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Article

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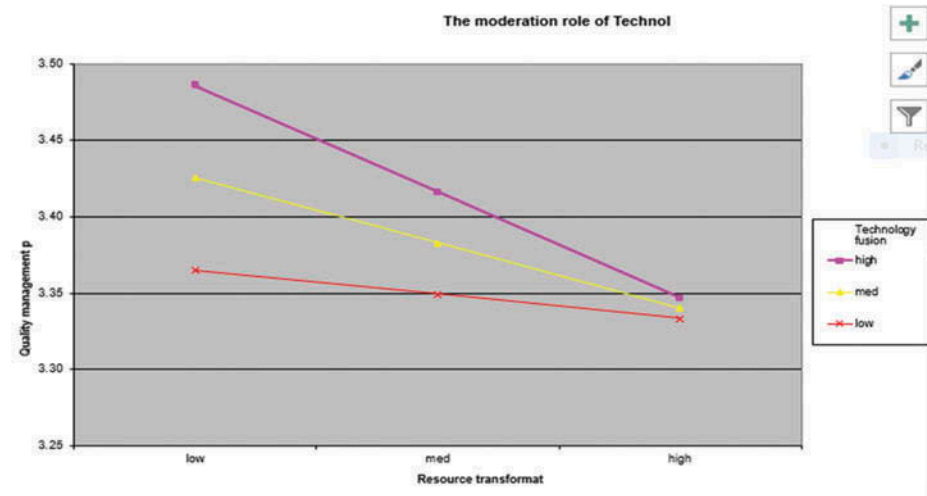
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a Mod-Graph signifying the interactive effect of ICT intensity



OPERATIONS, INFORMATION & TECHNOLOGY | RESEARCH ARTICLE

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OPERATIONS, INFORMATION & TECHNOLOGY | RESEARCH ARTICLE

ICT fusion on the relationship between resource transformation capabilities and quality management practices among SMEs in Uganda

Benard Onyinyi^{1*} and Will Kaberuka²

Abstract: The major objective of this study was to determine the relationship between resource transformation capabilities and quality management practices under conditions of varying levels of Information and Communication Technology (ICT) fusion among Small and Medium Scale Enterprises (SMEs). Data were collected using cross-sectional and descriptive survey designs; which involved 210 SMEs selected from the Central and Eastern regions of Uganda. Hierarchical regression models and a mod-graph were used in the analysis. The results reveal that the influence of resource transformation capabilities on quality management practices varies with the level of ICT fusion among SMEs. Further, there exists a positive and significant relationship between resource transformation capabilities and quality management practices. Based on findings, it is imperative for managers to re-tool their employees with modern ICT applications to strengthen the relationship between resource transformation capabilities and quality management practices among SMEs.

Subjects: Service Operations Management; Business, Management and Accounting; Production, Operations & Information Management; Operations Management

Keywords: SMEs; resource transformation capabilities; information and communication technology; quality management practices

1. Introduction

The business environment has become increasingly competitive and this has compelled business firms to adopt and modify sustainable quality management practices to deliver desired products that meet



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PUBLIC INTEREST STATEMENT

This paper analyzes quality management practices among SMEs using resource transformation capabilities under conditions of ICT applications. It is important because SMEs provide goods and services to both industrial consumers and individual clients who are more informed due to globalization and greater access to information for decision-making. SME sub-sector also makes a substantial contribution to the Gross Domestic Product in both developed and developing countries. Given resource constraints especially in developing countries that SMEs experience, they need to harness those at their disposal to provide unique products that meet the quality needs of their consumers.

the changing needs of the customers. Today, competition has constrained firms to continually reconfigure their products and systems to satisfy the customers who are apparently more informed due to unlimited access to information. Therefore, to sustain operations in the current unpredictable environment, firms ought to empower their human resources with skills and capabilities to support the provision of quality products. For SMEs in developing countries which are largely resource constrained, resource transformation efforts should be internally generated and supported by management.

Quality management practices among SMEs have been widely studied both in developed and developing economies. Generally, they are conceived as a set of activities adopted and modified by managers to improve firm operations necessary to meet customer expectations (Jaafreh & Al-Abedallat, 2012). Resource transformation capabilities are regarded as organizational efforts that involve re-modification of firm resources into unique assets to deliver customer desired systems and products (Teece, 2014). Information and Communication Technology (ICT) fusion has been perceived as applications that drive modern business practices (Wahab, Rose, & Osman, 2011).

