

Technology fusion on knowledge management potential and quality management practices among SMEs in Uganda.

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Abstract

The major objective of this study was to determine relationship of knowledge potential on quality management practices under conditions of varying levels of technology fusion among SMEs in Uganda. Data were collected using cross-sectional and descriptive survey, which involved 210 SMEs selected from Central and Eastern regions of Uganda. Correlations, hierarchical regression models and a mod-graph were used in the analysis. Results revealed that influence of knowledge management potential on quality management practices varies with level of technology fusion among SMEs in Uganda. Furthermore, there exists a positive and significant relationship between knowledge management potential and quality management practices among SMEs. Based on findings, it is imperative for managers to create an environment that supports knowledge management systems for sustainable operations in today's dynamic environment. Besides, there is need to re-tool their employees with modern technological applications so as to achieve firms' strategic objectives.

Keywords- SMEs, knowledge management, technology fusion, quality management practices.

Introduction

The business environment has become increasingly competitive and it has compelled business firms to adopt as well as modify sustainable quality management practices to deliver quality products that meet changing needs of customers. Today, customers have more access to information that informs their choice for products they consume perhaps due globalization and use of modern technological applications that ease access to information. Therefore, to sustain operations in the volatile environment, firms ought to empower their human resources with knowledge and skills to support provision of quality products. For Small and Medium sized firms (SMEs) in developing countries, which are largely resource constrained, knowledge management schemes contribute to better understanding of the market environment in which they operate.

Quality management practices among Small and Medium Enterprises (SMEs) have been studied widely in different contexts, developed and developing economies. Generally, they are conceived as a set of activities adopted and modified by managers to improve firms' operations necessary

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to meet customer expectations (Jaafreh & Al-Abedallat, 2012). Knowledge management potential is conceptualized as organizational ability to generate, absorb and integrate novel ideas into a firm's core operations system (Nguyet & Nguyen, 2010). Technology fusion has been perceived as Information and Communication Technology (ICT) applications that drive business practices (Wahab, Rose, & Osman, 2011). Moderation studies involving knowledge management potential and quality management practices among SMEs are scanty. However, available studies concentrate on direct relationships between knowledge management potential and quality management practices (for example, Honarpour, Jusoh, & Nor, 2012; Kaziliūnas, 2011). Therefore, this study sought to contribute to the existing body of knowledge by focusing on moderating role of technology fusion on relationship between knowledge management potential and quality management practices among SMEs in Uganda.

SMEs are crucial in stimulating economic growth and development through employment creation, Gross Domestic Product (GDP) support and generation of household incomes (MSME Policy, 2015). The study focused on SMEs that carry out value addition in their operational activities across processing, manufacturing and service sub-sectors. According to OECD (2005), SMEs are predominantly independent establishments that employ relatively fewer people, ranging from 50 to 249 and 250 to 499 for small and medium firms, respectively. However, Uganda Micro, Small and Medium scale Enterprises (MSME) Policy (2015) conceptualizes SMEs as firms formal or informal that employ between 5 and 50 as well as 51 and 100 in respect of small and medium sized firms. We adopted the MSME (2015) Policy guideline in categorizing firms. The rest of this paper is organized as follows: the next section focuses on theoretical background and review of related literature, conceptual framework followed by the research methodology, findings and discussion. The final section provides conclusion, implications and limitations of the study.

Theoretical Background and Related Literature

Quality Management Practices are anchored in the theory of continuous improvement (Kaizen, 1986). The theory posits that organizations continually endeavour to advance their operational levels despite their current achievements in view of corporate strategic objectives. Such improvements are required in operations, systems, structures and activities to support long-term organisational strategy (Singh & Singh, 2009). The theory also emphasises on the need for firms to invest in knowledge management schemes to support firms' operations in a dynamic environment. To achieve long-term quality goal, Zangwill and Kantor (1998) advocated for organizational wide employee training, empowerment, well-coordinated cross-functional teams, supplier quality management and process controls to deliver customer desired products. Hence, efforts to transform resources into inimitable capabilities are crucial to sustain quality management efforts.

Knowledge Management Potential and Quality Management Practices

SME managers need to establish a conducive environment that supports employees' search for better methods of work to sustain firms' survival and growth (Evangelista *et al.*, 2010). In dynamic environments, firms need to create and propagate knowledge management schemes so as to sustain provision of products that meet changing quality needs for customers (Jerônimo & Medeiros, 2012). Integrative Knowledge management initiatives support organizational quality management systems to create unique products (Halim *et al.*, 2014). Training human resources in skill development program fits well within organizational wide quality management agenda

(Kachba *et al.*, 2012). Consequently, social reality suggests that this is a knowledge economy and firms ought to keep in touch with developments in the market place for survival.

