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MODERATING ROLE OF ENTREPRENEURIAL ORIENTATION ON THE RELATIONSHIP BETWEEN INFORMATION TECHNOLOGY COMPETENCE AND FIRM PERFORMANCE IN KENYA

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ABSTRACT

This study explored moderating role of entrepreneurial orientation on the relationship between Information Technology Competence and firm performance in Kenya. The impact of IT on FP remains debatable to-date because some results of previous studies have had high variations resulting from diversities in the conceptualization of the key constructs and their interrelationship, coupled with the exclusion of intangible effect of IT on performance. In Kenya, SMEs employ about 85 percent of the workforce. The need to link ITC with FP has become vital for firms striving to achieve superior performance. However, limited attention has been paid to the link and more so to the moderating role of EO on ITC- FP relationship model. To better understand this relationship, this paper adopted a mixed methods research guided by cross-sectional survey design. Quantitative and qualitative techniques were employed to analyze the collected data using SPSS, Ms-Excel, AMOS, SmartPLS, STATA, R-GUI and ATLAS.ti analytical softwares. Analyses were conducted using a two-phase process consisting of CFA and SEM models. The theoretical models and hypotheses were tested based on empirical data gathered from 94 SMEs in the 2013 Top 100 Survey. The study found that ITC had a positive relationship with FP. The results also revealed that EO did not significantly moderate the relationship between ITC and FP in Kenya. However, when run with the interaction term, the Technical (ITC and ISRA)*EO was statistically significant at 10% α-level. This study will enhance the skill set in Kenyan SMEs and produce a more sustainable solution.

Keywords: Information Technology; Information Technology Competence; SMEs; Firm Performance; Information Technology Investments

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INTRODUCTION

Information technology (IT) competence is essential to delivering value through IT investments (Davis, 2013). This is why IT departments in many firms are changing from cost centers to trusted business partners within the respective enterprises. The change is needed to give the business the tools to be competitive in the global marketplace (Hendrickson, 2009). As a trusted partner, Hendrickson opines, IT can work with the business to provide the exact services the business needs at a price that the business wants to pay because the department understands and shares in the business vision. With this understanding, the IT department is better placed to provide a list of services that the business would find critical in achieving superior performance.

Information technology can distinguish market offerings, help firms meet customer expectations, deliver service standards and performance, and mobilize employees and business partners within the organization (Farhanghi, Abbaspour & Ghassemi, 2013). This realization is making corporations make huge investments in IT. Gartner (2010) reports that worldwide IT spending reached USD 3.4 trillion in 2010, a 4.6 percent increase from 2009. Because of the enormous expenditures on IT by today's organizations, researchers and practitioners through investigation, are seeking to understand better the relationship between IT competence and performance.

Moreover, researchers are inconsistent on the impact of IT investments on firm performance, with some studies finding positive relationship, others a negative relationship, and still others showing no relationship (Yao, Sutton & Chan, 2010). This is despite having studied this relationship for over a decade. Meanwhile, a generation of tech-savvy workers who grew up with IT is entering the labour force. As a result, the landscape of how IT competence is distributed across the enterprise is changing, requiring fresh thinking about IT human capital and how to leverage this expanding resource (Davis, 2013).

Research problem

The Top 100 medium-sized companies play a critical role in the development of the Kenya economy (ICPAK, 2015). They have an estimated combined annual turnover of nearly Sh100 billion and the sector accounts for 60% of the country's labor market, Juma (2011) as cited in (Ndung'u, 2014). SMEs are making huge investments in IT due to the realization that IT competence can distinguish market offerings, help firms meet customer expectations, deliver service standards and performance, and mobilize employees and business partners within the organization. Gartner (2010) reports that worldwide IT spending reached USD 3.4 trillion in 2010, a 4.6 percent increase from 2009. Yet, a large portion of IT investment does not guarantee high returns to SMEs (Farhanghi et al., 2013).

The long term survival of Top 100 medium-sized firms and SMEs in general, is closely related to their ability to successfully manage information technologies in today's harsh and rapidly changing business environment. Thus these firms have the potential to contribute more positively to the Kenyan economy than is currently the case. But to survive in a turbulent and dynamic business environment, they have to formulate and implement their strategy by engaging in entrepreneurial behaviors (Ndung'u, 2014).

One prominent concept of strategy-making in entrepreneurship literature is entrepreneurial

orientation (EO) (Schiendel & Hitt, 2007). Therefore it is expected that adopting entrepreneurial orientation may enhance the ITC-firm performance relationship in SMEs in Kenya, particularly given their resource limitations. There have also been no rich literature available that directly investigate the role of entrepreneurial orientation on the relationship between ITC and firm performance. Specifically, the impact of ITC on firm performance is expected to depend on firm's entrepreneurial orientation. This is the rationale for conducting this research. Overall, the research advances technology entrepreneurship anchored on Schumpeterian competition, or more specifically, the theory of creative destruction.

Research objective

The objective of this study is to investigate the effect of entrepreneurial orientation on the relationship between information technology competence and firm performance in Kenya.

Research hypothesis

The study hypothesized that;

H1a: There is no positive relationship between information technology competence and firm performance in Kenya.

The study also hypothesized that;

H1b: Entrepreneurial orientation does not moderate the influence of information technology competence on firm performance in Kenya.

