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Process Innovation and Performance of SMEs in an Emerging Economy: The Linking Effect of External Environment in Kenya

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Abstract:
Small and Medium Enterprises (SMEs) are widely recognized as the key engine of economic growth, wealth generation and job creation among the populace around the world and Africa in particular. Despite their contributions to income generation and employment creation, SMEs in general are currently faced with many problems. However, innovation adoption has been hypothesized as a means of overcoming harsh conditions of SMEs performance. Unfortunately, there have been poor business innovation processes among manufacturing SMEs in both developed countries and emerging economies. The study examined the effect of environment on the link between process innovation and performance of SMEs in Kenya. The study tested three null hypotheses: process innovation has no significant effect on the performance of SMEs, environmental dynamism has no significant moderating effect on the relationship between process innovation and performance of SMEs and environmental munificence has no significant moderating effect on the relationship between process innovation and performance of SMEs in Nairobi County.
The research followed a descriptive survey design. The target population for this study involved all the 600 registered manufacturing SMEs in Nairobi County. In this study, 164 respondents were included in the study. Using factor analysis, three antecedents of process innovation were identified namely; new processes, improved processes and blended processes. Based on the summary of the findings, process innovation was found to have a weak but positive significant effect on the performance of SMEs in Nairobi County. However, the inclusion of a moderator variable (external environment) enhanced the link between process innovation and firm performance. This study introduced new statistical models in the form: $Y_1 = \beta_{01} + \beta_{11} PI + \beta_{21} ED + \beta_{31} PI*ED + \varepsilon_0$ *and* $Y_1 = \beta_{01} + \beta_{11} PI + \beta_{21} EM + \beta_{31} PI*EM + \varepsilon_0$

Keywords: *Process Innovation, firm performance, SMEs, environmental dynamism, environmental munificent*

1. Introduction

Small and Medium Enterprises (SMEs) are widely recognized as the key engine of economic growth, wealth generation and job creation among the populace around the world and Africa in particular. Kenya, like other emerging economies, has recognized the role SMEs play in economic growth and job creation among the youth. According to Martin and Namusonge (2014), Small and Medium Enterprises (SMEs) constitute around 99.7 percent of the enterprises globally. Despite their contributions to income generation and employment creation, SMEs in general are currently faced with many problems (Dastgerdi, 2012) and which are an impediment to the overall survival and growth of SMEs world over. However, innovation adoption has been hypothesized as a means of overcoming harsh conditions of SMEs performance. Innovation is understood to be the introduction of new or improved processes, products or services based on new technology knowledge and organizational competency (OECD, 2015). The OECD (2005) inventories contained four types of innovation: product innovations, organizational innovations and marketing innovations and process innovations. According to Keupp *et al.* (2012), although the first three types of innovation have received extensive scholarly attention, process innovation has not been thoroughly analyzed by past literature. Process innovation includes the modification of tools or equipment, and requires the ability to transform knowledge into skill across the entire process (Agarwal & Selen (2011). Moreover, a study by Terziovski, (2010) on the relationship between innovation and performance of manufacturing SMEs in Indonesia found that innovation has a positive effect on firm`s performance. However, SMEs in developing countries have not fully embraced the concept of innovation in their businesses. Specifically, there have been poor business innovation processes. Consequently, SMEs face the problem of reduced sales volume and profit margins which are the major indicators of performance.

Research suggests that performance can be improved when key variables are correctly aligned with other moderator variables. However, there is little consensus on what constitutes suitable moderators in process innovation-performance relationship (Tan & Tan, 2005). Although research arguments have been suggested in favor of moderating variables, few moderator variables have empirically addressed the link between innovation process and firm performance.

The current study investigated the possible link between environmental (dynamism and munificence) variables and innovation process-firm performance association.

Kenya as one of the emerging economies in Africa, has recognized SMEs for their important contributions in economic growth, job creation and poverty reduction (Muriuki, 2016; Okpara, 2011; Terungwa, 2012). A recent National Economic Survey report by The Kenya National Bureau of Statistics (2017) indicates that there are more than 17 million SMEs registered in Kenya. Ninety eight percent of them contribute about 25% of the country's GDP and employing up to 50% of Kenya's workforce (Muriuki, 2016). However, past studies have revealed that small and micro enterprises (SMEs) have failed to achieve set objectives of generating, sustainable growth and employment (Muriuki, 2016). While lack of adoption of innovation among SMEs has been cited as a possible reason for their failure, empirical studies that confirm these claims are few. Although literature on entrepreneurship has suggested the positive relationship between all the composite variables of innovation adoption and firm performance, the same may not be true when examining the isolated relationship between process innovation and performance empirically.