Moderation studies involving resource transformation capabilities and quality management practices among SMEs are quite scanty. However, Uden (2007) used organizational culture as a moderator in a study involving leadership style and quality management practices in public hospitals. Therefore, this study seeks to contribute to the existing body of knowledge by focusing on the moderating role of ICT fusion on the relationship between resource transformation capabilities and quality management practices among SMEs.

SMEs are crucial in stimulating economic growth and development through employment creation, generation of household incomes, poverty reduction and Gross Domestic Product support (Iorun, 2014; MSME Policy, 2015). For Uganda, SMEs contribute 75% (GDP) and employ more than 2.5 million people with an employment growth rate of 25% (UIA, 2012). However, the failure rate in the subsector has remained considerably high; approximately 50% during the first year of operation compared to the industry average of 9.5% (Eurostat, 2015; Rooks, Szirmai, & Sserwanga, 2009). In developing countries, SME failure has been attributed to lack of capital, skilled manpower and inadequate ICT support system to propel resource transformation potential into quality products desired by the customers (Loboea, 2017) which the study investigates.

The rest of this paper is organized as follows: the next section focuses on the theoretical background and review of related literature, development of the conceptual framework; followed by the research methodology, findings and discussion. The final section provides conclusion, implications and limitations of the study.

2. Theoretical background and related literature

2.1. Quality management practices: Continuous improvement theory by Kaizen (1986)

Continuous improvement theory (Kaizen, 1986) posits that organizations perpetually endeavor to advance their operational levels regardless of the current status of achievement to attain their strategic objectives. Such improvements are required in operations, systems, structures and activities to support long-term organizational strategy (Singh & Singh, 2009). Accordingly, continuous improvement is critical in improving efficiencies in the production value chain, enhancing process yield and obtaining considerable success rate in new product introductions (Vrontis & Thrassou, 2013). Therefore, firms ought to develop and redeploy available and prospective resources in support of quality management activities which manifest into cycle time reduction, improvement in delivery frequencies and attainment of consistent quality products (Zangwill & Kantor, 1998).

2.2. Resource transformation capabilities and quality management practices among SMEs

Firm resource transformation capabilities involve a combination of organizational networking, creative and innovative efforts that convert current resources into unique assets that create customer value (Teece, 2014). Kashan and Mohannak (2015) observe that such efforts are crucial in enhancing new product development necessary to support firm operations. Bourke, Roper, and Roper (2015) conceptualize that operational competencies of firm are enhanced by multiple capabilities embedded in its functional parameters. In support of the above, Kashan and Mohannak (2015) emphasize that firms create strong dynamic competencies through organizational learning which supports continuous improvement effort. Therefore, it is of long-term benefit to create a couple of resourceful capabilities through business networks to counteract market challenges emerging from the turbulent business environment today (Mackinnon & Derickson, 2013).

Business networks involving suppliers, customers and partners enable firms to build competitive capabilities in quality management for long-term survival (Kashan & Mohannak, 2015). To maintain long-term relationships, intellectual capital, organizational learning and research & development programs are important in shaping strategic priorities of a firm (Bhatti & Zaheer, 2014). In knowledge-based economies, it is strategically convenient for SMEs to establish credible networks with major stakeholders in order to meet the ever-changing quality needs of their retail clients and industrial customers (OECD, 2017). Coordination and networking across functional teams improve activity value chain which ensures quality improvement on continuous basis through creativity and innovativeness (Kojima & Amasaka, 2017).

In essence, firm creativity bridges divergent thinking to a common phenomenon among employees through collective generation of product value that satisfies diverse markets (Ylitalo, 2017). According to Shan, Ahmad, and Nor (2016), firm creative efforts translate into new market segments, improve the production systems and propels new products to deliver customer value. Through creative efforts, SMEs are at the forefront of improving existing ideas to generate unique products that meet the recommended standards in the market place (Bourke et al., 2015). Hence, firm creativity promotes employee resourcefulness required to craft quality products that match international standards (Kanorio, 2014).