LITERATURE REVIEW

Information Technology-based resources can be classified as tangible resources encompassing the physical IT infrastructure components, or intangible IT resources consisting of knowledge assets, customer orientation and synergy (Zehir, Muceldili, Akyuz & Celep, 2010). The resources can also be classified as human IT resources comprising the technical and managerial IT skills. The long term survival of firms is closely related to their ability to successfully manage information technologies in today's harsh and rapidly changing business environment. IT is the fastest growing sector in the economy and corporations have invested billions of dollars in IT over the years (Callahan, Gabriel & Smith, 2009).

There are three factors behind this growth (Zehir et al., 2010). The first has to do with the fact that IT is no longer largely confined to backroom operations. Indeed technology has become integrated with every aspect of the business. Secondly, the role of IT Managers has been elevated from the back office to the board room with companies nowadays emphasizing on the ability of the managers to go beyond IT functionality. And thirdly, the use and misuse of IT has become fertile ground for an ever increasing number of opportunities to either gain a competitive advantage or fall into a position of competitive disadvantage.

Despite the fact that there was an early perspective where IT investments were suggested to have a misleading impact on firm outcomes, most modern-day researchers agree that well-positioned IT investments can have significant impacts on long-term performance (Yao et al., 2010; Zhang, Li & Ziegelmayer, 2009). Definitely, deploying IT serves as a catalyst for innovative ideas as well as an engine for delivering the ideas (McAfee & Brynjolfsson, 2008). IT competence is important to the firm since it can encourage the realization of rare, valuable and non-imitable resources, and it is through these newly created resources that one can understand the true impact of IT investments on firm outcomes (Crawford, Leonard & Jones, 2011).

The first dimension of an SME's IT competence is the IT infrastructure (Crawford et al., 2011). This addresses the level of an organization's financial investment in IT resources. IT infrastructure is the hardware and software acquired within an organization. However, IT infrastructure has also been discussed in terms of the IT human resources possessed by an organization. Thus IT infrastructure is seen as the quality and quantity of IT technical (software and hardware) and human resources within and across the organization (Davis, Kettinger & Kunev, 2009). The technical configuration of IT infrastructure is commonly studied because it is relatively easy to observe and compare across organizations. On the other hand, IT human resources are subject to natural and frequent variations through worker attrition and sourcing decisions, much as they are far more difficult to compare across organizations, and as such provide potential for competitive gains.

Being the quality and quantity of interaction between the business and its IT infrastructure, IT-business relationships are most often evidenced when members of the organization are engaged in the application of IT within business processes (Davis et al., 2009). IT-business relationships benefit SMEs by enabling a shared language within the organization, providing a conduit through which business and IT can converse. Within the business, a common language is developed through user involvement in the development and implementation of IT-based solutions as well as top management support through sponsorship of IT-related initiatives (Karimi, Somers & Bhattacherjee, 2007). The shared language that develops from a mature IT-business relationship enables internal collaboration (Zhang et al., 2009), providing an environment where business opportunities can be considered in light of IT understanding.

IT-business knowledge, the third dimension of IT competence, describes the degree to which an SME understands the "what is" and "what could be" of IT in relation to business opportunities, and is composed of two separate but interdependent parts (Crawford et al., 2011). In its ideal state, IT-business knowledge allows a firm to innovate attentively with IT so that it can maximize success in its competitive environment. Taken together, these three dimensions of IT competence, IT infrastructure, IT-business relationships and IT-business knowledge, interact and influence the degree to which an SME can leverage its investments in IT for strategic gains.

A number of SMEs have successfully engaged in e-business (Dibrell, Davis & Craig, 2008); but there is also much evidence that others have been slow to adopt internet-based technologies (Bengtsson, Boter & Vanyusyn, 2007). Fillis and Wagner (2005), as cited in (Ashurst, Cragg and Herring, 2011) concluded that a wide range of factors influenced e-business development in the SME environment. These encompassed many factors that were 'internal' to the firm, including the ability to combine business and technical skills, and the entrepreneurial orientation of the owner-manager. These studies offer strong evidence that a broad range of IT resources within a firm influence e-business developments in SMEs, and hence superior performance.

The resource-based view (RBV) of the firm and the notion of 'core competences' has been used to examine the skills and resources required by firms to successfully build and leverage IT, Daniel and Wilson (2003), as cited in (Ashurst et al., 2011). RBV of the firm considers the

organization as a package of resources and that by coordinating and incorporating these resources a firm can deliver competitive advantage. Caldeira and Ward (2003), as cited in (Ashurst et al., 2011) showed that IT competences are particularly important to SMEs. For instance, IT knowledge and skills are needed to tailor software, negotiate with IT suppliers, and to cooperate with a software house in the development of software. They also argued that SMEs need technical IT skills, managerial IT skills, and business and general management skills to help them identify and realize IT opportunities in the firm. All these with anticipated benefits of reduced costs, improved quality, increased flexibility, effective marketing, global sales, systematic management, real time monitoring, improved customer satisfaction, higher productivity and ultimately, long term business growth leading to higher financial performance.

Entrepreneurial orientation concept

The last three decades have countersigned the advent of entrepreneurial orientation (EO) as a comprehensively discussed concept in the management literature (Covin & Lumpkin, 2011). Hundreds of studies exploring the EO concept have been published in a wide variety of scientific journals and presented at top conferences (Wales, Gupta & Mousa, 2011a). Originating in Canada, specifically within a research program at McGill University under the leadership of Pradip Khandwalla and Henry Mintzberg, research on EO is now conducted by scholars around the globe (Basso, Alain & Bouchard, 2009).