In developing countries, SMEs are largely resource constrained and should endeavour to benchmark relatively bigger firms for sustainable knowledge generation, absorption and integration (Honarpour *et al.*, 2012). Generally, they lack financial, technical and managerial support needed to sustain operations in a global environment. Hence, adoption and integration of external knowledge improve SMEs' ability to establish quality planning, control and improvement mechanisms for proper quality management systems (Evangelista *et al.*, 2010). Therefore, knowledge sharing between firms enables SMEs to adopt industry good practice required to deliver customer quality requirements so as to meet market expectations.

Strategic knowledge management is associated with creativity, which spurs development of quality products in line with market expectations (Honarpour *et al.*, 2012). In due regard, knowledge management is synonymous with value creation in firms' products (Daud, Fadzilah & Yusoff, 2010). To achieve the stated aspect, it is imperative for firms to integrate knowledge into organizational quality management systems in a highly creative manner (Honarpour *et al.*, 2012). Therefore, creativity, a product of strategic knowledge management is a precursor to attaining organizational competitive priorities of a firm in the long run. Deriving from the above, we hypothesize that,

H₁: there is a positive and significant relationship between knowledge management potential and quality management practices among SMEs in Uganda.

Technology Fusion and Quality Management Practices

Empirical literature on relational studies involving technology applications and quality management practices among SMEs is scanty (Ghobakhloo, Hong, Sabour & Zulkifli, 2012). However, Bigliardi and Galati (2014) indicate that technology oriented companies are capable of using fundamentals of research and development in enhancing quality management performance. Increasingly, businesses are adopting information and communication technology (ICT) in quality management agenda, which results into reductions in operational costs, cycle time as well as reject rates (Siu, David, Wai, & Seebaluck, 2016). Similarly, Kim, Kumar and Kumar (2012) reported about quality management practices influencing technology related innovations including new product development and process improvements. Either way, some form of relationships between technology fusion and quality management practices exist. In Ernest, ICT support systems augment quick and timely access to vital information that supports quality decisions.

Presented manifestations are similar to those of Kim and colleagues (2012) who found a positive influence of quality management activities on performance improvement outcomes. SMEs endeavour to attain and maintain sustainable growth, which necessitate deployment of multiple interventions including change management, cultural integration as well as quality systems through technology support structures (Ghobakhloo *et al.*, 2012). Research and development environments support sustainable quality management efforts in search for innovative products given volatile market conditions (Bigliardi & Galati, 2014). It is prudent to note that adoption of modern technological applications in quality management programs

improves quality performance measures such as improved through-put and efficiencies in the value chain.

Technological applications are associated with just in time value chain methodologies, which advocate for real time responses; a requirement in quality adjustments in view of customer demands (Ward, 2006). According to Darbanhosseiniamirkhiz and Ismail (2012), SMEs that embrace contemporary technologies in their value chain systems are capable of retrieving and documenting data necessary to streamline system variability to achieve consistent quality in products. In due regard, Khanam, Siddiqui and Talib (2013) observe that adopting up-to-date technologies is imperative in achieving quality management practices necessary to support operations. Accordingly, literature portrays that technology fusion is associated with the firms' ability to develop quality applications, regardless of firm size. Therefore, it is probable that,

H₂: there is a positive and significant relationship between technology fusion and quality management practices among SMEs in Uganda.

Technology Fusion on Knowledge Management Potential and Quality Management Practices

Literature suggests that the outcome of predictor variable may be influenced by its interaction with a third variable outside the model (Frazier, Tix & Barron, 2004). Therefore, the predictive power of the independent variable may depend upon its interaction intensity with the moderator (Mackinnon, 2010). Hence, ICT applications are associated with perceived usefulness and usability that support knowledge management projects in different functional areas of the organization (Everett, 1995; Wahab, Rose, & Osman, 2011). Based on the presented works, an interaction between knowledge management potential and technology adoption schemes may support attainment of sustainable quality management practices. Recent advancement in technology and innovations have been associated with knowledge management in hastening organizational capacity to achieve respective operational goals (Zhou & Uhlaner, 2009). Technology fusion is considered a useful tool for knowledge management in organizational quality management strategy by creating, disseminating and integrating practical knowledge into a firm's operations (Honarpour *et. al.*, 2012). Knowledge and skills management are quite embedded in technology driven innovation processes in search for new products and services (Saunila, 2014). Technology adoption shapes employee skills and knowledge in development of optimal operating practices (Saunila, Pekkola, & Ukko, 2014). Henceforth, works of previous scholars already presented suggest that there exists a positive and significant association between knowledge management, technology deployment and some components of quality management practices.

ICT applications support applications that relate to knowledge acquisition, absorption and integration necessary for improvement in the firm's operations (Zhou & Uhlaner, 2009). Consequently, the firm's technological capabilities spur knowledge conversion into desired products by the market (Saunila *et. al.*, 2014). Organizational knowledge base and expertise ease product innovation processes in quality improvement effort(s) (Schniederjans & Schniederjans, 2015). The firm's performance measures including success rate in new product introduction and quality management are perceived outcomes of knowledge management through technological support (Saunila, 2014). Hence, technology adoption is a perceived core element of knowledge management wide agenda to support product innovations and improvement (Nguyen, 2009).

