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Influence of Technology Orientation in Performance of Small and Medium Animal Feed Manufacturing Enterprises in Kenya

Daniel Kiama Kiiru, Elegwa Mukulu, and Peter Ngatia

ABSTRACT

The objective of this study was to establish the influence of technological orientation on the performance of small and medium animal feed manufacturing enterprises in Kenya. The study adopted a cross-sectional survey design using both quantitative and qualitative approaches. The target population was 65 small and medium enterprises in animal feed manufacturing in Kenya that were members of Association of Kenya Feed Manufacturing (AKEFEMA) that are based in Kiambu and Nairobi City County in Kenya. The study used a census approach and respondents were 65 managers/owners and 65 directors. Data was collected using an open and ended questionnaire. The data were analysed using descriptive and inferential statistics. Descriptive statistics produced frequencies, pie charts mean, standard deviation, and percentages. Inferential statistics produced correlation and PLS Structural Equation Modelling (PLS-SEM) results, which showed the causal relationship among the variables. Findings showed that technology orientation had a positive and significant with the small and medium animal feed manufacturing in Kenya. Based on findings, the study concludes that SMEs in animal feed manufacturing in Kenya regularly upgrade technology, inculcate a culture of adopting new technologies and also possess technological skills. Also, the study concludes that SMEs under survey are owned/ managed by individuals who possess knowledge about the firm's field of operation and also relate well with stakeholders such as customers and suppliers. The study recommends management and entrepreneurs of small and medium animal feed manufacturing enterprises should possess the technical capabilities of the firm and embrace a culture of continuous learning with respect to new knowledge and skill this would lead to better performance.

Keywords: Kenya, Orientation, Performance, SMEs, Technology.

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I. INTRODUCTION

A. Background of the Study

Small and medium enterprises (SMEs) are business sectors that play an important economic role in many countries the world over. Their activities contribute to job creation; contribute to Gross Domestic Product (GDP) and enhance the industrial base of a country. Small and medium enterprises constitute about 90 percent of the business in the leading and developing economies (Murithi, 2017). In European Union (EU), more than 90 percent of enterprises are SMEs employing more than 50 percent of the workforce (SMEs European Report, 2018) as cited in Wanambisi *et al*. (2020). The report defines SMEs as enterprises employing 10-250 workers and having annual turnover ranging from 7 to 40 million Euros. Thinji (2017) indicates in middle-income countries SMEs contribute 70% employment and 95% GDP and also 60% employment and 70% GDP for least developed nations.

Technology orientation (TO) refers to firm behaviour towards the use and development of new technologies or new ways of carrying out operations, aimed at higher firm performance. It can be viewed as the firm; entrepreneurial strategy that fosters a competitive advantage for an enterprise over competitors. Technology orientation is a strategic aspect in a business that facilities in development and utilization of knowledge embedded in an organization to achieve a competitive edge (Del-Brio & Junquera, 2012). In today's environment, SMEs are facing stiff competition because of globalization, changes in customer's tastes and preferences, and inevitably, adopting and applying new ideas and methods in a firm is the solution. Cabral (2016) observed that adopting a technology posture is vital especially due to rising trends in emerging markets and the impact of globalization.

Thus, to emphasize the value of adopting and utilizing technology in the firm. Technology has been identified as instrumental in enhancing innovation and fostering new knowledge, transfer, and accepting and application of every latest business practice **(**Urbani & Heydenrych, 2015). In the view of Schumpeter's (Schumpeter, 1934) argues the theory of creative destruction, entrepreneurs disrupt the market price through new combinations such as product innovation, process innovation, and organization innovation through

embracing technology and ultimately an entrepreneur becomes a market leader (Urban & Heydenrch, 2015). Based on the foregoing argument, it can be concluded that TO enhance firm performance. Empirical studies have demonstrated that technology orientation contributes to firm performance (Ibrahim *et al*., 2017; Mwaura, 2018; *Odondo et al*., 2017; Ali *et al*., 2016; Urbani & Heydenrych, 2015).