Traditionally, EO research has primarily focused on firm-level entrepreneurship (Slevin & Terjesen, 2011). As such, much of the published work investigates the reasons why some firms behave entrepreneurially and the consequences of doing so. Also investigated is the cultural and contextual factors that facilitate or inhibit corporate entrepreneurial behaviors and whether the antecedents and moderating influences differ systematically from conservative firms.

The construct of EO originates from Miller's (1983) work, in which entrepreneurial firms are defined as those that are geared towards innovation in the product-market field by carrying out risky initiatives, and which are the first to develop innovations in a proactive way in an attempt to defeat their competitors (Wójcik-Karpacz, 2016). Miller clarified that EO encompassed a process or a way in which entrepreneurs behave in creating a new firm, a new product or technology, or a new market (Muchiri & McMurray, 2015).

Covin and Slevin (1988) proposed that EO should be considered as the strategic dimension which can be observed from the firms' strategic posture running along a continuum from a fully conservative orientation to a completely entrepreneurial one. They suggest that firms with a propensity to engage in relatively high levels of risk-taking, innovations and proactive behaviours, have EO of a high level, while those engaging in relatively low levels of these behaviors have conservative orientation (Covin & Slevin, 1991).

The definition of the concept formulated by Covin and Slevin is the definition which is the base for others to formulate their own ones (Wójcik-Karpacz, 2016). For instance, Tang, Tang, Marino, Zhang and Li (2008) proposed that EO refers to methods, practices and decision-making styles of managers or business owners of the firms which act entrepreneurially. However, Wiklund and Shepherd (2003) opined that EO refers to the strategy-making processes that provide organizations with a basis for

entrepreneurial decisions and actions. Lumpkin and Dess (1996) contended that EO refers to the processes, practices and decision-making activities that lead to a new firm, a new product or technology, or a new market They considered EO as a process construct, which is concerned with the methods, practices, and decision-making styles used by the managers (Vij & Bedi, 2012).

Further, Stam and Elfring (2008) describe EO as the simultaneous exhibition of innovativeness, proactiveness and risk taking. But despite the escalating scholarly interest in this area, the issue regarding the dimensionality of EO keep cropping up (Anderson, Kreiser, Kuratko, Hornsby & Eshima, 2015). As originally conceptualized by Miller (1983), EO encompasses a firm's propensity for risk taking, innovation and proactiveness. Later, Lumpkin and Dess (1996) further refined the EO construct, and added the two components of competitive aggressiveness and autonomy. However, it has sometimes been argued that autonomy is an internal organizational driver of entrepreneurship, which influences the organizational climate for entrepreneurship (Vij & Bedi, 2012). Some researchers also opine that competitive aggressiveness forms a part of the proactiveness dimension and does not represent a separate dimension (Chang & Lin, 2011). EO as multidimensional construct requires all its dimensions to be characterized.

There is widespread agreement amongst researchers that entrepreneurial orientation has three core dimensions: innovativeness, proactiveness and risk-taking (Kroon, Voorde and Timmers, 2013; Hughes and Morgan, 2007; Miller, 1983). Innovativeness is the firm's ability and willingness to support creativity, new ideas and experimentation which may result in new products/services (Lumpkin & Dess, 1996), while proactiveness is the pursuit of opportunities and competitive rivalry in anticipation of future demand to create change and shape the business environment (Lumpkin & Dess, 2001). Relating to risk-taking, it is the firm knowingly devoting resources to projects with chance of high returns but may also entail a possibility of high failure (Lumpkin & Dess, 1996). However, risk-taking is also commonly associated with entrepreneurial behavior and that generally successful entrepreneurs are risk-takers Kuratko and Hodgetts (2001) as cited in (Ndung'u, 2014). Miller (1983) argued that these three components of EO comprised a basic unidimensional strategic orientation.

Technology entrepreneurship concept

Technological entrepreneurship has been characterized as a system (Abetti, 1992), a strategy (Gans and Stern, 2003), a process (Shane and Venkataraman, 2003), a capability (Hindle and Yencken, 2004) or an individual attribute (Dorf, Byers & Nelson, 2011), related with the discovery or creation of technological opportunities and their exploitation. The technological opportunities are the possibilities to create new products, introduce these products into the market and sell them at a cost greater than their cost of production (Sarasvathy & Venkataraman, 2011). These possibilities originate from the divergence of beliefs about the future value of new or existing, but previously unexploited, technologies, with respect to one or more specific uses.

When this happens in the context of a new organization or entity, it is referred to as independent technological entrepreneurship (Petti & Zhang, 2013). When it happens in the context of an established organization or entity, it is referred to as corporate technological

entrepreneurship. Moreover, Petti and Zhang posit, wherever it happens and whatever the newness or sophistication of technologies it entails, technological entrepreneurship is about having or gaining superior insights about the future value of technologies, and creating new resources combinations to bring selected technologies to the market in the form of new products.

However, technologies, whether brand new or already existing, advanced or not, by themselves cannot automatically ensure value creation. Technologies create value when they are transformed in new products, those products are rapidly introduced to the market and extra-profits for enterprises, appropriate returns for investors, rewards for inventors and ultimately benefits for the whole society are generated (Petti & Zhang, 2011). In other words, technological entrepreneurship is the transformation of promising technologies into value.