The environment of a firm has also been recognized as an important determinant of innovation adoption (Davis, 2007). According to him, the environment not only offers new opportunities but also poses complex challenges, which firms must respond to creatively. Surprisingly, empirical research linking process innovation with firm performance where environment acts as a moderator variable is scarce in Kenya. The major concern for this study was be to examine the effect of environment on the link between process innovation and performance of SMEs in Kenya.

1.1. Statement of the Problem

Kenya has recognized SMEs for their important contributions in economic growth, job creation and poverty reduction (Muriuki, 2016; Okpara, 2011; Terungwa, 2012). A recent National Economic Survey report by The Kenya National Bureau of Statistics (2017) indicates that there are more than 17 million SMEs registered in Kenya. Ninety eight percent of them contribute about 25% of the country's GDP and employing up to 50% of Kenya's workforce (Muriuki, 2016). Unfortunately, most SMEs in Kenya fail within a short period from start-up. Nyangori (2010:4) reports that 60% of SMEs are estimated to fail in Kenya annually. Although literature on entrepreneurship has suggested the positive relationship between all the composite variables of innovation adoption and firm performance, the same may not be true when examining the isolated relationship between process innovation and performance empirically. Despite a number of studies concerning the various types of innovation, research endeavors that discuss process innovation in a single entity remain rather limited. Further, the environment of a firm has also been recognized as an important determinant of innovation adoption (Davis, 2007), where firms may be affected by the changes taking place in the environment. According to Machuki and Aosa (2011), these changes are often sudden and may dictate the firm's business direction. However, previous studies on innovation, have not discussed variables that potentially moderate the association between process innovation and performance among manufacturing SMEs in Nairobi County. The current study investigated the possible link between environmental (dynamism and munificence) variables and innovation process - firm performance association.

1.2. Objective of the Study

- To examine the effects of process innovation on the performance of SMEs in Nairobi County
- To determine the moderating effect of environment dynamism and munificence on the relationship between process innovation and performance of SMEs in Nairobi County

1.3. Hypotheses of the Study

- Process innovation has no significant effect on the performance of SMEs in Nairobi County
- Environmental dynamism has no significant moderating effect on the relationship between process innovation and performance of SMEs in Nairobi County
- Environmental munificence has no significant moderating effect on the relationship between process innovation and performance of SMEs in Nairobi County.

2. Methodology

This study used descriptive survey design. Descriptive survey design is the investigation in which either or both quantitative and qualitative data are collected and analyzed in order to describe the specific phenomenon in its current trends, current events and linkages between different factors at the current time. According to Creswell (2014) surveys are research studies conducted in order to establish the status quo. The survey design has been selected for this study because the study will involve describing, recording, analyzing and reporting conditions, as they currently exist (Kothari, 2003). The research adopted quantitative approach because the information collected through questionnaires is analyzable using statistical tools such as measures of central tendency and measures of dispersion. The target population for this study involved all the 600 registered manufacturing SMEs in Nairobi County. The manufacturing SMEs were classified into six key sub sectors. In addition, the study respondents comprised of the general managers in the 600 registered manufacturing SMEs Nairobi County. The unit of observation for the current study was individuals involved in the data collection. The appropriate unit of analysis was the SMEs. The sampling frame involved a list of all the 600 registered manufacturing SMEs in Nairobi County. The study adopted multi-stage sampling technique as the main sampling design by utilizing stratified sampling technique. The SMEs were grouped into six strata namely, chemical and Allied, Metal & Allied, Leather & Footwear, Paper & Board, Pharmaceutical & Medical Equipment and Plastics & Rubber. In

addition, simple random sampling was used to select the required sample from the list of each stratum of SMEs in Nairobi County. The following formula by Slovin's (1960) was used to determine the sample size from the population of SMEs. The sample size was computed as follows:

$n = \frac{N}{1+Ne^2}$ Thus n =160 SMEs

To obtain the desired sample size from each stratum, the following formula was used; *i = n (N/P),* (Kothari, 2011) used. Where*: i* is the number of SME in the stratum to be sampled, *n* is the sampled SMEs in the two Counties, (i.e.,160), *N* is the number of SMEs in each stratum, *P* is the total number of SMEs in Nairobi. This information is shown in Table 1.