B. Statement of the Problem

Small and medium manufacturing enterprises such as animal feeds are experiencing low performance in Kenya despite having the greatest potential to contribute to economic growth and addressing the ever-raising challenges of unemployment. Kenya Bureau of Statistics (2019) report indicated that the growth rate of the manufacturing sector was 4.2 percent in 2019 which arose from 3.7 percent in the year 2018. A growth rate of an average of 3.9 % is very low given that the Kenya Vision 2030 envisages that the manufacturing sector will grow at the rate of 10 percent annually. Manufacturing stands tall as a key pillar in the Big Four development agenda by the National Government in Kenya (Muigua, 2019). Therefore, the low performance of manufacturing SMEs implies that the realization of a robust manufacturing sector by the Kenya Government will remain a pipe dream. The poor firm performance among SMEs is attributed to a number of factors such as poor management, access to finance, technology, market access, lack of entrepreneurial spirit, politics, and poor business environment (Were, 2016). A recommendation by Ali, Leifu, and Rehman (2016) indicates that improvement of technology orientation by the enterprise owners enhances the performance of SMEs. Despite the increasing importance of technology orientation in recent times in determining enterprise success, few studies have given considerable attention. This study sought to narrow this knowledge gap by examining the influence of technology orientation on the performance of small and medium animal feed manufacturing enterprises in Kenya.

C. Hypothesis

There is no relationship between technology orientation and the performance of small and medium animal feed manufacturing enterprises in Kenya.

II. Literature Review

A. Theoretical Review

The study relied on a theory of stage development (Churchill and Lewis Model (1983)).

1) Theory of Stage Development (Churchill and Lewis Model, (1983))

The study adopts the Churchill and Lewis Model (1983) also known as the theory of stage development. The theory of stage development uses a model relevant to small and growing businesses that delineate five sages of firm development (Gupta, 2013). Each particular phase of the enterprise faces certain challenges that require intervention through technology and innovation. The first stage of the enterprise is the existence stage (start-up) which is characterized by a low customer base (Churchill & Lewis, 1983). The start-up stage is the appropriate point for an entrepreneur to advance technology to attract customers by addressing their needs (Chege *et al*., 2019). The second stage is known as survival which is characterized by a workable enterprise process with key questions being on how the firm can break even and remain in business. Technology is the key to the success of SMEs at the survival stage as argued by Tidd and Bessant (2010), in their viewpoint technology contributes to innovation which gives them a competitive advantage in the marketplace. The third stage of the business is success which dictates to the entrepreneur to either exploit the firm's progress and expand or keep the firm profitable and provide alternative business activities (Churchill & Lewis, 1983). Likewise, firms that embrace technology have been found to expand market share and new ideas for expanding their enterprises. Stage four is take-off or growth which is concerned with how to make the firm grow quickly and how to finance this growth (Favaretto & Meirelles, 2015). In the argument of Favaretto and Meirelles, growing SMEs, the technological innovation strategy is particularly paramount as the technology matures and is constantly updated at this stage. The fifth stage is resource maturity where the firm enjoys advantages of size, managerial talents, and monetary resources (Runyan, Huddleston & Swinney, 2007). It could be concluded that technology is a catalyst and oil to foster the performance of a firm.

This study has factored in technology as a key tool for animal Feed manufacturing SMEs in Kenya as an avenue to exploit change as an opportunity for a different business or a different service. Technology fosters innovation that leads to creative destruction as emphasized by Schumpeter theory of innovation in the firm and ultimately an entrepreneur enjoys a monopoly in the market. Inculcation of technological innovation among the SMEs under survey would ultimately have a base of economic growth and consequently, economic growth in Kenya, and lastly challenges of unemployment especially among the youth will be minimized.