There is an apparent positive link between the manager's creative capabilities and establishment of sustainable learning, inventiveness & innovativeness (Holzmann & Golan, 2016). Experiential learning and accumulation of cross-functional skills can offer better strategic interventions in solving managerial responsibilities relating to firm competitiveness in a broader global environment through prospective business networks (Kimbell, 2013). Therefore, firm creativity and innovativeness collectively offer an improved roadmap to serve customers in international markets (Felix, 2015).

SMEs that demonstrate positive and innovative strides by adjusting the current operations value chains to achieve a sustainable level of quality and productivity performance often receive recognition for being innovative due to their ability to redesign their work processes by taking advantage of advanced technology to register desirable levels of quality products on a continuous basis (Larsson, 2017). Today, SMEs seek to increase the value of their products by adopting innovative strategies for quality and manufacturing excellence synonymous with modern practices (Lara, De, Regina, & Guimarães, 2014). In essence, innovativeness results in the quality of products which enhance a firm's competitive advantage in dynamic global markets through vibrant capabilities (Rosli & Sidek, 2013). Hence, it is sufficient to hypothesize that;

H1: Resource transformation capabilities are positively and significantly related to quality management practices among SMEs.

2.3. The moderating role of ICT fusion on the relationship between resource transformation capabilities and quality management practices among SMEs

SMEs that focus on advancing new capabilities exhibit active behavior and are predominantly ICT driven in search of organizational goals (Pratono & Mahmood, 2015). Price, Stoica, and Boncella (2013) and Saunila, Pekkola, and Ukko (2014) indicate that innovativeness is a measure of dynamic capabilities for SMEs that comply with modern technology applications. Innovative capabilities of a firm are crucial in the development of quality products for firm survival in a turbulent operating environment (Kocoglu & Ince, 2011). Technology-based innovations are considered a useful input for generating valuable capabilities in response to changing customer expectations (Osei, Yunfei, Appienti, & Forkuoh, 2016). It is common knowledge that technological progress has been associated with shorter product life and order cycle time (Janaratne, 2014).

Multiple capabilities provide firms with alternative technology engineered support applications required in quality management efforts (Pratono & Mahmood, 2015). For example, creative capabilities are associated with innovations and system improvements (Price et al., 2013). Firm resource capabilities and innovative potential have cumulative and long-term incremental contributions to firm performance (Price et al., 2013). Creative efforts of a firm are synonymous with technology supported innovations; and have been found to reduce waste along the value chain (Kocoglu & Ince, 2011). Generally, firm capabilities coupled with technological advancements support the development of improved products that meet the quality needs of the customer (Pratono & Mahmood, 2015).

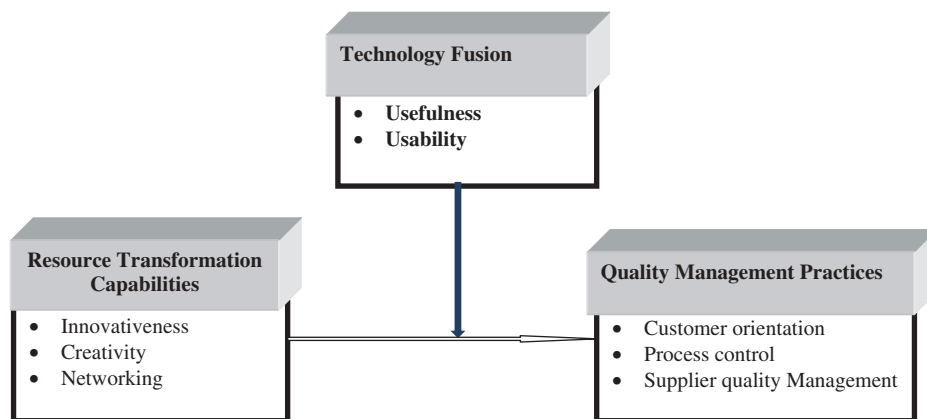
Studies indicate that SMEs are capable of sustaining creative and innovative networks with the support of ICT applications (Price et al., 2013). Firm innovativeness as a measure of dynamic capability spurs value addition activities required in quality management programs (Slater, Mohr, & Sengupta, 2014). Pratono and Mahmood (2015), in support of the above views, state that the foundations of innovative firms include; investment in ICT, entrepreneur skills and adoptive capabilities needed to support corporate strategy. Therefore, some SMEs have benchmarked innovation practices of leading firms in search of good practices (Sadikoglu & Olcay, 2014). Continuous improvement in quality management endeavors is best achieved by adapting relevant ICT applications in the market place (Noor-Ul-Amin, 2013). Customers constantly demand for better quality products and this can be achieved through ICT acquisition and integration in a firm's operational base (Osei et al., 2016). The above review supports the hypothesis that;

H2: ICT fusion moderates the relationship between resource transformation capabilities and quality management practices among SMEs.