Registered SMEs	Nairobi County	
	Population	Sample
Chemical & Allied	111	28
Leather & Footwear	54	15
Metal & Allied	63	17
Paper & Board	48	13
Pharmaceutical & Medical Equipment	59	17
Plastics & Rubber	265	70
Total	600	160

Table 1: Population and Sample Size

In this study, 160 respondents were included in the study while twenty respondents were randomly selected before the target population for pre-testing the validity and reliability of the instruments. The study employed a self-administered questionnaire to collect primary data from the respondents. The secondary data was accessed from the findings stated in published documents and literatures related to research problem. The research instrument was piloted from 10 SMEs with 20 respondents. A pilot survey was conducted to establish the content validity of the instrument and improves questions, format, and scales. The reliability of the instrument was tested using Cronbach's Alpha coefficient which is used to assess the internal consistency among the research instrument items. A Cronbach's coefficient alpha of 0.896 was adequate in this study and thus allowed the instrument for data collection. To test the validity of the research questionnaires, the researcher used face validity where a panel of experts and the supervisors gave their input and confirmed that the instrument met the criterion. The statistical processes which were employed in the analyses of the data comprised of descriptive statistics and inferential statistics. The descriptive statistics comprised of measures of central tendency (means) and measures of dispersion (standard deviation) aided by SPSS 20 software. Inferential statistics comprised of factor analysis, Pearson correlation analysis and multiple regression. In order to assess the existence of relationship between socio-cultural factors, entrepreneurship education as a moderating factor and entrepreneurship behavior, the Pearson's correlation coefficient '*r'* was computed.

In addition, multiple regression analyses were conducted to examine the relationships between innovation process and the firm performance in determining the individual contribution of each of the individual variables to the dependent variable. A general equation of the multiple regression models is given as:

$Y_1 = \beta_o + \beta_i PI + \varepsilon_o$..... (1)

Where: Y is the Firm performance and PI is the Process Innovation. To determine the moderation effect of environment on the relationship between process innovation and firm performance, the following model were adopted.

$Y_1 = \beta_{o1} + \beta_{11} PI + \beta_{21}ED + \beta_{31}PI*ED + \varepsilon_o$..... (2)

$Y_2 = \beta_{o1} + \beta_{11} PI + \beta_{21}EM + \beta_{31}PI*EM + \varepsilon_o$..... (3)

Where: Y is firm performance; β_0 is the intercept term; β_i (i=1, 2...) are the regression coefficients; PI is the Process Innovation; ED is Environmental Dynamism, EM-environmental munificent; and ε is the random error term.

3. Findings

The study targeted 160 general managers with all of them filling the questionnaires, thus resulting to a yield of 100% response rate. The study response rate was considered high enough for analysis to proceed. The Cronbach Alpha Value obtained for the all the variables was .896 meaning that they were above the critical value of 0.7 and hence all items were retained in the study.

The first objective was to determine the effects of process innovation on the performance of SMEs in Nairobi County. The first objective also related to the testing of null hypothesis that stated: *Process innovation has no significant effect on the performance of SMEs in Nairobi County.* The respondents were required to indicate their level of agreement or disagreement on the effects of process innovation on the performance of SMEs. This information is presented in Table 2.

Responses	SD	D	N	A	SA	Total		
	%	%	%	%	%	%	Mean	STD
Introduction of new processes enhances firm performance	8.5	4.2	8.8	39.o	40.1	100	4.4.51	1.621
Improving existing processes enhances firm performance	5.6	8.0	6.5	32.4	47.3	100	4.332	1.333
Blending new and existing processes improves firm performance	12 .6	9.2	6.1	32.4	52.7	100	61.11	1.432
Adopting new distribution networks enhances firm performance	11.0	5.7	7.2	33.3	46.8	100	4.567	1.512
Introduction of new processes increase quality of services and hence firm performance	7.6	5.4	9.1	29.7	51.0	100	4.401	1.434
improved processes results to improved products and hence firm performance	5.7	12.4	6.4	27.4	48.7	100	4.042	1.218
Blending new and improved processes results in improved products and thus enhanced firm performance	6.8	7.5	6.2	30.3	50.7	100	4.932	1.432

Table 2: Process Innovation and Firm Performance
Key: 1=Strongly Disagree, 2 when the firms decided to =Disagree, 3=Neither Agree Nor Disagree, 4=Agree, 5=Strongly Agree

From Table 2, its evident that majority of respondents were of the opinion that firm performance is enhanced when SMEs introduce new processes into the firm (71.0%). In addition, 79.7% of the respondents felt that firm performance is enhanced when existing processes are improved.