B. Empirical Review

Technology orientation (TO) refers to firm behavior towards the use and develops new technologies or new ways of doing operations, consequently, contributing to firm performance. Technology is a strategic aspect that guides in development and use of technological capabilities in the firm (Junquera *et al*., 2012). A study by Ibrahim *et al*. (2017) investigated the moderating role of government support policy on the relationship between entrepreneurial orientation, technology orientation, and performance of small and medium enterprises in Northeast Nigeria. The methodology adopted was a quantitative survey method, stratified random sampling, and a sample size of 240 SME owners/manage in Northeast Nigeria. The findings indicated that technology orientation correlated strongly and positively with small and medium enterprises in Northeast Nigeria. The study recommended managers/ owners of SMEs nurture and support technology orientation through applying technology to products and operation procedures.

Mwaura (2018) explored the influence of strategic orientation on the performance of medium manufacturing firms in Kenya. The study variables were market orientation, technology orientation, and innovation. The methodology includes cross-sectional design, questionnaire, and the target

population was all 179 registered medium Manufacturing Firms in Kenya. The findings indicated that technology orientation had a positive significance on the performance of medium manufacturing firms in Kenya. The study emphasized that managers and owners of the SMEs should possess technology capabilities pertaining to enhancing firm performance

Another study by Ali *et al*. (2016) examined the influence of strategic entrepreneurship and the performance of SMEs in China. The independent variables were technology and customer orientation. The study used a sample size of 158 Chinese firms that were clustered on the bases of their mix of technological and customer focus. The results revealed both technology orientation and customer orientation had a positive influence on firm performance. Further, the results found that firms combining technology orientation and customer orientation effectively performed better than those with one of the strategic orientation factors.

C. Conceptual Framework

The concept of the study presented technology-oriented performance of small and medium animal feed manufacturing enterprises in Kenya.

Fig. 1. Conceptual Framework.

III. Research Methodology

This study was anchored on the positivism research paradigm as an element of epistemological research philosophy and cross-sectional research design. The target population was small and medium animal feed manufacturing enterprises that are members of Association of Kenya Feed Manufacturing (AKEFEMA) that are based in Kiambu and Nairobi City County in Kenya.

TABLE I: Sample Size

County	Target population	Sample Size
Nairobi	33	66
Kiambu	32	64
Total	65	130

Source: Association of Kenya Animal Feeds Manufacturing (2017).

Celsius sampling technique was used and thus, 65 managers/CEO and 65 directors were selected as respondents (see Table I). This study used a self-administered, open and closed-ended questionnaire to obtain primary data.

The study employed descriptive statistics and inferential statistics. Inferential statistics involved the use of correlation and PLS Structural Equation Modelling (PLS-SEM). PlS SEM was used for model analysis and hypothesis testing. The model used was as indicated below:

$$Yi= \beta o + \beta 1X1+ \acute{\varepsilon}$$

where:
Yi= Performance;
B0- Constant;
X2= Technological Orientation;
ε= Error Term.

IV. Results and Discussions

A. Response Rate

The study administered a total of 116 questionnaires to selected respondents and 102 of the questionnaires were duly filled and returned which represented a response rate of 87.9%. This response rate was considered adequate for this study based on the criteria provided by Babbie (2004) who suggested that for a descriptive study response rate of above 50% should be accepted for analysis.

B. Pilot Study Results

Reliability analysis was evaluated using Cronbach's alpha was used and Bougie (2013) argued that a coefficient greater than or equal to 0.7 is acceptable for basic research. The Cronbach's Alpha for technology orientation was 0.834 as indicated in Table II which was above the threshold of 0.7 adopted in this study hence the nine items were reliable in measuring technology orientation.

TABLE II: Summary of Reliability Statistics of Technology Orientation

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.834	0.842	9

The test for the validity of the data collection instrument was more qualitative than quantitative where the indicators used in the conceptual framework and in the questionnaires were based on a thorough literature review to ensure that the indicators were also used by other scholars who have used these variables. Content validity was done through the use of experts from entrepreneurship and supervisors. After confirmation that the questionnaire had met the threshold of reliability and validity, actual data collection was carried out.