In this regard, technology entrepreneurship concept is made of an entrepreneurial component and a management component. Entrepreneurial component is the enterprise's capabilities to recognize technologies' entrepreneurial and business opportunities, while the management component is the enterprise's capabilities to develop compelling value propositions and business models made to exploit those opportunities (Bingham, Eisenhardt, & Furr, 2007).

These two capabilities make technological entrepreneurship capabilities, or the capabilities to identify and exploit technological opportunities to create new or significantly improved products and to successfully commercialize them.

Theoretical review

Creative destruction theory proposes that companies holding monopolies based on incumbent technologies have less incentive to innovate than potential rivals, and therefore they eventually lose their technological leadership role when new radical technological innovations are adopted by new firms which are ready to take the risks Foster and Kaplan (2001) as cited in (Ndung'u, Wanjau, Gichira, and Mwangi, 2014). Ndung'u et al further emphasize that when the radical innovations eventually become the new technological paradigm, the newcomer companies leapfrog ahead of former leading firms.

Schumpeter (1942) posits that innovation causes market dislocations, which allow the ascendance of new firms and the corresponding decline of the large incumbent firms whose leadership positions they assume. This occurs through the introduction of a new commodity, new technology, new source of supply, new type of organization, resulting into competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the output of the existing firms but at their foundations and their very lives.

In the late 20th century, traditional industries in the United States of America with higher firm-specific stock returns and fundamental performance heterogeneity used Information Technology more intensively to post faster productivity growth (Chun, Kim, Morck & Yeung, 2007). Arguably, this mechanically reflects a wave of Schumpeter's (1942) creative destruction disrupting a wide swathe of industries, with successful Information Technology adopters unpredictably undermining established firms.

Conceptual framework

The key variables in this study were categorized as independent variable, moderator and dependent variable. Mugenda (2008) explains that the independent variables are called predictor variables because they predict the amount of variation that occurs in another variable while dependent variable, also called criterion variable, is a variable that is influenced or changed by another variable. The dependent variable is the variable that the researcher wishes to explain. A moderator variable is a variable that alters the strength of the causal relationship (Frazier, Tix & Barron, 2004). See details in Figure 1.

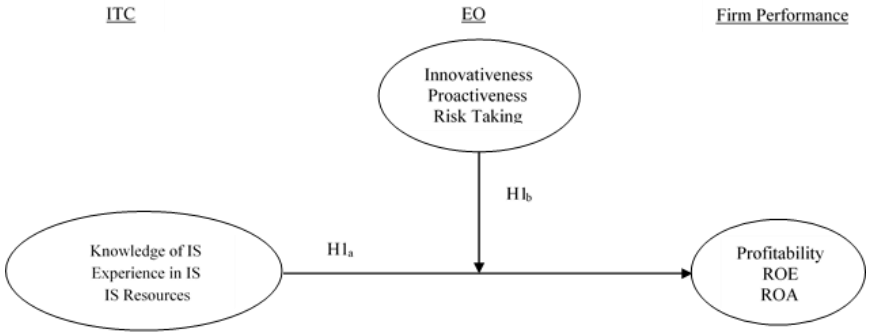

Figure 1 - Hypothesized model
Source – Author

Firm performance

Various firm performance measurements have been applied in previous studies. However, the majority of these studies did not provide any justification for the selection of measures used. Furthermore, there has not been any agreement among entrepreneurship scholars on the assignment of an appropriate set of measurements (Madsen, 2007). To capture different aspects of firm performance, multiple measures, that is, financial and non-financial should be employed. However, most studies apply only financial measurement to assess performance, with firm performance being investigated as the dependent variable (Wang, 2008). The three dimensions used in the financial measurement are efficiency, growth and profit.

Liang, You and Liu (2010) state that firm performance refers to organizational effectiveness in terms of its financial and operational performance, and a number of indicators are used to measure it, including finance, efficiency, customer satisfaction, value addition, and market share. Liang et al further posit that financial indicators include commonly used measures such as Return on Investment (ROI) or the measure of profitability for a given amount of time, Return on Equity (ROE), Return on Sales (ROS), Return on Assets (ROA) revenue, and sale. These indicators usually can show the firm's capability in making profits. Efficiency-related indicators are productivity and cost reduction.

Lastly, firm performance can be assessed objectively as well as subjectively. The former relies on secondary or accounting data and the latter is based on respondents' perceptions or self-reported data. While objective measurement has an advantage in reducing common method variance, it is often difficult to accomplish (Stam & Elfring, 2008). The alternative is subjective measurement, which is conducted by comparing a firm's current performance with its previous performance (Wang, 2008). This study adopted subjective measurement.

RESEARCH METHODOLOGY

This study was quantitative and guided by cross-sectional survey. This design helps with hypothesis formulation and testing the analysis of the relationship between variables (Kothari, 2009). The target population was made up of the small and medium enterprises in Kenya while the accessible population consisted of the small and medium enterprises that participated in the 2013 Top 100 Survey. The respondents were the Information Technology managers of these firms. These managers were considered to be internal champions. Their primary motivation tended to be entrepreneurial performance. Profit opportunity, entrepreneurial leadership, and the passion and drive of individual employees were factors that motivated them to behave entrepreneurially. They guide or drive how entrepreneurial activities will be manifested in innovation processes within the firms. They are versed with technology-push approach. The sampling frame consisted of the small and medium enterprises in the services and manufacturing sectors in Kenya that had been registered with KPMG for the Top 100 Survey.