In addition, 85.1 % of the respondents agreed that small firms increase performance by blending new and existing processes. As attested by a majority of respondents, many other areas lead to improved performances by SMEs. The results of findings identified areas that enhance firm performance. These are: Adopting new distribution networks, Introduction of new processes increase quality of services, improved processes results to improved products and Blending new and improved processes results in improved products.

In addition to descriptive analysis, Pearson Correlation was used to establish the linear association between the independent and dependent variables. Pearson Correlation analysis tested the degree of relationship between the variables. The independent variable process innovation (New processes, improved processes and Blended processes) was correlated with firm performance variables (sales, profit and market share). This information is shown in Table 3.

Process Innovation		Performance Indicators		
		Firm Sales	Profits	Market Share
New Processes	Pearson Correlation	.241	.202	.248
	Sig.	.000	.000	.000
	N	160	160	160
Improved Processes	Pearson Correlation	.211	.202	.221
	Sig.	.000	.000	.006
	N	160	160	160
Blended Processes	Pearson Correlation	.214	.259	.297
	Sig.	.000	.000	.000
	N	160	160	160

Table 3: Correlation Analysis Results between Process Innovation and Firm Performance
Correlation Is Significant at the 0.05 Level

Pearson correlation coefficient between process innovation and firm performance indicators shows significant results at .05 levels. This shows that process innovation variables are directly related with indicator of firm performance (sales, profits and market share). Thus, a unit increases in process innovation variables results in a proportionate increase in firm performance i.e., increase in sales, profits and market share. To investigate the internal structures of the seven items that were used to measured process innovation variables and to establish the extent to which the underlying factors influence performance, factor analysis was undertaken. The fundamental measures for factor analysis were the Kaiser-Meyer-Olkin measure of sampling adequacy (MSA) and Bartlett test of sphericity and these are important for testing the suitability of the data. This data is presented in Tale 4.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.654
Bartlett's Test of Sphericity3	Approx. Chi-Square	13.03
	Df	3.0
	Sig.	.000

Table 4: Tests of the Suitability of the Data for Factor Analysis

Table 4 Indicates that both values show that the data is suitable for factor analysis

The factor analysis resulted in three components initially extracted accounting for 59.31%% of the total variance in the six items of process innovation variables with eigen values greater than unity. The first three factors together accounted for 67.44%% of the total variance. Items loading above .5 for every component were grouped to form three factors. The rotated component matrix that was obtained after the varimax rotation with the three new components are described shown in Table 5.

Statements	Components		
	1	2	3
Introduction Of New Processes Enhances Firm Performance	.708	.192	.146
Improving Existing Processes Enhances Firm Performance	.166	.865	.109
Blending New and Existing Processes Improves Firm Performance	.131	.112	.743
Adopting New Distribution Networks Enhances Firm Performance	.842	.146	.071
Introduction Of New Processes Increase Quality of Services and Hence Firm Performance	.657	.107	.103
Improved Processes Results to Improved Products and Hence Firm Performance	.068	**.897**	.125
Blending new and improved processes results in improved products and thus enhanced firm performance	.123	.045	**.753**

Table 5: Determinants of Entrepreneurial Innovation Behavior Rotated Component Matrix
Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
a. Rotation Converged in 3 Iterations

From Table 5 items loading greater than 0.5 for each component combined to create the three components of process innovation. All the higher loadings of component one relates to introduction of new processes. This component was renamed New Processes. The New Processes Component consists of three items. The three items in this component measured the extent to which SMEs introduce new processes, new distribution Networks and the introduction of new processes to increase quality of products and services that in the in ma enhance firm performance. Findings from the study revealed that the introduction of new processes as an alternative to the existing business processes enhances firm performance. The higher loading of component two relate to Improved Processes. The Improved Processes Component consists of two items. The three items in this component measured the extent to which improving the existing processes resulted in improved products and firm performance. According to a majority of respondents, improving the existing processes decreases the unit cost of production in SMEs operation than to introducing new ones.