C. Descriptive Statistics

The study sought to determine the influence of technology orientation on performance. To achieve this the respondents were requested to indicate the level of agreement on five-point Likert scale with '1' indicating 'strongly disagree',2 'disagree', 3 'neutral', 4 'agree' and 5'strongly agree'. The respondents were asked to fill out a questionnaire that had statements on the level of technology orientation within their firms. The results of the descriptive statistics were shown in Table III.

TABLE III: Measurement of Technology Orientation

Technology Capability	Mean	Std Dev
Our enterprise is one of the leaders in our industry to upgrade technology standard	2.65	1.10
Our enterprise has strong technological skills in various field	3.11	1.22
Our enterprise is skillful in applying new technologies to problem solving	2.85	1.34
Owner/Manager Capability		
Our enterprise's manager/owner has knowledge about firm's field of operation	4.20	0.61
Our manager/owner has required technical capabilities for the industry in which we operate	2.09	0.96
Our manager/owner is in good relationship with customers, suppliers and employees	4.37	0.49
Commitment to Learning		
In light of the new knowledge, if necessary, our enterprise revises routine and procedures	2.10	0.74
In light of the new knowledge, if necessary, our firm revises current technical infrastructure elements (e.g., production line)	2.25	0.71
In light of the new knowledge, if necessary, our firm revises current practice to reach better working approaches	2.02	0.82

From the results of the descriptive statistics respondents agreed with statements on technology capability and owner/manager capability, however, disagreed with statements on a commitment to learning. This implies not all aspects of technology orientation are embraced by the SMEs under survey.

D. Diagnostic Test

In this study, test for normality, multicollinearity and homodescasticity were carried out.

1) Normality

Table iv indicates the test results for normality, using skewness and kurtosis.

TABLE IV: UNIVARIATE NORMALITY FOR TECHNOLOGY ORIENTATION

Constructs	Statistic	Std. Error	Statistic	Std. Error
Technology orientation	0.351	0.239	-0.564	0.474

Based on the results presented in Table IV, shows skewness values are below 3.0 and kurtosis values are below 8.0. The data, therefore, adhered to the regression assumption of normal distribution.

2) Multicollinearity

Table V shows the test results for multicollinearity, using both the Variance Inflation Factor (VIF) and tolerance.

TABLE V: MULTICOLLINEARITY TEST OF STUDY VARIABLES

2nd order constructs	VIF	Tolerance
Technology orientation	1.621	0.617

Based on Table V, VIF values were less than 5. It was thus concluded that there was no presence of multicollinearity. The VIF shows how much the variance of the coefficient estimate is being inflated by multicollinearity.

3) Heteroscedasticity Test

Breuch-pagan / cook-weisberg test was used to test null hypothesis that the error variances are all equal versus the alternative that the error variances are a multiplicative function of one or more variables. Table VI shows the results of a test of heteroscedascity.

TABLE VI: HETEROSCEDASTICITY TEST OF STUDY VARIABLE

Ho	Variables	Chi2(3)	Variables
Constant Variance	TO	2.409	0.121

Table VI shows that the constant variance (Chi-square= 2.409) is insignificant (P = 0.121). A large Chi-square value greater than 9.22 would indicate the presence of heteroscedasticity (Sazali *et al*., 2009). Thus, we fail to reject the null hypothesis and conclude that the error variance is equal thus heteroscedasticity is not a problem in the data.

E. Correlations of Study Variables

The study found that technology orientation had a positive linear relationship with firm performance in small and medium animal feed manufacturing enterprises in Kenya. With Pearson correlation coefficient of 0.802 at 0.01; the significance level is shown in Table VII. Thus, firm performance must be enhanced through the application of technologies in both products and operational procedures (Song & Jing, 2017).