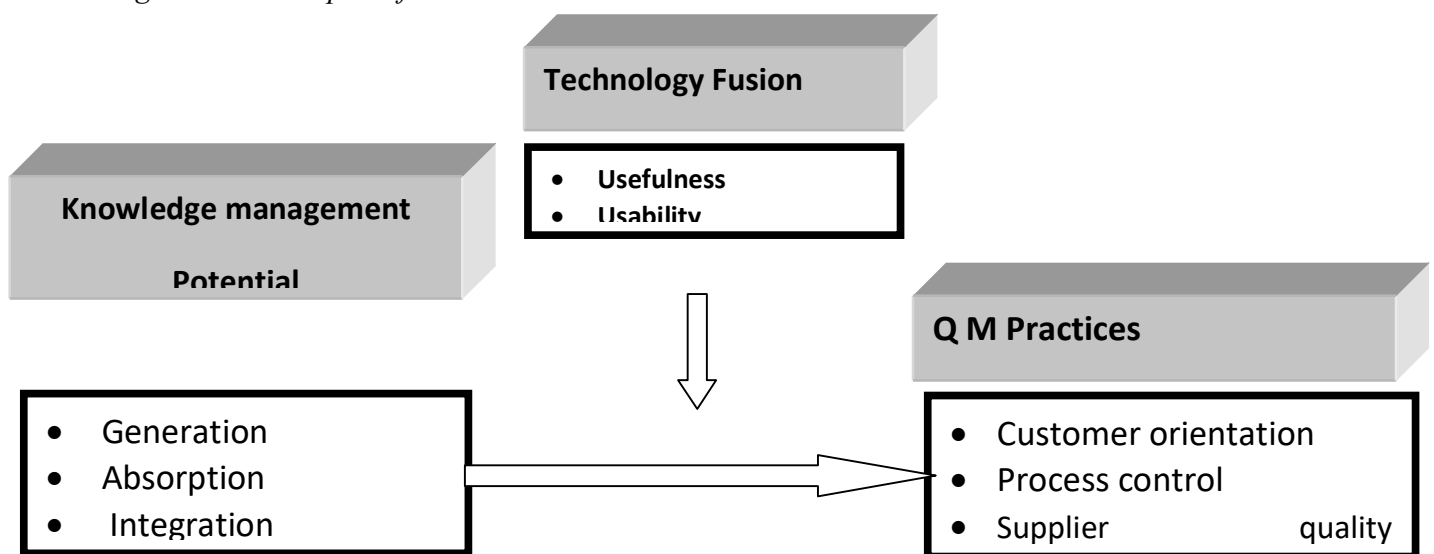
Deriving from the presented scholarly works, technological knowhow supports knowledge creation and exchange necessary for adoption of desired quality management practices.

Knowledge generation and sharing coupled with technology engineered innovations reinforce development of quality products (Saunila *et. al.*, 2014; Zhou & Uhlener, 2009). Technology embedded human resources have been closely associated with innovativeness in execution of organizational corporate strategy (Saunila *et. al.*, 2014a). In due respect, knowledge management processes that involve idea generation and integration are a critical step in technology-based innovation efforts, which serve as an entry point into quality management strategy (Do, Volery, Mazzarol, & Reboud, 2011). Sharing similar observations, Saunila (2014) argues that knowledge and skills acquired through technological benchmarks are positively linked to successful innovative efforts by SMEs in search for quality products. A study by Asikhia and Rensburg (2015) reveals that the manager's skill orientation determines a firm's innovative capability in a technology driven corporate strategy. From the foregoing, there is a possibility that,

H₃: influence of knowledge management potential on quality management practices varies with the level of technology fusion among SMEs in Uganda

Theory and empirical works depict that SMEs that have the potential to generate, absorb and integrate novel ideas into their operations systems are likely to adapt sustainable quality management practices in view of customer focus, control of work flow activities and supplier quality management. Notably, the environment is quite dynamic characterized by high competition and frequent changes in consumer tastes and preferences. Therefore, use of technological applications enhances firms' ability to fast track changes in the market place to inform strategic decisions about desired quality. In essence, conditions of modern ICT applications spur acquisition and assimilation of fresh ideas to support the firm's overall quality agenda. Hence, theory and literature guided development of the conceptual framework as illustrated in Figure 1.

Figure 1: A conceptual framework



Source: Literature review

Operationalization and Measurement of Variables

This is concerned with reduction of phenomenon into representative measurable factors (Machery, 2007). The study made inference to theoretical works of previous scholars to operationalize variables that include quality management practices, knowledge management potential and technology fusion into measurable constructs. This is summarized in Table 1.