Israel (2012) posits that although cost considerations make census technique impossible for large populations, a census is attractive for small populations of 200 or less. Since the accessible population consisted of 100 respondents, this study used the entire population as the sample. The study used a self-administered, semi-structured questionnaire to obtain primary data. Consequently 94 SMEs (53 Services and 41 Manufacturing SMEs) out of 100 responded.

For pilot testing, data from 10 respondents were collected, representing 10% of the population in the study. Cronbach's Alpha statistic ranged from 0.8 to 0.9, indicating high reliability of data. Mertens (2010) avers that the closer the coefficient is to 1.0, the more reliable the measurements. This study adopted construct validity. Mertens advises that factor analysis can be used to validate hypothetical constructs as it attempts to cluster items or characteristics that seem to correlate highly with each other in defining a particular construct.

Eigen values criterion was used to determine the selection of factor loadings for each component. The larger the eigen value loading, the more important the associated principal component (Graham & Midgley, 2000). In this case, the varimax with Kaiser Normalization sampling adequacy with eigen value greater than 1 were used as the rotation method because the items were uncorrelated. Montgomery, Peck and Vining (2001) recommend that a minimum factor loading of 0.40 should be used when factor analysis is used to refine construct validity. All items had factor loadings ranging from 0.408 to 0.990.

IBM Statistical Package for the Social Sciences (SPSS) version 21.0 for Windows 7 and Windows 8 was used for data entry, data cleaning and running the Exploratory Factor Analysis (EFA). Other software applications used were Ms-Excel for Windows 8 for case cleaning, variable screening and as a transit package in that the data from SPSS was saved in Ms-Excel for it to be exported to SmartPLS; Analysis of Moment Structures (AMOS) version 18, which is essentially analysis of mean and co-variance structures, for Initial EFA, Confirmatory Factor Analysis (CFA), Path Analysis and Structural Equation Modeling (SEM); SmartPLS version 2.0 for Path Analysis, SEM with moderation and model diagnostics; STATA version 12.0 for normality testing; R-GUI version 2.10.0 for building plots, for instance box-plots using the

Ggplot2 package, and for univariate and multivariate testing of outliers in the dependent variable.

ANALYSIS OF INFORMATION TECHNOLOGY COMPETENCE

Information Technology Competence was operationalized into knowledge of information systems, experience in information systems and information systems resources. When asked whether members of staff in their firms had been trained to secure their computers at all times when moving away from their stations, majority (92.6%) of the respondents said yes, a few (6.4%) responded in the negative, and 1.1% did not respond, as shown in table 1.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	6	6.4	6.5	6.5
	Yes	87	92.6	93.5	100.0
	Total	93	98.9	100.0	
Missing	System	1	1.1		
Total		94	100.0		

Table 1 - Trained to secure computers at all times when moving away from stations
Source - Author

This finding boarders on competence. A study by Fraser, Conner and Yarrow (2003) indicated that desired core competences within organizations, which often depended on effective and creative use of ICT were innovation and agility. Innovation is linked to successful performance for firms in both the industrial and service sectors as well as to entire economies (Kluge, Meffert & Stein, 2000), and effective innovations create new value for customers.

Asked whether members of their staff that traveled with portable computers in their firms were aware of the risk relating to theft and the potential liability through compromised data, majority (96.8%) of the respondents answered in the affirmative while a few (3.2%) said no, as shown in table 2.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	3	3.2	3.2	3.2
	Yes	91	96.8	96.8	100.0
	Total	94	100.0	100.0	

Table 2 - Awareness of the risk relating to theft and potential liability through compromised data
Source – Author

Almost all of them were aware of the risk relating to theft. This was yet another area requiring core competences as was indicated by Fraser et al (2003). A study by Makumbi, Miriti and Kahonge (2012) on An Analysis of Information Technology (IT) Security Practices: A Case Study of Kenyan Small and Medium Enterprises (SMEs) in the Financial Sector found out that loss of computer assets was a prevalent problem within these organizations as no particular measures had been put in place to guard against it.

As indicated by Wainwright, Green, Mitchell and Yarrow (2005), skills and knowledge concerning some key ICT tasks result in sets of core information technology, managerial and organizational competences that could then be leveraged to provide innovation capabilities at

the level of the business. On the other hand, resources are the basis of firm differential performances in terms of wealth creation, and resources would enable the top 100 medium-sized firms to engage in strategic entrepreneurship.

On whether they were confident that their systems were adequately protected despite being connected to public networks, majority (91.5%) of the respondents answered in the affirmative, a few (7.4%) said no while 1.1% of the respondents were neutral, as shown in table 3.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	7	7.4	7.5	7.5
	Yes	86	91.5	92.5	100.0
	Total	93	98.9	100.0	
Missing	System	1	1.1		
Total		94	100.0		

Table 3 - Confidence in systems being adequately protected despite connection to public networks
Source – Author

Confidence comes with experience in technology. Experience is a distinctive competence that helps companies obtain a competitive advantage (Ong & Ismail, 2008). They propose that experience be assessed by measuring both the diversity of experience (i.e. breadth) and the level of responsibility taken (i.e., intensity). This is illustrative of the level of responsibility required in the top 100 medium-sized firms in ensuring security of their computer systems, despite the myriad of threats emanating from public networks.

Measurement of knowledge of information systems factor amongst top 100 medium-sized firms

Knowledge of information systems factor was measured using the Likert scale and the results, expressed as percentages, tabulated in table 4.