TABLE VII: CORRELATION MATRIX

	TO	Per
TO	1	
PER	0.802**	1

F. Measurement Model

The measurement model assessed the relationship between the observable variables and the theoretical constructs that represent. Three stages were undertaken in testing the measurement model, namely, assessment of the suitability of data, exploratory factor analysis, and lastly confirmatory factor analysis. Based on Table VIII technology orientation yielded a KMO statistic of 0.712 exceeding the KMO threshold value of 0.50 (Hair *et al*., 1998) for factorable items. On the other hand, Bartlett's test of Sphericity showed a p-value of 0.000, showing that there were sufficient relationships among the variables to investigate. Table VII, factor loading found that none of the items was removed because all of them had a factor loading of greater than 0.4 (Rahim & Magna, 2005). Table VIII shows that commonalities ranged from 0.523 to 0.729 thus showing that all were above the 0.5 cut-off points as posited by Pallant and Tennant (2007) hence this shows the variables fitted well with other variables in their factor. Based on the criteria, three factors were imputed. Amongst themselves, they were able to explain 71.980 % of the total variance in the data.

Confirmatory factor analysis (CFA) involves evaluating the measurement model on multiple criteria such as internal reliability, and convergent and discriminant validity. Prior to testing reliability and validity, CFA loadings were done for the purpose of validating confirmatory factor analysis (Kock, 2015). All of the item loadings for Technology orientation were above 0.50 and were statistically significant as p-values were less than 0.05. Construct reliability for the variable was assessed by computing the composite reliability and internal consistency of the items. Table IX shows the output of construct, composite, and convergent reliability.

TABLE VIII: EXPLORATORY FACTOR ANALYSIS FOR TECHNOLOGY ORIENTATION

Item	KMO	Bartlett's (df)	Sig.	%Variation	Factor loadings	Communalities
TC1	0.712	χ^2=434.406 (d.f.=36)	0.000	36.670	0.682	0.659
TC2					0.850	0.800
TC3					0.685	0.704
OMC1				23.566	0.919	0.334
OMC2					0.739	0.595
OMC3					0.952	0.937
CoL1				11.744	0.835	0.799
CoL2					0.864	0.816
CoL3					0.898	0.834
			cumulative %	71.980		

TABLE IX: CONSTRUCT RELIABILITY AND CONVERGENT VALIDITY

constructs	First order constructs	Cronbach's Alpha≥0.6	Composite Reliability ≥0.7	Average Variance Extracted (AVE) ≥0.5
	Technology orientation	0.894	0.7623	0.663
	Technological capabilities	0.803	0.880	0.710
	Owner/manager capability	0.794	0.752	0.586
	Commitment Learning	0.916	0.947	0.856
		0.796	0.744	0.619

The composite reliability of indicator items was all above the acceptable 0.6 threshold which means all the variables in the study exhibited construct reliability. Cronbach's Alphas (α) as a measure of internal consistency its indicator items were all above the 0.7 thresholds (Hair *et al*., 2006) indicating average to good reliability. Convergent validity was also assessed using average variance extracted (AVE). The overall Average Variance Extracted for all factors was above 0.5 as indicated in Table X which exceeded the cut-off value of 0.5, thus confirming convergent validity.

TABLE X: RESULTS OF DISCRIMINANT VALIDITY

	Per	To
Per	0.905	
To	0.802**	0.814

The discriminant validity was confirmed as the square root of a construct's Average Variance Extracted AVE was greater than the correlation between the construct and other constructs in the model as indicated in Table IX.

G. Structural Modelling and Hypothesis Testing

The statistical objective of PLS is to show the coefficient of determination (R-squared), coefficients (βs), and t-values. R^2 coefficient was used to determine the variation in firm performance that was accounted for by the independent variable (latent variable). Coefficients (βs) were meant to show direction and strength and t-values were the basis of rejecting or accepting the null hypothesis of no effect.

H. Hypothesis Testing

To examine the influence of Technology orientation in the performance of small and medium enterprises in animal feed manufacturing in Kenya.

