ISSN No. 0976-5697

Volume 5, No. 7, September-October 2014

International Journal of Advanced Research in Computer Science

RESEARCH PAPER

Available Online at www.ijarcs.info

Determinants of Implementation of Strategic Information Systems in Small and Medium Firms

Omanga Cleophas Mochoge
Department of mathematics & Computing Sciences,
Kabarak University, P.O Private Bag 20157,
Kabarak – Kenya

Abstract: Firms want their information systems (IS) to not just work but to be effective and efficient. Thus firms need to manage their IS. Thus, it is crucial for SMEs to adopt information system to enhance their business operations capability and efficiency. Nevertheless, SMEs limited resources to implement information systems have been one of the critical barriers that hindered the adoption of information systems. Moreover, unlike large firms, small and medium-sized (SME) firms are faced with many challenges in implementations of IS. Previous IS studies have given more attention to large firms without much effort to small firms. Therefore, this study is to investigate the determinants of strategic information system on firm performance of Kenyan SMEs. The study was conducted in SME in Nairobi County. Structured questionnaires were used to collect primary data. Data was analyzed using descriptive statistics such as frequencies, percentage, means and inferential statistics such as Pearson correlation and multiple regression models. The findings are of relevance for SME successful implementation of IS particularly when we consider that Small and Medium Enterprises (SMEs) in Kenya has been targeted as a mechanism in generating domestic-led investment to stimulate economic development.

Keywords: SME, information systems, IT capability, Managerial competence

I. INTRODUCTION

Information Technology (IT) adoption is an important field of study in a number of areas, which include small and medium-sized enterprises. Due to the numerous advantages of IT, SMEs are trying to adopt strategic information system (SIS) to support their businesses [1].There has been a higher dependency of business on Information Systems in daily operations, thus, SMEs need to pay more attention to the implementation of strategic information systems which aims to facilitate the achievement of the organization's business goals [2].

Accordingly, there is an increasing consciousness of the necessity to derive profit through investment in IT within SMEs. IT tools can significantly assist SMEs by supplying the required infrastructure, which is necessary for providing appropriate types of information at the right time. IT can also provide SMEs with competitiveness through integration between supply chain partners and inter-organizational functions, as well as by providing critical information [3]. However, IT adoption by SMEs differs from larger organizations because of their specific characteristics, such as resources constraints [1]. In addition [4] showed that only a small number of studies focused on the adoption and use of IS in SMEs. In support, [5] IS practices among the smaller firms have received somewhat limited attention in previous works. Moreover, it has been found that in spite of the exponential growth of IT within SMEs, the rate of SIS adoption by these businesses has remained relatively low [6], and large organizations have noticeably profited more than SMEs in both IT-enabled improved sale and costs savings [7]. In looking for reasons for such differences in IT adoption in SMEs, unique characteristics of these businesses can be highlighted.

SMEs generally have limited access to market information and suffer from globalization constraint [8]. A tendency to employ generalists rather than specialists, reliance on short-term planning, informal and dynamic strategies and decision-making process, plus an unwillingness to develop and the use of standard operating procedures are other distinctive characteristics of SMEs [9]. However, Compared with large organizations, SMEs are relatively weaker at various levels (i.e., organizational, managerial, technological, individual and environmental). Therefore, IT adoption and usage in SMEs is at a disadvantage [10].

Small and Medium Enterprises (SMEs) in Kenya have reluctantly laid focus on information system which has hampered growth in most firms resulting in stagnancy. Like the rest of Africa, SMEs in Kenya are faced with exertions of malicious organizational, managerial, technological, individual and environmental challenges. Consequently, Information Communication Technology (ICT) SME firms fail to reap the benefits of information system such as firm growth and economic opportunities [11].

The aim of this research is to achieve a better understanding of SIS implementations in SMEs through explicitly and understandably exploring and identifying factors influencing SIS implementations processes within SMEs in developing countries. The research investigates and reveals a number of internal and external issues pressuring and persuading SMEs to adopt SIS solutions. Likewise, barriers to SIS implementation in SMEs will be addressed by reviewing and classifying SIS adoption factors.

II.LITERATURE REVIEW

A. Top Management Commitment and SIS Implementation

In SMEs, the IT adoption process is directly affected by top management where all decisions from daily functions to future investments are made by them [12]. Top management commitment affects SIS implementation because this level of management provides information about the organization's

strategic goals to the SIS process. Moreover, top management may be allocated to the planning process as a resource. In the larger firm context, many firms have reported the significant importance of top management commitment. For example, [13] have found that the resources (including top management commitment) affected SIS success. [2] also found that senior management involvement affected the SIS success. [14], in a study of US-based organizations reported that top management affected environmental assessment, and environmental assessment affected the SIS success. A number of studies have revealed that in SMEs, the role of top management or owner/manager is central to the enterprise, since their decision influences all firms' activities, both currently and in the future [15]. Similarly, and based on the upper echelon theory, prior literature suggests that top management competence are the significant determinants of IT usage behavior and performance within businesses [16].