In view of literature, we develop a model in Figure 1 to guide this study.

Figure 1. Conceptual framework for quality management practices.

Source: Theoretical and literature review.



3. Research method

We adopted a quantitative cross-sectional research design which assumes a deductive approach; synonymous with hypotheses and relationship testing between variables (Almalki, Centre, Arabia, & Centre, 2016; Creswell, 2003). A cross-sectional design was quite sufficient because it caters for research studies that analyze a particular phenomenon at a point in time (Saunders, Lewis, & Thornhill, 2009).

The study scope focused on SMEs that carry out value addition in their operations 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 sizes, respectively. However, Uganda MSME Policy (2015) conceptualizes SMEs as those firms formal or informal that employ between 5–50 and 51–100 in respect of small and medium-sized firms. We adopted the MSME (2015) Policy guideline in categorizing firms.

The study population comprised 460 SMEs in Uganda; from the central and eastern regions 60% and 40%, respectively (Uganda MSME Policy, 2015). We selected the above two regions because they have the highest rate of SME concentration in Uganda. The study conceptualized firm category by employment levels; Small firms (5–50) and medium (51–100) employees (Uganda MSME Policy, 2015). Due to relatively high mortality rates of SMEs in Uganda, we identified those firms that had been in existence for at least five years. The period was perceived sufficient for firms to demonstrate considerable capabilities to transform resources, adopt relevant ICT applications and build sustainable quality management practices to support corporate strategy. The sample size was determined on the basis of Krejcie and Morgan (1970) statistical table. Subjecting the study population to the statistical table, a sample size of 210 firms was determined.

A total of 126 and 84 firms were selected from the central and eastern regions, respectively. Basing on respective sampling frames, we used a simple random sampling technique to identify sample firms with the help of M/S Excel random selector. The target respondents were either quality controllers or operations managers. Therefore, we used a 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 response patterns.

4. Operationalization and measurement of variables

This is concerned with reduction of phenomenon into representative measurable factors (Machery, 2007). The study made inference to the theoretical works of previous scholars to operationalize the variables that include; quality management practices, resource transformation capabilities and ICT fusion into measurable constructs. These are summarized in Table 1.

4.1. Data collection

The unit of inquiry was an employee in operations function preferably quality controllers or operations managers because they occupy strategic positions in the operations function in particular and the organization in general (Ayala-Cruz, 2015). An SME was the basic unit of analysis. We administered the instrument in two phases to control for common methods variance (Podsakoff, Mackenzie, & Podsakoff, 2012). First, we collected data on the dependent variable and then the predictors and moderator variables after one-week interval. During the interval, there were no policy shifts within the sampled firms or external to affect our data. Besides, we used multiple scales and simplified the items for easy interpretation (Podsakoff et al., 2012) to further minimize the common methods biases.

4.2. Data management

We conducted a pilot study to pretest and determine the instrument's validity, reliability and made improvements where necessary. The results from the Pilot found the instrument reliable and valid as shown in operationalization and measurement of variables Table 1 already presented. After data