Test for outliers and model fit indices were carried out before testing the hypothesis. From Table XI normality test on the factors produced values between -1 and +1. There were no outliers detected because the values obtained in testing the model fit indices were within the thresholds. Model Fit Indices for technology orientation in performance of small and medium enterprises in animal feed manufacturing in Kenya showed that Standardized root means square residual (SRMR) value was 0.056 which is less than 0.08 thus indicating a reasonable fit to the data and accepted (Henseler *et al*., 2014). Normed Fit Index (NFI) had a value of 0.948 and it was acceptable because any value of 0.90 or greater indicates well-fitting model (Bentler & Bonett, 1980). The squared Euclidean distance (d_{ULS}) fit indices had the value of 1.452 which was less than the bootstrapped HI 95% of d_{ULS} and similarly, the geodesic distance (d_G) had the value of 0.954 which was less than bootstrapped HI 95% indicating the data fits the model exactly. The GOF of the model was 0.443, which shows that empirical data fits the model's satisfactory and has substantial predictive power in comparison with the baseline value (Henseler *et al*., 2016). The structural model therein shows path coefficients relationship between technology orientation and performance of small and medium animal feed enterprises in Kenya.

TABLE XI: CONFIRMATORY FACTOR ANALYSIS MODEL FITS OF TECHNOLOGY ORIENTATION

Model	NFI	SRMR	d_{ULS}	d_G	GOF
Saturated Model	1	1	1	1	1
Independent Model	0.948	0.056	1.452	0.954	0.443

The hypothesis to test for this specific objective was:

H_{01} Technology orientation does not influence the performance of small and medium enterprises in animal feed manufacturing in Kenya.

The study found that there was a positive path coefficient (beta= 0.802) between technology orientation and performance of small and medium enterprises in animal feed manufacturing in Kenya, as shown in Fig. 2. Similarly, Fig. 3 shows that technology orientation had a coefficient of determination (R^2) 0.644. The value of R^2 indicates that 64.4% of the variation in firm performance can be accounted for by customer orientation.

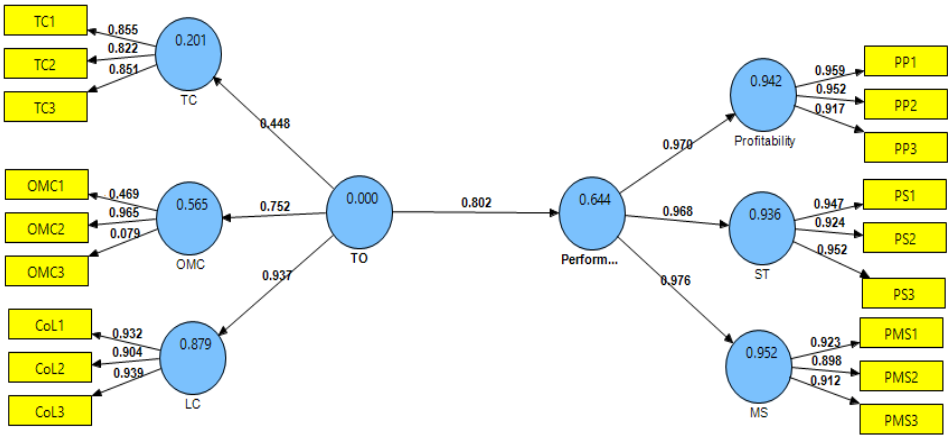

Fig. 2. Structural model path coefficients between technology orientation and performance of small and medium enterprises.