Knowledge of Information Systems Factors		SD	D	N	A	SA	Mean	Std. Dev.
ITC1	%	2.1	0.0	2.1	68.1	27.7	4.19	0.676
ITC2	%	1.1	0.0	4.3	59.6	35.1	4.28	0.646

Table 4 - Response to knowledge of information systems
Source - Author

The results showed that majority (95.8%) of the respondents agreed to the opinion that expertise on information security was available internally, and where not, their firms took to external advice, a few (2.1%) disagreed while 2.1% were neutral. This finding somehow contradicts that by Dojkovski, Lichtenstein & Warren (2007) who found out that SMEs generally lack funds, expertise, and time to coordinate and manage security activities. But this contradiction is understandable since the current study is dealing with topnotch medium-sized companies who can afford external expertise. A study by Green, Mitchell and Yarrow (2005) on Towards a Framework for Benchmarking ICT Practice, Competence and Performance in Small Firms, agreed with the finding in the current study when they indicated that external IT experts provided an important source of expertise and advice to small firms. On

whether their staff knew what to do with information with regard to its storage, usage, archiving, backup and destruction, majority (94.7%) of the respondents agreed to the opinion, 1.1% of the respondents disagreed while 4.3% remained neutral.

A study by Kimwele, Mwangi & Kimani (2010) on Adoption of Information Technology Security: Case Study of Kenyan Small and Medium Enterprises (SMEs) found out that 76.2% of the respondents had suffered information security breaches within the last 12 months, one of the breaches being backup failure. This is an indication of serious lack of understanding on how to safeguard vital proprietary information.

On a positive note, Makumbi, Miriti and Kahonge (2012) found that most of the SMEs used firewalls to guard against hacking, a nevertheless commendable practice but not enough to secure computers at all times as security extends to activities that firewalls cannot guard against, inter alia, locking and logging off computers when moving away from one's work station. To overcome this hurdle, an entrepreneurial culture as well as entrepreneurial leadership would be required in the top 100 medium-sized firms. Entrepreneurial culture would shape the firm's members actions to produce behavioral norms (Dess & Picken, 1999) such that employees are aware of what to do with information, and an entrepreneurial leader would influence other employees to manage resources strategically (Covin & Slevin, 2002), in turn securing computers in the firm as well as the information stored in them.

Assessment of experience in information systems factor amongst top 100 medium-sized firms

Experience in information systems factor was measured using the Likert scale and the results, expressed as percentages, tabulated in table 5.

Experience in Information Systems Factors		SD	D	N	A	SA	Mean	Std. Dev.
ITC3	%	1.1	12.8	22.3	53.2	10.6	3.60	0.884
ITC4	%	2.1	3.2	4.3	69.1	21.3	4.04	0.761
ITC5	%	1.1	2.1	5.3	59.6	31.9	4.19	0.723

Table 5 - Response to experience in information systems
Source - Author

The results showed that majority (63.8%) of the respondents agreed that all their systems provided audit trails, a few (13.9%) disagreed while 22.3% were neutral. On whether the roles and responsibilities for information security in their firms were well defined, majority (90.4%) of the respondents agreed, a few (5.3%) disagreed and 4.3% remained neutral. On whether they were confident of technological competence invested in their team over time, majority (91.5%) of the respondents agreed, a few (3.2%) disagreed while 5.3% remained neutral.

As pointed out earlier, these are desired core competences which depended on effective and creative use of ICT (Fraser et al., 2003). Medium-sized firms must be creative to develop innovation. Innovation is significant to entrepreneurs as it is a means by which firms pursue new opportunities. The top 100 medium-sized firms in Kenya that vigorously encouraged

innovation are better performers than those that tended to discourage innovation. They should particularly be encouraged to pursue disruptive innovations in order to introduce new ways of playing the competitive game.

Measurement of information systems resources factor amongst top 100 medium-sized firms

Experience in information systems factor was measured using the Likert scale and the results, expressed as percentages, tabulated in table 6.

Information Systems Resources Factors		SD	D	N	A	SA	Mean	Std. Dev.
ITC6	%	1.1	2.1	9.6	71.3	16.0	3.99	0.664
ITC7	%	1.1	5.3	22.3	63.8	7.4	3.71	0.728

Table 6. - Response to information systems resources
Source - Author

The results showed that majority (87.3%) of the respondents agreed that information systems resources in their firms were adequate, well maintained, and/or replaced as appropriate, a few (3.2%) disagreed while 9.6% remained neutral. On whether information systems resources were in synchronization with technological advancements, majority (71.2%) of the respondents agreed, a few (6.4%) disagreed while 22.3% remained neutral.

This is in line with Prahalad and Hamel's (1990) concept of core competence, where core competence is seen as the capability of the entire organization to learn and to include all firm-specific assets, knowledge and skills and capabilities embedded in the organization, based on technology, processes, structure, and interpersonal and inter group relations. Based on this therefore, the adequacy of information systems resources in a firm as well as technological advancements of assets used, would be satisfactorily taken care of, given the adoption of the concept within the firm. The adoption of the concept in the top 100 medium-sized firms would, in turn, be expected to raise the entrepreneurial intensity levels, culminating into superior performance of the firms.

