4, 5 and 6.

Table 4: Technological Innovations and firm's performance: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics F	df1	df2	Sig. F Change	Durbin-Watson
1	.499 ^a	.249	.236	.54334	.249	19.849	1	60	.000	2.083

Results in Table 4 indicate that technological innovation accounts for 24.9% (R square value = .249) of the total variations in the performance of the cement manufacturing firms in Kenya. These results confirm the correlations output in Table 3 that a positive and significant influence exists between technological innovation and the performance of cement manufacturing firms ($\beta_1 = .361$, $P = .000$) as shown in Table 6.

Durbin-Watson value of 2.083 in model summary Table 4 is higher than 1. The Durbin-Watson value of 2.083 confirms that no autocorrelation was detected hence the model is reliable. Table 6 further shows absence of multicollinearity among the variables where Variance Inflation Factor (VIF) is 1.000. The regression model was therefore valid since no multicollinearity was detected. Table 5 also indicates that the model is valid (a good fit of the data), ($F_{(1, 60)} = 19.849$), ($P = .000$) which implies that technological innovation is a statistically significant predictor of the performance of the cement manufacturing firms in Kenya.

Table 5: Technological Innovations and Firms Performance: ANOVA Summary

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.860	1	5.860	19.849	.000 ^b
	Residual	17.713	60	.295		
	Total	23.572	61			

Since all the factors of the technological innovation predictor (X) had identical (Likert) scales, and due to the fact that the constant value was significant, the study preferred interpreting the unstandardized B-coefficients rather than the beta coefficients.

Consequently, the value of regression weights shown in Table 6 indicate that technological innovation will always exist in the cement manufacturing firms at a certain significant minimum ($\beta_0=2.857, P < .000$).

Table 6: Technological Innovations and Firms Performance: Regression Weights

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	2.857	.291		9.810	.000		
1 Technological Innovation	.361	.081	.499	4.455	.000	1.000	1.000

The second null hypothesis (H_{01}) predicted no positive and significant effects of technological innovation on the performance of cement manufacturing firms. The findings from univariate correlation in Table 3 ($r = .499^{**}, P = .000$) and from univariate regression weights in Table 6 ($\beta_1 = .361, P = .000$) indicates that there is a positive and significant effects of technological innovation on performance of the cement manufacturing firms in Kenya. Therefore, the null hypothesis (H_{01}) is rejected and conclusion is made that there is a positive and significant effect of technological innovation on performance of the cement manufacturing firms in Kenya. This finding affirms the significant effect of technological innovation on performance of firms, unlike, Muita (2013) results which did not bring out explicitly the impact of technological innovation on firm performance. Instead, his finding focused more on customers' needs.

The implication of this finding is that any cement manufacturing firm that adopts technological innovation will always experience a significant improvement in its performance. This result indicates the great need for cement manufacturing companies in Kenya to strengthen their technological related innovations.

5.0 Conclusion

According to the findings, the study concluded that technological innovation has a positive and significant effect on the performance of the cement manufacturing companies in Kenya. In particular, the findings revealed four most essential aspects of technological innovation that are significant in driving the performance of the cement manufacturing firms in Kenya. These are: integrated manufacturing management information system, inter-organizational processes and collaborations, innovative technology in the production processes and training of staff on technical skills.

6.0 Recommendations

This study noted an imperative influence of technological innovation on performance of the cement manufacturing firms in Kenya. It is therefore necessary for the cement manufacturing firms in Kenya to strengthen their technological related innovations. They should adopt integrated manufacturing management information system in their functional operations; embrace inter-organizational processes and collaborations, implement innovative technology in the production processes and come up with deliberate strategy of training and developing staff on technical skills. The results further point out the need for the cement manufacturing firms to automate systems and routine tasks, and need to embark on producing and utilizing online reports in order to reduce costs.

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