Table I: Operationalization and measurement of variables

Variable	Dimensions	Definitions	Sample items	Source
Quality management practices	Customer orientation	Organizational efforts towards aligning firm processes to create customer value (Mentzer, Keebler, Nix, Smith, & Zacharia, 2001).	“Accurate information to customers, product benefits and empowering them to make right decisions”	(Saxe & Weitz, 2010).
	Process control	Precautionary approaches to quality management intended to achieve consistent results (Palmberg, 2009)	“Process documentation, monitoring, use of instruction manuals and supplier quality checks”	Sadikoglu & Olcay (2014)
	Supplier quality management	A set of activities supply organizations should comply with to ensure quality supplies (Foster, Wallin, & Ogden, 2011)	“Supplier relationship management, maintenance of long term relationships, provision of timely feedback and regular compliance checks”	Sadikoglu & Olcay (2014)
<i>Reliability</i> ($\alpha=0.781$); <i>Validity</i> (TVE = 62.17%).				
Knowledge management potential	Knowledge generation	Initiatives firms undertake to increase the skill capability of human resources in the organization (Bratianu & Orzea, 2010).	“Understanding customer needs, market developments, supply needs and retrieval of stored knowledge.	Nguyet & Nguyen (2010)
	Knowledge absorption	The ability of an organization to integrate knowledge in operations (Huisman & Hurman, 2003).	“Communication of acquired knowledge, knowledge sharing, exchange and assimilation into existing knowledge base ”	Nguyet & Nguyen (2010)

	Knowledge integration	Amalgamation external knowledge within established systems to support operations (Chang & Pai, 2013).	“Matching knowledge with operation’s needs, efficiency, and development of new products and solving operational challenges.	Nguyet & Nguyen (2010)
				<i>Reliability</i> ($\alpha=0.717$); <i>Validity</i> (TVE = 72.39%).
Technology fusion	Usefulness	Perceived benefits derived from ICT applications (Wahab et al., 2011).	“Ability to accomplish tasks easily, doing work the right way, improvement in work quality and improvement in productivity”.	Davis (1993).
	Usability	The perception that that applications require minimal efforts to support of operations (Davis, Baggozi & Waarshaw, 1989).	“Easy to apply, understandable, friendly and flexible”.	Davis (1993).
				<i>Reliability</i> ($\alpha= 0.916$); <i>Validity</i> (TVE = 66.80%).

Methodology

Philosophical Orientation

This study was guided by assumptions of positivistic research paradigm that examined the process by which social researchers come to understand reality (Krauss & Putra, 2005). Positivists hold that reality is absolute, exists, tangible and social researchers come to discern it through data collection, measurement, analysis and interpretation based on well-constructed research instruments (Neuman, 2007; Saunders, Lewis & Thornhill, 2008). Consequently, positivistic epistemology encompasses objective perspectives, which researchers can test by use of relevant statistics. The approach is largely deductive, focusing on testing primary data to determine whether or not results support the study hypotheses (Saunders *et. al.*, 2008). Quality concept is partially objective based on guidelines by regulatory houses, the above philosophical approach optimally guided the research process.

Research Design

We adopted a quantitative cross-sectional and descriptive survey research designs, which assume a deductive approach; synonymous with hypotheses and relationship testing between variables (Almalki *et. al.*, 2016; Creswell, 2003). Cross-sectional design was quite sufficient because it caters for research studies that analyse a particular phenomenon at a point in time (Saunders *et. al.*, 2008).

Population and Sample

The study population comprised of 460 SMEs in Uganda from the central and eastern regions 60, percent and 40 percent, respectively (URA, 2014). We selected the two regions because they

have the highest rate of SME concentration in Uganda. The study conceptualized firm's category by employment levels depicted as follows: small firms (5- 50) and medium (51-100) employees (MSME Policy, 2015). Due to relatively high mortality rates of SMEs in Uganda, we identified firms that had been in existence for at least five years. The period was perceived sufficient for firms to demonstrate considerable capabilities to acquire and integrate knowledge, adopt relevant technologies and build sustainable quality management practices to support corporate strategy. The sample size was determined on the basis of Krejcie and Morgan's (2010) formula as follows:

$S = [X^2 NP (1- P)] \div [\{d^2 (N -1)\} + \{X^2 P (1- P)\}]$ anchored at 95 percent confidence level and .05 error margin

Where

S = required sample size.

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level.

For 95 percent confidence level, the value is 3.841.

N = the population size.

P = the population proportion (assumed to be .50 since this would provide the maximum sample size).

d = the degree of accuracy expressed as a proportion (.05).

Subjecting the study population to the presented formula, sample size ($S=210$) was determined.

Sampling Procedure and Design

In the study, we determined the respective sample sizes of 126 and 84 firms from the central and eastern regions with regard to population ratios. Basing on respective sampling frames, we used simple random sampling technique to identify sample firms with the help of M/S Excel random selector. However, our target respondents were either quality controllers or operations managers. Therefore, we used purposive sampling technique to identify respondents from the selected study firms. The purpose was to obtain a homogeneous sample for our study and minimize on divergences in responses.