Several factors, including management's IT knowledge and experiences, directly affect the process of IT adoption in SMEs [17]. Small businesses that have adopted IT are more likely to have CEOs who possess better positive attitudes in IT adoption [10]. Likewise, when management has been highly willing to implement SIS application, SMEs do not perceive management priority on IT as a major barrier in adopting IS application [3]. [18] identified insufficient attention by management to IS as one of the three main problem areas for computing in small firms. Since top management support and commitment are the key factors contributing to IS success within small firms, these authors argued that top management directly affects IS evolution and sophistication. For success of IT in Malaysian SMEs however, it was found that the anticipated benefits of computerization in SMEs can only be achieved by the existence of five conditions, including strong top management support as the key condition [19]. In a similar context, and interpreting the successful adoption and use of IS/IT from the resource based theory Considering its size, top management of the SMEs tends to have substantial roles in most aspects of the firm decision [10]. Therefore, they tend to have a stronger influence on SISP success. Based on this argument, this study asserts that:

H_{O1}: Top management commitment has no significant effect on SIS implementation

B. IT capability and SIS implementation

The process of IT adoption within SMEs also depends on characteristics of marketed IS/IT itself which consist of a cluster of factors including type, process compatibility, user friendliness and popularity of implemented IS, quality of software available in market and the costs of IT [20]. For adoption of enterprise application software, easy-to-understand and relatively long-experienced enterprise applications are more effective in SMEs as compared to hard-to-understand and brand-new applications. Given that information systems and technologies are considered as the major enablers of superior business performance, quality of IS products available in the market (e.g., attribute of the selected product, its reliability and usefulness) could be an important determinant when it comes to deciding on the adoption IS products among SMEs (Shin, 2006) [21].

Several prior studies on IT adoption within SMEs found that IT adoption and usage is significantly affected by the firm IT capability [22]. Moreover, most US businesses have significant difficulty affording the costs of ICT tools while 90% of these businesses consider lack of financial resources and skills as the main barriers to ICT adoption [23]. With regard to the financial constraints experienced by the majority of SMEs, as well as the high start-up costs of ICT or very expensive software or ready-to-use online packages, it is expected that SMEs generally cannot afford to adopt ICT or reap its benefits through the effective use of ICT, in short or medium period of time [23].

H_{O2}:IT capability has no significant effect on SIS implementation

C. External IT Consultant and SIS implementation

There is a body of research that show that the assistance of external IT expertise, consultants and vendors and their respective quality is one of the most important aspects of the IT adoption process within SMEs [1]. Their professional abilities could have positive impacts on the IT adoption process while most SMEs suffer from a lack of both IT experts and the hiring of external consultants [24]. [18] pointed out that a lack of internal expertise has seriously hindered IS sophistication and evolution within small firms, therefore, they must overcome this problem through either seeking help from external sources or developing their own internal end-user computing skills .

According to [10] external consultants and vendors are the main sources of external IS expertise regarding IS implementation within small businesses. In general, the duties undertaken by external expertise comprise IS project management, encouraging employees to accept new systems and overcome their fear of new technology, fulfilling information requirements analysis of business needs, IS user training and recommending suitable computer hardware and [10]. It is crucial for management to consider the fact that external supports provided by vendors are essential for SMEs having no sufficient IT expertise to implement these new technologies [25].

Based on the above-mentioned viewpoints and studies, the authors conclude that regarding the lack of IT knowledge and internal IT/IS experience and skills, SMEs could fill this knowledge gap the through the use of external assistance, such as engaging external experts and the use of vendor assistance. The authors suggest that because of the unique characteristics of SME resources and financial poverty, SMEs should cautiously consider the available financial resources for hiring external consultants since they generally entail considerable expense. Moreover, it should be considered that external experts' recommendations and suggestions might not be always a practical fit for SME requirements if strategies and objectives of the businesses are not sufficiently understood. As a result, a clear objective and definition of new IT implementation within SMEs seems to be necessary [26].

H_{O3}:External IT Consultant has no significant effect on SIS implementation

Wherever Times is specified, Times Roman or Times New Roman may be used. If neither is available on your word processor, please use the font closest in appearance to Times. Avoid using bit-mapped fonts if possible. True-Type

1 or Open Type fonts are preferred. Please embed symbol fonts, as well, for math, etc.