The third component corresponds to Blended Processes. The Blended Processes component consists of two items that measured the extent to which Blending New and Existing Processes Improves Firm Performance. In addition, blending new and improved processes results in improved products and thus enhanced firm performance. To measure the extent to which the independent variables predict the dependent variable, multiple regression models was adopted. The multiple regression models of the three components assumed the form:

$Y = \beta_o + \beta_1 X_{NP} + \beta_2 X_{IP} + \beta_3 X_{BP} + \varepsilon_o$

Y = Firm Performance,
NP = New Processes
IP = Improved Processes,
BP = Blended Processes

Multiple Regressions was used to test the hypothesis that stated*: Process innovation has no significant effect on the performance of SMEs in Nairobi County.* The multiple regression models were summarized as:

Firm performance = 2.271+ 0.193 X_{NP} + 0.225 X_{IP} + 0.109 X_{BP}. These results are summarized in Table 6.

	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant)	2.271	0.192		0
New Processes	0.193	0.211	0.121	0
Improved Processes	0.225	0.159	0.105	0.001
Blended Processes	0.119	0.125	0.215	0

Table 6: Regression analysis of the Effect of Process Innovation on the Performance of Manufacturing SMEs in Nairobi
Significant at p =0.05 levels; R^2=59.2%; F=32.201, p=0.000

The multiple regression model with all the three predictor variables produced R^2 =59.2%, F (3, 157) = 32.201, p<.05. The results showed that process innovation variables revealed a significant positive relationship with firm performance. The null hypothesis that *Process innovation has no significant effect on the performance of SMEs in Nairobi County was rejected.*

The second objective was to determine the moderating effect of external environment on the relationship between *process innovation and performance of SMEs in Nairobi County*. The indicators of external environment were environmental dynamism and environmental munificent. Two hypotheses were derived from this hypothesis. The two hypotheses testing the influence of external environment on the relationship between *process innovation* and *firm performance* were stated as:

3.1. Environmental Dynamism has no significant moderating effect on the relationship between process innovation and firm performance

The results are presented in Table 7.

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	.765	.585	.565	2.241	.585	3.222	3	158	.000
2	.826	.682	.637	2.5000	.237	7.102	2	157	.000
a. Predictors: (Constant), Environmental Dynamism, process Innovation									
*b. Predictors: (Constant), Environmental Dynamism, process Innovation, Environmental Dynamism * process Innovation. Dependent: Firm Performance*									

Table 7: Results for the Moderating Effect of Environmental Dynamism on the Relationship between Process Innovation and Firm Performance

Table 7 shows that Model 2 with the interaction term between environmental dynamism and process innovation accounted for significantly more variance than just environmental dynamism and process innovation alone, R^2 change = .237, p = .000, indicating that there is significant moderating effect between environmental dynamism and process innovation on firm performance in Nairobi County. The interaction term showed an enhancing effect on firm performance. This meant that although there was a positive effect between process innovation and firm performance, this effect was greater in a dynamic environment. Based on the research findings, *the hypothesis that Environmental dynamism has no significant moderating effect on the relationship between process innovations and firm performance was rejected.* This study thus adopted a new statistical model to establish the relationship between the moderated independent variables and dependent variable.

This model is of the form: $Y_1 = \beta_{o1} + \beta_{11}$ PI + β_{21}ED+ β_{31} PI*ED +ε_o

Where:

Y = Firm Performance
PI = Process Innovation
ED = Environmental Dynamism
PI*ED = A Product of Process Innovation and Environmental Dynamism

The multiple regression models were summarized as:

Firm performance = 2.932+ 0.312 PI + 0.211ED+ 0.471 PI*ED.

The result shows that the independent variables significantly predict the dependent variable, *F* (3, 159) = 9.234, *p=0.000.* These results are summarized in Table 8.

	Un standardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant)	2.932	1.522		.000
PI	0.312	.133	0.114	.000
ED	0.211	.231	0.312	.000
PI *ED	0.471	0.108	0.211	.000

Table 8: Summary of Regression Results Showing the Effect of Moderated Independent Variable on Dependent Variable
Significant at p=0.05 levels; R^2=57.6%; F = 9.234, p=0.000

The results indicate that the effect of the process innovation and environmental Dynamism, PI*ED (β =0.471); is much greater than the effects of the individual predictors, process innovation (β=-0.312) and environmental dynamism ((β=0.211) on firm performance.