Data Collection

The unit of inquiry was an employee in operations function preferably operations managers, quality controllers and supervisors because they occupy strategic positions in the operations function, in particular and the organization, in general (Ayala-Cruz & Ayala-cruz, 2015). An SME (firm) was the basic unit of analysis. We administered the instrument in two phases: first, on the dependent variable; then predictors and moderator after one week to control for common methods bias (Podsakoff, Mackenzie, & Podsakoff, 2012). During the interval, there were no policy shifts within firms or external to affect our data.

Data Management

We conducted a pilot study to pre-test and determine the instrument's validity, reliability and made improvements where necessary. Results from the pre-test found the instrument reliable and valid as clearly shown in a couple of sub-sections that follow. After data collection for the main study, we conducted manual data editing for accuracy and completeness. Out of 210 questionnaires that were received, we isolated and discarded 8 (eight) items that had glaring gaps of omissions. Thus, 202 were usable representing 96.2 percent response rate. This was well

above the average response rate of 56 percent established by Nulty (2008) for paper-based studies. We conducted data cleaning exercise using Statistical Package for Social Sciences (SPSS) software in respect of missing values and outliers (Vardeman & Morris, 2003) purposely to optimize the predictive power, effect size and reliability of our data. Using descriptive statistics, some values were identified missing. Subjecting the data to Little's MCAR test, results indicated that data were missing completely at random (Sig. = .101). Therefore, we replaced the missing data using linear interpolation method (see also Bardsley, Jefferies, & Nagy, 2006)

Data Analysis and Interpretation

We sought to determine the firms' characteristics of the study sample and results are illustrated in Table II.

Table II: Firms' characteristics

<i>Location of firm by region in Uganda</i>		
	Frequency	Percent
Central	118	58.4
Eastern	84	41.6
Total	202	100
<i>Nature of business</i>		
Processing	26	12.9
Manufacturing	74	36.6
Service	102	50.5
Total	202	100
<i>Approximate number of employees</i>		
5-50	122	60.4
51-100	80	39.6
Total	202	100
<i>Years the organization has been in existence</i>		
5-10	73	36.1
11-15	87	43.1
16-20	23	11.4
Over 20	19	9.4
Total	202	100
<i>Number of branches</i>		
None	99	49
One	57	28.2
Two	22	10.9
Three	9	4.5
Over Three	15	7.4
Total	202	100
<i>Tick the quality management practice (s) commonly used by your firm</i>		
Supplier quality management	52	25.7
Process control	68	33.7
Quality certification	82	40.6
Total	202	100

Results revealed that 58.4 percent firms are located in the central region and 41.6 percent in the eastern. This is probably due to relative stable market conditions for goods and services since the central region hosts Kampala, the Central Business District. Service firms represented 50.5 percent compared to manufacturing and processing firms (49.5%) combined. This is in line with OECD (2005), which reveals that service firms are increasingly replacing sister manufacturing and processing firms. Small scale firms dominate (60.4%) compared to medium (39.6%). This is perhaps explained by perpetual resource constraints experienced by the SME sub-sector as noted before. Close to half (49%) of firms had no branch probably due to their small nature (5-10) employees. The rest (43.1%) of firms had been operating in the sub-sector between 11 and 15 years thereby demonstrating ability to apply relevant quality management practices in the SME-sub-sector. This demonstrates the importance of quality management practices by business firms. Then slightly close to half (40.6%) of firms rely on quality standards established by quality certification houses. This may be due stringent controls by the regulatory bodies. Pearson's two tailed correlations test in Table II was performed to establish whether or not associations existed between variables as postulated in the empirical literature (Field, 2009). In this study, a zero order correlation was adopted to establish associations. The results are indicated in Table III.

Table III: The zero order correlation to establish associations

	Mean	Std. Deviation	1	2	3
1. Quality management practices	4.8524	.55017	-		
2. Knowledge management potential	4.6902	.57261	.44 **	-	
3. Technology fusion	4.8499	.60808	.54 **	.23 **	-

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

We examined the association between knowledge management potential and quality management practices. Results revealed that a significant relationship exists ($r=.44$; $p<0.01$). This implies that changes in knowledge generation, absorption and integration potential of a firm are associated with changes in its customer orientation, process management and supplier quality management practices. This finding supports H_1 , which states that, “there is a positive and significant relationship between knowledge management potential and quality management practices among SMEs in Uganda.”

Findings also revealed a positive and significant relationship between technology fusion and quality management practices ($r=.54$, $p<0.01$). These results suggest that adoption and usage of modern technical applications is associated with the firm's ability to understand their customer needs, operations process and manage sustainable quality inputs from suppliers. The finding accordingly supports H_2 , which states that, “there is a positive and significant relationship between technology fusion and quality management practices among SMEs.”