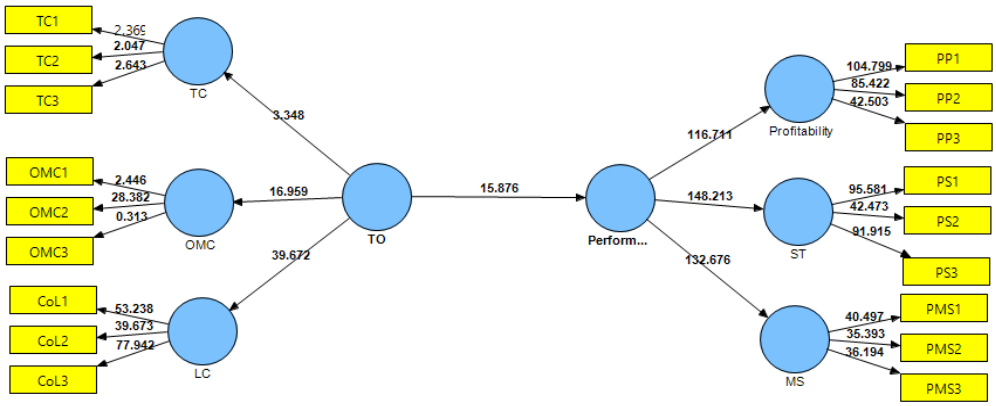

Fig. 3. Structural Model T-Statistics for relationship between Technology orientation and performance of small and medium enterprises.

Based on the T-value of technology orientation 15.876 which was more than 1.96 ($p<0.05$), thus the relationship between technology orientation and performance of small and medium enterprises was significant and positive, as shown on Fig. 3. The study rejects the null hypothesis and accept alternative and concludes that technology orientation (technological capabilities, owner/manager capability, and learning capabilities) Influence the performance of small and medium enterprises in animal feed manufacturing in Kenya.

Table XII shows that technology orientation had a beta value of 0.802 and T-statistics of 15.876 which is above the critical value of 1.96, thus it H_{01} is rejected. The beta value of 0.802, signifies that for every one-unit increase in technology orientation, the performance of small and medium enterprises in animal feed manufacturing in Kenya is predicted to increase by 0.802 units and therefore $H_{01.}$ Therefore, technology orientation enhances the performance of small and medium enterprises in animal feed manufacturing in Kenya and thus managers/owner of these enterprises should embrace and nurture technology in all spheres to release better profits, sales turnover, and new markets.

TABLE XII: PATH COEFFICIENTS FOR RELATIONSHIP BETWEEN TECHNOLOGY ORIENTATION AND PERFORMANCE OF SMALL AND MEDIUM ENTERPRISES

Path	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P-value
TO -> Performance	0.802	0.802	0.051	15.876	0.000

I. Qualitative Data Analysis

The study further sought to find out from the respondents how else technology orientation influenced their business performance. According to the majority of the respondents, technology orientation enabled them to increase the number of customers, improve their methods of production, increase their customer satisfaction, and finally assisted the SMEs to identify new distribution and methods of marketing. According to the respondents, technology orientation opens new channels of doing business that never existed before, and hence the companies that adopt new technologies likely to boost their performance. Some of the technologies that respondents mentioned they had adopted include the use of mobile money payment for their customers, the use of internet banking, and digital marketing. They further mentioned that their production technologies have been changing over time and they have been aggressive in adopting them to improve the quality of the animal feeds produced.

V. CONCLUSION

From the findings, technology orientation had a positive and significant relationship with small and medium animal feed manufacturing enterprises in Kenya. From the study findings, the study concludes that upgrading of technology, possession of strong technological skills, and knowledgeable entrepreneurs contributed to increasing firm profits, sales turnover, and new markets. Similarly, the study concludes that TO has enabled the firm to increase the number of customers, improve its methods of production, increase customer satisfaction, and open channels of doing business. Further, the study concludes that the SMES under survey adopted the following technologies use of mobile money payment for their customers, the use of internet banking, digital marketing, and production technologies have been changing over time and they have been aggressive in adopting them to improve the quality of the animal feeds produced.

VI. RECOMMENDATIONS

The study findings indicate technology orientation promote positively small and medium animal feed manufacturing enterprises; therefore, the study recommends that SMEs owners and management should at no cost ignore the importance and role of technologies in enhancing the performance of their businesses. The study results reveal few SMES survey encourage commitment to learn new practices, technologies, and technologies thus the study recommends management always scan their operating environment for new technologies and invest in these technologies to stand a chance of outperforming their competitors and dominating their industries.

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