DATA ANALYSIS AND RESULTS

The main objective here was to provide results of the analyses, interpretation of the results and findings. Several steps were undertaken towards ensuring building of a good quantitative model, as well as key general guidelines for structuring a quantitative model. As a general approach, the analysis of the descriptive data were presented as the first step to understanding the data structure. This was followed by univariate analysis, necessary for uncovering the one-on-one relationship. Factors which were significant univariately were further subjected to a rigorous multivariate analysis, and the steps carried out in a hierarchical manner.

Case screening was undertaken through the examination of the missing data by running the cases counts in excel, using the standard deviations to access the level of engagement of the respondents. The few records with missing cases were dropped. The variables with missing data were mainly in the section where the respondents were required to indicate the average growth for indicators of performance in

their firms: average pre-tax profits, Return on Equity, Return on Assets, employment growth and sales turnover from year 2010 to 2012. The respondents in question found the section sensitive.

Variable screening was also done. In this case the missing data was generated using central tendencies where the most appropriate central tendency measure was adopted. For the cases, median was adopted as it is least affected by the outliers. It is instructive to note that missing data can pose a serious modeling challenge, more so with SEM. For the Likert scales, median was the appropriate statistics to use while with the continuous variates the mean was appropriate.

To ensure that there was no violation of the assumptions, this study tested for outliers, normality, linearity, homoscedasticity, multicollinearity, non-response bias and common method variance. The results of the tests conformed to the respective thresholds for each test.

In general, analyses were conducted using a two-phase process consisting of confirmatory measurement model and confirmatory structural model. This is in line with the two-phase process suggested by Anderson and Gerbing (1988). The first phase involved confirmatory factor analysis (CFA) that evaluates the measurement model on multiple criteria such as internal reliability, convergent and discriminant validity. Prior to this was the exploratory factor analysis (EFA) whose key steps included the computation of pattern matrix, communalities and principal components analysis (PCA). EFA is used when you have a large set of variables that you want to describe in simpler terms and you have no a priori ideas about which variables will cluster together (Tabachnick & Fidell, 2013), thus necessitating carrying out of the analysis at the early stages of the research (Bordens & Abbot, 2014).

EFA is preceded by two statistical tests: Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity. These tests were conducted to confirm whether there was a significant correlation among the variables to warrant the application of EFA (Snedecor & Cochran, 1989). The KMO statistics vary between 0 and 1 (Argyrous, 2005). A value of zero indicates that the sum of partial correlation is large relative to the sum of correlations indicating diffusions in the patterns of correlations, and hence that factor analysis likely to be inappropriate (Costello & Osborne, 2005). A value close to 1 indicates that the patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors (Cooper & Schindler, 2011).

Bartlett's Test of Sphericity tests the hypothesis that one's correlation matrix is an identity matrix, which would indicate that the variables are unrelated and therefore unsuitable for structure detection. Small values ($p < 0.05$) of the significance level indicate that a factor analysis may be useful with one's data. The results of the two tests are shown in Table 7, with indications of appropriateness of application of EFA.

KMO Measure of Sampling Adequacy	Bartlett's Test of Sphericity	
0.871	Approx. Chi-Square	3349.637
	df	528
	Sig.	***0.000***

Table 7 - Results of the test for suitability of structure detection
Source – Author

The second phase involved latent variables structural equation modeling (SEM) to test the hypothesized relationships and to fit the structural model. Normality test on the factors produced Skewness values between -1 and +1. The outliers were tested for each of the observations, with observations farthest from the centroid, Mahalanobis distance, being taken into consideration. There were no outliers detected. The values obtained in testing the model fit indices were within the thresholds as shown in Table 8.

Model	CFI	GFI	AGFI	RMSEA
Default model	.993	.978	.916	.045
Saturated model	1.000	1.000		
Independence model	.000	.673	.509	.336

Table 8 - Model fit indices for the influence of ITC on firm performance
Source – Author

The structural equation modeling (SEM) for the study objective was as shown in Figure 2, indicating there was a positive relationship (regression weight = 0.68) between information technology competence and firm performance.

Figure 2 - SEM for the objective
Source – Author

Therefore, H1a was rejected. The significance test result for the hypothesis is shown in Figure 3.

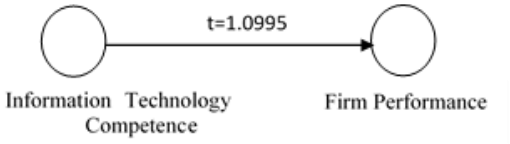

Figure 3 - Significance test for the influence of ITC on firm performance
Source – Author

Therefore this model was not statistically significant at 80% significant level with t=1.0995.

Structural Equation Modeling (SEM) with moderation was carried out. Prior to moderation, a bootstrapping procedure (Hesterberg, 2003) to evaluate the statistical significance of path coefficient was carried out, resulting in the initial model in Figure 4.

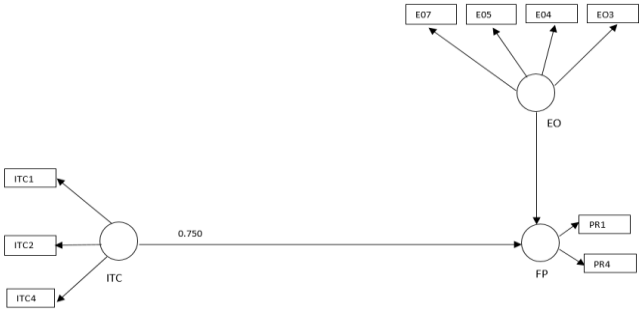

Figure 4 - Weights initial model with bootstrapping
Source – Author

The t-statistics indicate that information technology competence (ITC) was not significant at 10% α level (t-statistics < 0.842).