Regression of knowledge Management Potential and Quality Management Practices with Control variables

We used hierarchical regression analysis in respect of guiding procedures (see Petrocelli, Cohen, & Wampold, 2003) where group categories are entered simultaneously. In our study, we sought to find out influence of control variables and the predictor on the outcome variable, quality management practices (Frazier, Tix, & Barron, 2004). Table IV presents results from the analysis in respect of model 1 and model 2. The model coefficients are used as indicators to determine

contribution of each variable on quality management practices. The variance (R^2) explains overall contribution of variables in the final model. Results are shown in Table IV.

Table IV: Regression analysis results for KMP & QMP

Dependent variable: Quality management practices				
Variable	Model 1		Model 2	
	B	B	B	B
Constant	5.30		2.857	
Location by region	-.08	-.10	-.06	-.09
Nature of business	-.06	-.12	-.02	-.04
Approximate number of employees (size)	.11	.15*	.13	.19***
Years in existence	.01	.01	-.01	-.01
Number of branches	.02	.06	.01	.02
KMP			.46	.58***
R^2	.06		.38	
Adj. R^2	.04		.36	
ΔR^2	.06		.32	
ΔF	2.90		125.60	
F	2.90		24.60	
Sig	.01		.000	

*** $p < .001$; * $p < .05$; $p > .05$

Model 1 takes into account the following control variables: location of firm by region, nature of business, approximate number of employees, years the organization has been in existence and number of branches. Location of firm by region is not a significant predictor of quality management practices among SMEs in Uganda ($\beta = -.10$; $p > .05$). This may be partially explained by the fact that quality management practices cut across regions, depending on customer preferences. Similarly, the nature of business does not determine quality management practices among SMEs ($\beta = -.12$; $p > .05$). This implies that quality management efforts are necessary regardless of nature or type of the sub-sector in which the firm operates.

Further analysis indicated that the number of years a firm has been in existence is not a significant predictor of quality management practices adopted by a firm in the SME sub-sector ($\beta = .01$; $p > .05$). This implies that regardless of firm's experience, quality requirements are crucial for sustainable operations. Further analysis of results showed that the number of branches was found not to significantly predict quality management practices among SMEs in Uganda ($\beta = .06$; $p > .05$). Ideally, firms tend to maintain consistent quality across their branches as a symbol of identity. However, the number of employees is the only control variable that stood out as a significant predictor of quality management practices ($\beta = .15$; $p < .05$). Therefore, firm size is a determinant of the preferred quality management practice adopted by respective firms. Results indicated that the number of employees contributes a significant variation in quality management practices among SMEs in Uganda with a predictive power of 6 percent of variation in quality management practices ($\Delta R^2 = .06$; $p < .05$).

Model 2 takes into account knowledge management potential, whose results indicated that it is a positive and significant predictor of quality management practices among SMEs in Uganda ($\beta = .56$; $p < .001$). Knowledge management potential accounted for a considerable variance of 32

percent in quality management practices ($\Delta R^2=.32$; $p<.001$). Therefore, the finding extends further support for hypothesis H_1 , which states that, “there is a positive and significant relationship between knowledge management potential and quality management practices among SMEs in Uganda.”

The model further indicates that the number of employees is a positive and significant predictor of quality management practices ($\beta =.19$; $p<.01$). However, location of firm, nature of business, number of years a firm has been in existence and the number of branches were found not to be insignificant predictors quality management practices with the following respective beta coefficients and significance values ($\beta =-.09$; $p>.05$); ($\beta =-.04$; $p>.05$); ($\beta =-.01$; $p>.05$) and ($\beta =.02$; $p>.05$).

The overall model is statistically significant (sig. = .000, $p<.001$, $F=24.59$). Two components, one predictor and another control are significant predictors of quality management practices. They account for 38 percent of variation in SME quality management practices in Uganda. In the final model, a unit change in knowledge management potential increases the level of quality management practices by .58 ($\beta =.58^{***}$) and a unit change in firm size (number of employees) increases quality management practices by .19 ($\beta =.19^{***}$). Thus, out of the total effect (38%), knowledge management potential explains 32 percent, while firm size explains dismal (6%) of the variation management practices, respectively.

A moderated regression model of technology fusion

The major focus of this study was to test for interaction effect of knowledge management potential and technology fusion on quality management practices among SMEs in Uganda. For interaction to exist, there should occur a variation in effect between the predictor and the dependent variable as a result of changes in the moderator (Baron & Kenny, 1986; Preacher, Curran & Bauer, 2006). Conditions for testing moderation effects are further articulated by Jose (2013) by emphasizing on the following:

Researchers should centre values of both independent and moderator variables by subtracting absolute means from respective global variables to obtain marginal mean scores;

Compute the product of centred scores to generate the interaction term; and

Integrate the resultant term to test for interaction effect through a moderated hierarchical regression model.