3.2. Environmental Munificent Has No Significant Moderating Effect on the Relationship between Process Innovation and Firm Performance

The results are presented in Table 9.

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	.787	.616	.590	1.232	.616	3.311	3	158	.000
2	.841	.707	.622	2.312	.241	7.225	2	157	.000
a. Predictors: (Constant), Environmental Munificent, process Innovation									
*b. Predictors: (Constant), Environmental Munificent, process Innovation, Environmental Munificent * process Innovation. Dependent: Firm Performance*									

Table 9: Results for the Moderating Effect of Environmental Munificent on the Relationship between Process Innovation and Firm Performance

Table 9 shows that Model 2 with the interaction term between environmental Munificent and process innovation accounted for significantly more variance than just environmental munificent and process innovation alone, R^2 change = .241, p = .000, indicating that there is significant moderating effect between environmental munificent and process innovation on firm performance in Nairobi County. The interaction term showed an enhancing effect on firm performance. This meant that although there was a positive effect between process innovation and firm performance, this effect was greater in a munificent environment. The study findings indicate that process innovation thrive better in environments with ample resources – both physical and human. Based on the research findings, *the hypothesis that Environmental munificent has no significant moderating effect on the relationship between process innovations and firm performance was rejected.* This study thus adopted a new statistical model to establish the relationship between the moderated independent variables and dependent variable.

This model is of the form: $Y_1 = \beta_{o1} + \beta_{11} PI + \beta_{21} EM + \beta_{31} PI*EM + \varepsilon_o$

Where:

Y = Firm Performance
PI = Process Innovation
EM = Environmental Munificent
PI*EM = A Product of Process Innovation and Environmental Munificent

The multiple regression models were summarized as:

Firm performance = 1.739+ 0.333 PI + 0.267 EM + 0.501 PI*EM.

The result shows that the independent variables significantly predict the dependent variable, *F* (4, 159) = 11.1284, *p=0.000.* These results are summarized in Table 10.

	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant)	1.739	1.418		.000
PI	0.333	0.197	0.155	.000
ED	0.267	0.266	0.187	.000
PI *ED	0.501	0.188	0.101	.000

Table 10: Summary of Regression Results Showing the Effect of Moderated Independent Variable on Dependent Variable
Significant at p=0.05 levels; R^2=61.4%; F = 11.1284, p=0.000

The results indicate that the effect of the process innovation and environmental Dynamism, PI*ED (β =0.501); is much greater than the effects of the individual predictors, process innovation (β=-0.333) and environmental dynamism ((β=0.267) on firm performance.

4. Discussion

Innovation is the introduction of new or improved processes, products or services based on new scientific or technology knowledge and/or organizational know-how (OECD, 2015). According to Camisón-Zornoza et al, (2004), the core of innovation is the newness of an idea that in turn improves firm performance. One of the key antecedents of innovation is process innovation. Process innovation means improving the production and logistic methods significantly or bringing significant improvements in the supporting activities such as manufacturing and computing (Polder et al., 2010). Several studies (Mohd & Syamsuriana, 2013; Njogu, 2014; Olughor, 2015; Gu & Shao, 2015) have assessed the impact of innovation on firm performance. But most of previous studies did not focus on process innovation (Ar & Baki, 2011). However, there is growing interest among scholars on the adoption of process innovation and the claims that it

leads to increase productivity and growth. Process innovation includes the modification of tools or equipment, and requires the ability to transform knowledge into skill across the entire process (Moyano-Fuentes et al, 2018). The factor analysis resulted in three components initially extracted from the six items of process innovation variables. The first component of process innovation related to new processes. Majority of the respondents agreed that the introduction of new processes in Manufacturing SMEs in Nairobi County enhances firm performance. According to Yamamoto and Bellgran (2013), adoption of new process innovation is a radical form of innovation involving the facing out of the old and obsolete equipment, and bringing new efficient and effective machines. This enhances firm performance.