First Order Construct using the t-statistics through bootstrapping produced insignificant interaction, that is, ITC*EO, which had t<0.842 (Fisher, 1926) at 10% α level. Therefore H1b was accepted. The next step involved testing the significance for the synergies of the factors at a higher level. This was done at second order level, where Information Technology Competence (ITC) was combined with ISRA factor to form Technical factor. When run with the interaction term, the Technical*EO interaction was statistically significant at 10% α level. This is shown in Figure 5.

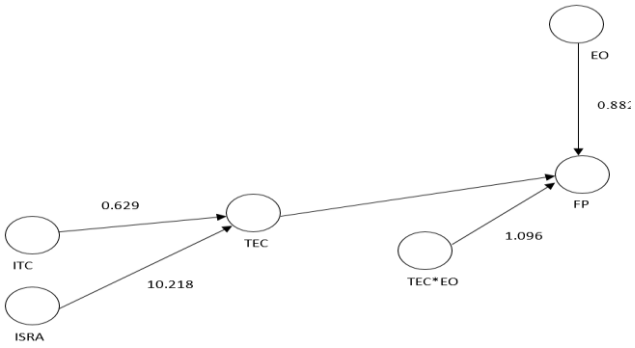

Figure 4 - Second order SEM with moderation
Source – Author

Many SMEs have been slow to exploit the potential of e-business. However, it can be difficult for any firm to gain value from e-business, and particularly so for SMEs that may lack important information technology (IT) competences. Information Technology competence enables a company to plan, organize, execute, and invest on information security effectively (Chang & Ho, 2006). In this study, Information technology competence had a relationship with performance of medium-sized firms.

Two factors, namely knowledge of IS and experience of IS contributed to the information technology competence influencing performance of medium-sized firms in Kenya. Thus the hypothesis that there is no relationship between information technology competence and firm performance in Kenya was rejected. It is instructive that IS resources did not feature in the relationship, meaning that heavy investments in IT do not guarantee high returns to SMEs (Farhanghi et al., 2013). Nonetheless, information technology competence did not have a statistically significant relationship with firm performance in Kenya.

Makadok (2001), in his study on Toward a Synthesis of the resource-based and dynamic-capability views of rent creations, found no statistically significant relationship between information technology competence and firm performance. Ray, Muhanna and Barney (2005) in their study on Information Technology and the Performance of the Customer Service Process: A resource-based Analysis, also found that there were no direct effects of three different information technology resources, that is, technical skills of information technology unit, managers' technology knowledge, and information technology spending, on the performance of the customer service process, leading to overall firm performance.

At second order structural equation modeling with moderation, however, the synergy between the technical factors, that is, information technology competence and information security risk assessment produced significant interaction. This is insightful considering that this study is advancing technological entrepreneurship. The top 100 medium-sized firms advancing technology entrepreneurship should adopt entrepreneurial orientation philosophy for superior performance. Undoubtedly, the interplay of information technology competence and information security risk assessment as moderated by entrepreneurial orientation could be said to be the face of technological entrepreneurship.

Therefore, companies, particularly medium-sized businesses in Kenya need to become more entrepreneurial in order to increase their competitiveness (Antoncic & Hisrich, 2001; Drucker, 2002) and survive and prosper in turbulent environments (Lumpkin & Dess, 1996). Being more entrepreneurial means increased entrepreneurial intensity levels (Morris, 1998), a trait that must have been exhibited by the firms that appeared in the 2013 Top 100 Survey.

The decision to act entrepreneurially occurs as a result of interactions among organizational characteristics, individual characteristics, and some kind of precipitating event (Morris, Kuratko & Covin, 2008). Competition which is considered as an external trigger has made Top 100 medium sized firms in Kenya behave entrepreneurially. They have embraced EO to cope with a dynamic, threatening, and complex external environment. The external environment and considerations within these organizations has made the owners/managers to respond creatively and act in innovative ways. This entrepreneurial behavior is well described by the Schumpeterian theory. It should also be noted that, Top 100 medium sized firms have planned programmes for innovation regardless of what is happening in the external environment at a given point in time, or they have created an entrepreneurial culture which allows initiation of open innovation.

Overall, the study has demonstrated positive relationship between technological entrepreneurship and performance of medium-sized firms in Kenya. It has also demonstrated that entrepreneurial orientation enhances the technological entrepreneurship and medium-sized firm performance relationship, meaning that a continued increase of entrepreneurial intensity levels will ensure that the relationship will continuously be positive. Certainly this is a model that can be adopted by SMEs in Kenya as a way of enhancing their firm performance and thus allowing them to internationalize.

This study also fills the gaps identified at the literature review stage where it was revealed that limited attention has been paid to the moderating role of entrepreneurial orientation on the relationship between information technology competence and firm performance. Moreover, the few studies that have been done in this area mostly in Europe, Asia and the United States of America fail to relate information technology competence to firm performance. This study therefore has added value to existing literature by providing empirical information technology competence measures that medium-sized firms in Kenya can adopt in order to improve on their performance.

Lastly, the findings presented in this study are based on evidence gathered from SMEs that participated in the 2013 Top 100 Survey. Future research should be extended to financial institutions whose allure to cyber criminals are the millions of financial transactions carried out every day.

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