The major aim of centering mean values of the predictor and moderator variables is to alleviate secondary multicollinearity effects associated with regression analyses (Iacobucci, Schneider, Popovich, & Bakamitsos, 2016). We observed the stated conditions in running the analysis and results are presented in Table V.

Table V: Moderation Results for technology fusion

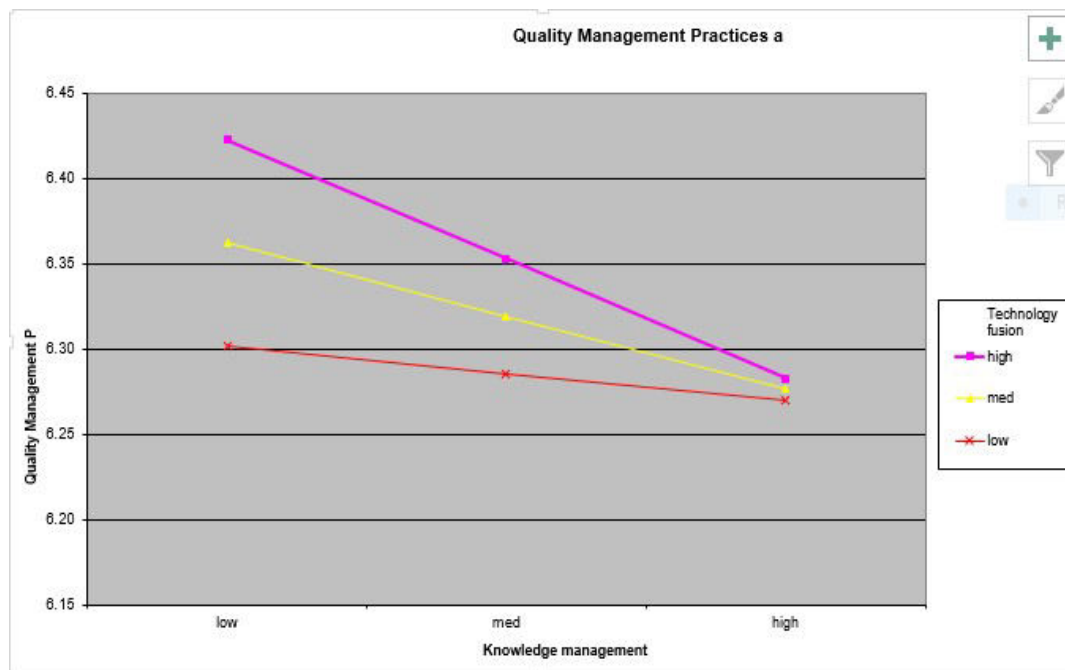
n=202 Dependent variable: quality management practices

	Model 1		Model 2		Model 3		
Variables	B	B	B	B	B	B	VIF
(Constant)	5.267 ***		5.267 ***		5.278***		

KMPC(M/E)	.479 ***	.580***	.348 ***	.422***	.346 ***	.419***	1.221
TFC (MOD)			.269***	.373***	.240 ***	.332***	1.377
Interact. Term					-.068 *	-.056 *	1.168
R^2	.337		.451		.461		Na
Adjust. R^2	.334		.446		.455		Na
ΔR^2			.114		.010		Na
ΔF	126.029 ***		51.162 ***		4.756*		Na
F	126.029		101.341		70.174		Na
Sig.	.000		.000		.000		Na

*** $p < .001$, * $p < .05$, $p > .05$

Scholars of moderation studies have indicated that the interaction effect is perceived to manifest if the beta coefficient of the product term is significant (Baron & Kenny, 1986; Jose, 2013). In due regard, the beta coefficient of the interaction term was significant ($p < .05$); implying existence of interaction. Jose (2013) recommends that results from a regression model should be plotted on ModGraph (excel version) for purposes of determining whether lines are parallel or not to confirm existence of the interaction effect between the predictor and the moderator variables on the dependent variable. The results are illustrated in Figure II.



As presented, results showed that the rule for conditional effect was not violated since the simple lines are not parallel, signifying interactions between knowledge management potential (main effect), technology fusion (moderator) and quality management practices (dependent variable).

Figure II indicates that quality management practices were the highest in the context of both low knowledge management potential and high technology fusion. Higher levels of knowledge management potential had a negative impact on quality management practices under conditions of high technology fusion. This is depicted by the negative value of the interaction term (-.056)

and the downward sloping nature of the Mod-Graph lines from left to right. At high levels of knowledge management potential and technology fusion, quality management practices are negatively affected. However, when the propensity of knowledge management potential is low, higher conditions of technology fusion were associated with higher quality management practices. This renders support for H_3 that, "the influence of knowledge management potential on quality management practices varies with the level of technology fusion among SMEs in Uganda."