Table 1. 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 and Olcay (2014)
	Supplier quality management	A set of activities supply organizations should comply with to ensure quality supplies (Foster, Wallin, & Ogaen, 2011)	"Supplier relationship management, maintenance of long term relationships, provision of timely feedback and regular compliance checks" Reliability ($\alpha = 0.781$); Validity (TVE = 62.17%).	Sadikoglu and Olcay (2014)
Resource transformation capabilities	Creativity	A range of activities involving inventive efforts to transform products, processes and markets in view of customer expectations (Griffin, 1997).	"Analysis of the current product benefits, additional applications, new idea creation, creative ways to solve operational challenges".	(Kumar & Holman, 1997)
	Networking	A process of establishing business links with external stakeholders to enhance firm performance (Farinda, Kamarulzaman, Abdullah, & Ahmad, 2009).	"Maintenance of business partnerships, initiating partnerships for strategic goals, acquisition of new business parsnips".	Borch and Madsen (2007)
	Innovativeness	Unique capabilities that sustain firm competitiveness in a dynamic environment (Bayarçelik, Taşel, & Apak, 2014).	"Introduction of innovative products, new product launch, perception of new products by customers, technological adoption, first to market new products". Reliability ($\alpha = 0.813$); Validity (TVE = 69.5 %).	Wang, Campus, and Campus (2004)
ICT 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 productivity".	Davis (1993).
	Usability	The perception that that applications require minimal efforts to support of operations (Davis, Baggiozi, & Paul, 1989).	"Easy to apply, understandable, friendly and flexible". Reliability ($\alpha = 0.916$); Validity (TVE = 66.80%).	Davis (1993).

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 questionnaires that had glaring gaps of omissions. A total of 202 were usable representing 96.2% response rate. This was well above the average response rate of 56% established by Nulty (2008). We conducted data cleaning exercise using 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 as 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 a linear interpolation method (Bardsley, Jefferies, & Nagy, 2006).

4.3. Validity (convergent and discriminant validity)

Convergent validity measures the degree of internal consistency across study constructs (Wang, French, & Clay, 2015). Therefore, convergent validity was examined using the Bentler–Bonett Normed Fit Index (NFI). Mak and Sockel (2001) posit that a scale with NFI ≥ 0.90 demonstrates good convergent validity. In this study, all of the variables registered NFI values above 0.90 representing strong convergent validity as shown in Table 2.

Table 2 signifies that the constructs under each global variable are interconnected and portray acceptable convergent validity since the respective Bentler–Bonett Normed Fit Indices are above .90.

To ascertain whether specific constructs measured only one distinct variable and therefore not correlated to one another, we performed discriminant validity statistic as recommended by Hair, Babin, and Krey (2017). For discriminant validity to manifest, the construct square root of the average variances extracted should be significantly greater than its corresponding correlation coefficients and that all the matrix correlations are statistically significant (Fornell & Larcker, 2018). Results in Table 3 mirror the recommended respective thresholds.

As shown in Table 3, the diagonal values represent the construct square roots of the average variances extracted which are evidently greater than the corresponding inter-construct correlations. Besides, the matrix correlations between constructs are statistically significant.

Table 2. Convergent validity index for global variables

Variable	Normed fit index (NFI)
Quality management practices	.96
Resource transformation capabilities	.95
ICT intensity	.95

Table 3. Discriminant validity

Con’t	CO	PC	SQ	CR	CR	NT	IN	UB	UF
CO	.709								
PC	.41**	.707							
SQ	.38**	.53**	.709						
CR	.28**	.31**	.24**	.707	.707				
NT	.25**	.32**	.37**	.40**	.40**	.739			
IN	.32**	.36**	.51**	.33**	.33**	.36**	.728		
UB	.30**	.36**	.40**	.27**	.27**	.24**	.38**	.811	
UF	.40**	.44**	.42**	.29**	.29**	.34**	.38**	.55**	.794

**Correlation is significant at the level of .01 (1-tailed)

5. Reliability

We established internal consistency of scales by composite reliability statistic using confirmatory factor analysis. According to Hair et al. (2017), Composite Reliability (CR) and the Average Variance Extracted (AVE) should meet minimum thresholds of .70 and .50, respectively, for a scale to be considered reliable. Accordingly, all the CR and the AVE complied with the recommended thresholds as shown in Table 4.

5.1. Analysis and interpretation of findings

We sought to determine the sample characteristics of the study samples and results are illustrated in Table 5.

Most firms (58.4%) are located in the central region and (41.6%) in the eastern. This is probably due to relatively stable market conditions for goods and services since the central

Table 4. Composite reliability

Variable	C.R	AVE
Quality management practices	.70	.50
Resource transformation capabilities	.70	.51
ICT intensity	.79	.64

Table 5. Sample characteristics

	Frequency	Percent
<i>Location of firm by region in Uganda</i>		
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 (Small)	122	60.4
51 ≤ 100 (Medium)	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

region hosts Kampala; the central business district. Service firms represented (50.5%) 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 explained by perpetual resource constraints experienced by the SME sub-sector as earlier noted. Most firms had no branch (49%) probably due to their small nature (5–10) employees. The majority of firms (43.1%) had been operating in the sub-sector between 11 and 15 years demonstrating the ability to apply relevant quality management practices in the SME-sub-sector. This also denotes the importance of quality management practices among SMEs.