The higher loading of component two relate to Improved Processes. According to a majority of respondents, improving the existing processes decreases the unit cost of production in SMEs operation than to introducing new ones. These findings concur with Hassan et al. (2013) who established that the adoption of improved process innovation requires the training and the upgrading of the technical know-how of the manpower thus leading to an increase in productivity and growth. The third component corresponds to Blended Processes. It was noted from the study that blending new and improved processes results in improved products and thus enhanced firm performance. According to Hassan et al. (2013), blending processes require integrating the new and the existing production equipment, which may lead to higher operational cost, but lower than the new process.

The second objective was to determine the moderating effect of external environment on the relationship between *process innovation and performance of SMEs in Nairobi County*.

Two hypotheses were derived from this hypothesis. The first hypothesis tested whether *environmental dynamism has any significant moderating effect on the relationship between process innovation and firm performance.*

The Model with the interaction term between environmental dynamism and process innovation accounted for significantly more variance than just environmental dynamism and process innovation alone, R^2 change = .237, p = .000, indicating that there is significant moderating effect between environmental dynamism and process innovation on firm performance in Nairobi County. The interaction term showed an enhancing effect on firm performance. This meant that although there was a positive effect between process innovation and firm performance, this effect was greater in a dynamic environment. This confirms that performance of SMEs in the study depend on the dynamism of the business environment. The result however differs with the findings of Machuki & Aosa (2011) who reported that environmental dynamism did not have any impact on organizational performance. The second hypothesis tested whether *environmental munificent has any significant moderating effect on the relationship between process innovation and firm performance.* the Model with the interaction term between environmental Munificent and process innovation accounted for significantly more variance than just environmental munificent and process innovation alone, R^2 change = .241, p = .000, indicating that there is significant moderating effect between environmental munificent and process innovation on firm performance in Nairobi County. The interaction term showed an enhancing effect on firm performance. This meant that although there was a positive effect between process innovation and firm performance, this effect was greater in a munificent environment. The study findings indicate that process innovation thrive better in environments with ample resources – both physical and human. There is direct association between quantity of resources and firm performance. These results are similar of Eisenhardt and Schoonhoven (1990) who found that munificence environments may positively impact on firm performance.

5. Summary

The study established the association between process innovation and firm performance among micro and small enterprises in Kenya and the moderating effect of external environment in this link.

Pearson correlation coefficient between process innovation and firm performance indicators shows significant results at .05 levels. The factor analysis resulted in three components initially extracted accounting for 59.31%% of the total variance in the six items of process innovation variables with eigen values greater than unity. All the higher loadings of component one relates to introduction of new processes and was renamed as New Processes. Findings from the study revealed that the introduction of new processes as an alternative to the existing business processes enhances firm performance. The higher loading of component two relate to Improved Processes. The Improved According to a majority of respondents, improving the existing processes decreases the unit cost of production in SMEs operation than to introducing new ones. The third component corresponds to Blended Processes. The study findings showed that blending new and improved processes results in improved products and thus enhanced firm performance. The multiple regression models of the three components assumed the form:

Firm performance = $2.271 + 0.193\ X_{NP} + 0.225\ X_{IP} + 0.109\ X_{BP}$

The multiple regression model with all the three predictor variables produced R^2 =59.2%, F (3, 157) = 32.201, p<.05. The results showed that process innovation variables revealed a significant positive relationship with firm performance. The null hypothesis that *Processes innovation has no significant effect on the performance of SMEs in Nairobi County was rejected.*

The second objective was to determine the moderating effect of external environment on the relationship between *process innovation and performance of SMEs in Nairobi County*.

The Model with the interaction term between environmental dynamism and process innovation accounted for significantly more variance than just environmental dynamism and process innovation alone, R^2 change = .237, p = .000, indicating that there is significant moderating effect between environmental dynamism and process innovation on firm performance in Nairobi County.

In addition, the Model with the interaction term between environmental Munificent and process innovation accounted for significantly more variance than just environmental munificent and process innovation alone, R^2 change =

.241, p = .000, indicating that there is significant moderating effect between environmental munificent and process innovation on firm performance in Nairobi County. Based on the research findings, *the hypothesis that Environmental dynamism and munificent has no significant moderating effect on the relationship between process innovations and firm performance was rejected.*

6. Conclusion

Based on the summary of the findings, it was concluded that process innovation *has significant positive effect on firm performance among SMEs in Nairobi County*. However, the association was enhanced with the introduction of a third variable namely external environment, which accounted for significantly more variance than just process innovation alone indicating that there is significant moderating effect between external environment and process innovation on firm performance among SMEs in Nairobi County.

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