Discussion of Findings

We established that all confounding variables, safe for firm size, are not significant predictors of quality management practices among SMEs in Uganda. However, firm size, represented by the number of employees was found to be a significant predictor of quality management practices among SMEs. It means that Small and Medium sized firms differ in their choice for preferred quality management practices in Uganda. In due regard, firms in each category (small or medium) are expected pursue different approaches in identifying customers' benefits; process monitoring, inspection, documentation and supplier relationship management.

Studies involving firm characteristics and quality management practices in regard to firm size (number of employees) reflect mixed results. For example, Hendricks and Singhal (2001) found that smaller firms exhibit optimal coordination and control of activities that support effective implementation of quality management practices. However, Mady (2004) found medium and large sized firms highly effective in embracing relevant quality management practices by regulatory houses perhaps due to substantial firm resources they control. Since majority of the sample firms (60.4%) were small; employing between 5 and 50 employees, we may associate the positive and significant predictive power of firm size on quality management practices to small firms that dominate the Uganda SME sub-sector.

The study also set out to test hypotheses generated from theory and empirical literature and results are discussed in the subsequent sub-sections.

Hypothesis		Result
H1:	<i>There is a positive and significant relationship between knowledge management potential and quality management practices among SMEs.</i>	Supported
H2:	<i>There is a positive and significant relationship between technology fusion and quality management practices among SMEs</i>	Supported
H3:	<i>The influence of knowledge management potential on quality management practices varies with the level of technology fusion among SMEs in Uganda</i>	supported

In regard to hypothesis (1), the study results indicated that SMEs that understand customer needs and developments in product markets are capable of providing useful information to customers about product benefits, which inform their consumption decisions. Besides, SMEs that encourage knowledge sharing, exchange and assimilation into existing knowledge base can document relevant work guidelines, control checks and monitoring mechanisms, which ensure consistency in final products. Additionally, SMEs that are capable of utilizing acquired knowledge to solve work flow challenges may improve firm's efficiency and promote development of new products that meet customer value needs in a dynamic environment.

The presented findings lend support to Kachba and colleagues (2012) who revealed that SMEs that have the ability to manage knowledge on sustainable basis are capable of achieving organizational wide quality management agenda. In a related study, Yusof (2013) emphasizes that customer needs and preferences keep changing overtime and organizations need to provide product value according to the client's preferences. In contrast, Soltan and Vaisi (2014) found a non-significant relationship between knowledge management potential and project quality management in the construction industry. However, this does not render our study findings doubtful since respective sub-sectors require quite different operational needs.

The study further reveals that technology support applications are useful in enabling employees accomplish tasks easily, carry out assignments in the right way and improve work quality as well as productivity, which support development of customer desired product value. Likewise, SMEs find technological applications easy to understand, apply, friendly as well as flexible and likely to sustain development of control work guidelines for quality improvement.

In addition, presented findings are in harmony with those from a study by Khanam, Siddiqui and Talib (2013) who observed that adopting up-to-date technologies is imperative in achieving quality requirements necessary to support organizational corporate strategy. However, contrasting findings by Idil, Bolatan, Gozlu, Alpkan and Zaim (2016) in the large industry setting indicate an insignificant relationship between technology adoption and quality performance. Despite the contrast, this does not affect validity our findings since the sectors are different.

The key objective of the study was to establish whether or not effect of knowledge management potential on quality management practices varies with the level of technology fusion among SMEs in Uganda. The interaction effect was only helpful for firms with low levels of knowledge management potential under conditions of high technology fusion. Besides, conditions of high levels of technological applications are highly useful to enable firms experiencing relatively low levels of knowledge acquisition, absorption and storage to identify reliable and cost-effective sources of inputs. Likewise, high conditions of technological applications ease the firms' ability experiencing low capabilities in matching fresh ideas with operations requirements to achieve improvement in monitoring, control and inspection of work processes in operations. These findings are similar to those by Ortega (2014) who indicated that technological capabilities influence on relationship between quality orientation and performance .

Conclusion

Based on findings and discussion, knowledge based SMEs can achieve sustainable quality management schemes necessary to improve compliance with modern quality management practices. Besides, technology support systems enhance a firm's strategic performance in respect of obtaining strategic quality management practices. SMEs should consider using modern technological applications to achieve organizational strategic quality goals.

Policy Implications

In this study, we draw policy implications that may help SMEs to improve performance.

- i. The government should design relevant policies that support SME sub-sector in knowledge acquisition and application to sustain operations.

- ii. Operations managers should create an environment that supports knowledge acquisition, absorption and integration into operations in order to respond effectively to today's dynamic environment.
- iii. Managers need to re-tool their employees with modern technological applications to support the firm's corporate strategy.
- iv. For researchers, there still exists room to exploit additional moderation research projects involving knowledge management potential and quality management practices by focusing on the SME sub-sector in developing countries since the study focused on one environmental factor; technology fusion.

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