5.2. Regression of resource transformation capabilities and quality management practices with control variables

We used hierarchical regression analysis in respect of guiding procedures of Petrocelli, Cohen, and Wampold (2003) where group categories are entered simultaneously. In our study, we sought to find out the influence of control variables and the predictor on the outcome variable; quality management practices (Frazier, Tix, & Barron, 2004). Table 6 represents the results of the analysis in respect of model 1 and model 2. The model coefficients are used as indicators to test for the contribution of each variable on quality management practices. The variance (R^2) explains the overall contribution of the variables in the final model. Results are illustrated in Table 6.

Model 1 takes into account 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. Analysis indicates that apart from the number of employees; a proxy for firm size, all the other constants did not have any significant effect on quality management practices among SMEs as indicated by the non-significant β values of $-.036$, $-.057$, $.132$, and $-.081$ for location by region, nature of business, years of existence and number of branches, respectively.

Table 6. Regression analysis results for RTC & QMP with Control variables.

Dependent variable: Quality management practices				
Variable	Model 1		Model 2	
	B	t	β	t
Constant		.000		.000
Location by region	-.036	.606	-.094	.130
Nature of business	-.057	.417	-.038	.543
Approximate number of employees	.160*	.022	.107	.086
Years of existence	.132	.060	.074	.238
Number of branches	-.081	.252	-.100	.107
RTC			.469***	.000
R^2	.059		.269	
Adj. R^2	.035		.246	
ΔR^2			.210***	
ΔF			55.587	
F	2.444		11.871	
Sig.	.036		.000	

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

The number of employees, a proxy for firm size had a positive and significant effect on quality management practices ($\beta = .160^*$). Firm size accounts for 5.9% of the variation in quality management practices ($\Delta R^2 = .059$). Model 1 is statistically significant (sig = .036; $p < .05$; $F = 2.444$). The results mean that as firms expand in size from small to medium, the choice of the preferred quality management practices may change. In view of the above, Small and Medium-sized firms are expected to pursue different approaches in identifying customers' product benefits; process monitoring, inspection, documentation and ways of obtaining their supply needs.

Empirical 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 (2009) found medium and large-sized firms more effective in embracing relevant quality management practices by regulatory houses perhaps due to the substantial firm resources they control.

In model 2, we introduce resource transformation capabilities whose results indicate that they are significant predictors of quality management practices ($\beta = .469^{***}$). When resource transformation capabilities were factored in the model, R^2 changed from 5.9 to 21% in the last model. The overall model is statically significant (sig. = .000; $p < .001$; $F = 11.871$). The two predictors of quality management practices; firm size and resource transformation capabilities account for 26.9% of the variation in quality management practices among SMEs. In the final model, a unit increase in resource transformation capabilities increases quality management practices by .469 ($\beta = .469$). However, a unit increase in firm size increases quality management practices by .160 ($\beta = .160$). Thus, resource transformation capabilities account for the largest variation in quality management practices in comparison to firm size.

5.3. Regression model of ICT fusion

The major focus of this study was to test for the interaction effect of resource transformation capabilities and technology fusion on quality management practices among SMEs. We use a hierarchical regression model of the independent variable (resource transformation capabilities) and the interaction term (technology fusion) on the dependent variable (quality management practices). For interaction to exist, there should occur a variation in effect between the predictor and the dependent variable when a moderator is introduced (Baron & Kenny, 1986; Preacher, Curran, & Bauer, 2006). Conditions for testing interaction effects are further articulated by Jose. (2013) emphasizing that;

- (i) Researchers should center the values of both the independent and moderator variables by subtracting the absolute mean from respective global variables to obtain marginal mean scores;
- (ii) Apply the product of the centered variables to generate the interaction term;
- (iii) Integrate the resultant term to test for interaction through a moderated hierarchical regression model.

We observed the above principles based on guiding procedures of Petrocelli et al. (2003) where group categories are entered simultaneously and results are shown in Table 7.

As observed in Table 7, there exists a variation in effect between the predictor and the dependent variable as a result of introducing a moderator in the model (Baron & Kenny, 1986; Preacher et al., 2006). 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). The beta coefficient of the interaction term was significant ($\beta = -.110$; $p < .05$); implying existence of interaction. Further, Jose. (2013) recommends that results from a regression model

Table 7. The moderation effect of ICT intensity dependent variable: quality management practices

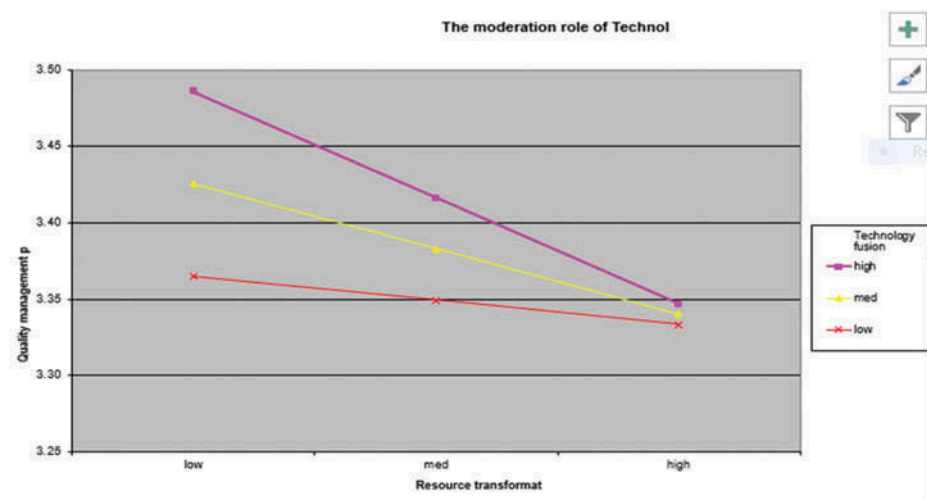
Variables	Model 1		Model 2		Model 3		VIF
	B	β	B	B	B	β	
(Constant)	5.27 ***		5.27 ***		5.28***		
RTC(Main Effect)	.48***	.58***	.35 ***	.42***	.35***	.42***	1.22
ICT (MOD)			-.27***	-.37***	-.24***	-.33***	1.38
Interaction Term					-.125*	-.110 *	1.17
R ²	.34		.45		.46		Na
Adjust.R ²	.33		.45		.46		Na
ΔR^2			.11		.01		Na
ΔF	126.01 ***		51.16***		4.76*		Na
F	126.01		101.34		70.17		Na
Sig.	.000		.00		.00		Na

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

should be plotted on Mod-Graph for purposes of determining whether the lines are parallel or not to confirm existence of the interaction effect between the predictor and the moderator on the dependent variable. The results are illustrated in Graph 1.

As presented above, results show that the rule for conditional effect was not violated since the lines are not parallel indicating interactions between resource transformation capabilities (main effect) and ICT fusion (moderator) to predict quality management practices (dependent) in line with the results of the regression model. The negative beta value of the interaction term and the downward sloping nature of the Mod-Graph lines from left to right indicate that quality management practices were highest in the context of low resource transformation capabilities and high ICT intensity. ICT intensity had a negative impact on quality management practices at higher levels of resource transformation capabilities. This renders support for H_2 that ICT fusion moderates the relationship between resource transformation capabilities and quality management practices among SMEs.

Graph 1: A Mod-Graph showing the interactive effect of ICT intensity



5.5. Discussion of results

The results in respect of H_1 designate that SMEs that endeavor to introduce new products by extending existing ideas often meet customer anticipated benefits. Further, firms that seek to create additional product benefits extend product scope from which customers make preferred choice given multiple alternatives. Additionally, SMEs that successfully introduce new products in the market ahead of their competitors are perceived to possess superior technical and managerial capabilities that ensure compliance with recommended quality standards to deliver customer value.

Findings above resonate well with Herzallah, Gutierrez-Gutierrez, and Munoz Rosas (2017) who posit that creative solutions enable SMEs to deliver customer desired products in competitive markets. In a similar measure, creativity is imperative in service improvement especially in volatile conditions and is more satisfying to customers (Giannopoulou, Gryszkiewicz, & Barlatier, 2014). However, contrasting findings by Brito and Sauan (2013) indicate that creative efforts of employees do not translate into innovative product value desired by the customers without management support. Since the success of SMEs in developing countries is associated with the managerial competencies of the entrepreneur according to Tehseen and Ramayah (2015), the study findings are well linked with the empirical works.

Further, the study results authenticate the empirical works of Odlin and Benson-Rea (2017) who contend that SMEs can rely upon business networks to harmonize key strategic information required to re-position themselves appropriately in the operations value chain and obtain fresh inputs needed to deliver anticipated quality. On the contrary, Waikar, Huynh, Cope, and Tate (2011) found that prospective business performance in SME sub-sector does not necessarily depend on the performance of a particular supplier since they deal with multiple suppliers due to the nature of their operations and success may not be associated with a single entity. Nevertheless, our findings stand the taste of time given the dynamics in the environment in which businesses operate today.

From the study, SMEs operating in an environment of high usage of mobile phones, WhatsApp, twitter, websites are capable of finding new products and novel product value that meet customer anticipated needs even if they experience low resource transformation capabilities. This further implies that conditions of high ICT applications augment SMEs ability to improve work-related activities, extend the existing product lines and minimize variations in operations value chain. Likewise, SMEs that adopt ICT support systems are better positioned to find reliable suppliers that meet the quality, quantity, timely and cost-effective supply needs of the organization.

The above findings are similar to that of Ortega (2010) whose results indicate that technological capabilities influence the relationship between firm resources and quality management orientation. Further, Basu, Bhola, Ghosh, and Dan (2016) found that SMEs in developing countries have adopted basic ICT infrastructure to achieve tactical goals including market outreach, customer responsiveness and coordination. In contrast, empirical research by Shanmugam (2016) found that ICT applications are not useful in supporting SME performance due to improper applications of the underlying tools. However, several SME managers have adopted ICT support applications since they relate with stakeholders on international scenes.

5.6. Conclusions and implications

This study examined the moderating role of ICT fusion between resource transformation capabilities and quality management practices among SMEs. Therefore, we conclude that firm efforts to convert resources into inimitable assets have an influence on its ability to deliver quality products that meet customer expectations through creative thinking. SMEs need to induce and support imaginative thinking among their employees through teamwork, cross-functional deployments, quality circles and hands-on skill transfer to nurture their latent skills to sustain organizational inventive potential. Creative and innovative efforts translate into unique products that sustain the changing tastes and preferences of the more informed customers in today's business world. Therefore, the management

of SMEs should provide a conducive work environment that encourages employees to turn their dreams into reality in line with organizational strategic objectives.

In the same vein, interactions of high ICT applications augment the interactive effect between firm resource transformation capabilities and quality management practices among SMEs. Hence, SMEs operating in an environment of high usage of mobile phones, WhatsApp, twitter and websites are capable of finding the right formula, activities and work methods through business networks to improve product value and deliver customized products. ICT applications reduce time and space in the real business world. The service supports close interaction between the organization and its collaborations to create sustainable operations.

5.7. Managerial implications

The study suggests that;

- (I) Operations managers should endeavor to support creative, innovative and business networks to harness strategic business objectives in order to compete favorably in the current volatile business environment.
- (II) SME managers should institute and support efforts by employees to transform firm resources into unique products through teamwork, cross-functional deployment and hands-on training.
- (III) SME management should intensify training in ICT applications across organizational functional areas to improve coordination and networking within and with external stakeholders in pursuance of the overall firm strategy.

5.8. Study limitations

It was cumbersome to trace some sampled firms since most streets and roads were not marked. However, we used local guides to identify the sampled firms which enabled us to optimize the response rate.

The study focused on SMEs that directly add value to the final products. Those firms that conduct commercial and trading activities were not considered. This did not have a significant effect on our study findings since the latter carry out less of quality management practices given that they largely deal with the final products.

The study scope focused on the value chain activities of the supply side of the firm and ignored the customers. This was controlled by the research instrument which was limited to value addition perspectives of the operations function undertaken by the employees.

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