III. RESEARCH METHODOLOGY

The study is intended to focus on Kenyan SMEs. National SMEs Development Council's (2005) classifies firms as micro, small or medium-sized based on the number of employees and annual sales turnover, depending on the different nature of the firm's operation. As for the manufacturing sector, small firm refers to business with employees of between 5 and 50. Meanwhile, business with employees from 50 to 150 is classified as medium-sized firm. .According to Nairobi County there are 30252 registered SMEs in Nairobi County, (Company Registrar, 2013). Out of these, only 11753 SMEs are found in Nairobi's CBD. The unit of analysis for this study is an individual organization. The targeted respondent is the IS manager or other member of the top management. A self- administered postal questionnaire was used to collect data. Variables construct was measured by five items using 5-point Likert scale from "Strongly disagree" to "Strongly agree" as adapted from [27].The study sampled 387 SMES.

A. Data Analysis

Data was organized by use of descriptive statistics such as frequency distribution tables and percentages. Descriptive analysis such as mean, standard deviation, frequencies and percentages was used to analyze demographics data. Inferential statistics such as Pearson correlation and multiple regressions were used to get the statistical inference. The Multiple Regressions Analysis was used to determine the nature of relationship between predictor variables and outcome variable and also to test study hypothesis.

The regression model was expressed in mathematical notation as follows:

IV.

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \varepsilon$$

Where Y = implementation of strategic information system

x_1= top management commitment

x_2= IT capability

x_3= External IT Consultant

e= error term

β_0 = the PMSE intercept

β = the model parameters

A. Study findings

1. Introduction

This chapter analyzes the data collected, presents and interprets it accordingly. Of the total (360) distributed questionnaires, 348 were properly filled and collected. This amounts to 96.7% of the total respondents. Since this Response rate is adequate enough to make the analysis, all the discussions below are made on these groups of respondents.

2. Descriptive and Correlation Analysis

The study findings in table 1 indicated correlation analysis of variables. From the study findings it can be inferred that top management commitment had significant and strong positive Pearson correlation value of 0.954 significant at 0.05 (level of significance), this implies there was strong and positive relationship between top management commitment and Strategic information system implementation. Further, IT capability also recorded a significant and strong positive Pearson Correlation value of 0.953 significant at 0.05, suggesting that there existed very strong relationship between IT capability and Strategic information system implementation. External IT consultant had Pearson Correlation of 0.853 significant at 0.05 (level of significance) suggesting external IT consultant were highly and positively correlated to Strategic information system implementation

V. TESTING HYPOTHESIS

To establish the effect of each independent variable on the dependent variable the study performed multiple regression model. Results from table 2 below reported that coefficient of determination (R2) was 0.7875. This implies that the independent variables; top management commitment, IT capability and external IT consultant explained 78 percent of the total variation of implementation of strategic information system. Suggesting that by employing the three strategic factors into SME operation one can be able to predict 78.75 percent implementation of strategic information system.

Top Management Commitment has no significant effect on SIS implementation

The findings indicated that top management commitment significantly and positively affect implementation of SIS (β1= 0.365), the study results are supported by [12] assertion that IT adoption is directly affected by the top management since they are in control of all decisions made right from daily functions to future investments. Likewise, [13] have found that top management commitment affected SIS success. Cognate to study findings, [28], provided evidence that top management support and commitment towards IS/IT adoption is one of the key cornerstones of higher levels of success and satisfaction with IS/IT adoption and use in SMEs. On a similar note, [29], and [1] demonstrated that management support towards IS/IT adoption significantly improved IS/IT adoption success within SMEs. Therefore, there is positive relationship between top management commitment and SIS implementation.

IT capability has no significant effect on SIS implementation

IT capability was also reported to affect the implementation of SIS (β2 = 0.969), the results coincide with [20] argument that the process of IT adoption within SMEs also depends on characteristics of marketed IS/IT itself which consist of a number of factors. User friendliness and popularity of implemented IS, the type, process compatibility and the quality of software available in the market have to be put into consideration. According to [22], IT adoption and usage within SMEs is significantly affected by the firm IT capability as evidenced from the study findings. Thus, there is a positive and significant effect between IT capability and SIS implementation.

HO3: External IT Consultant has no significant effect on SIS implementation

External IT consultant affects implementation of SIS with 0.787 rate of change (β4= 0.787).Cognate to study findings,

assistance of external IT expertise, consultants and vendors and their respective quality is one of the most important aspects of the IT adoption process within SMEs [1]. Further, Thong et al. (1997) confirmed that external consultants and vendors are the main sources of external IS expertise regarding IS implementation within small businesses thus supporting the study findings. Therefore, for SMEs having insufficient IT expertise, the management needs to consider the fact that external supports provided by vendors are essential thus the need to implement these new technologies [25].From the above findings, there is conclusive evidence that external IT consultant has a significant effect on SIS implementation.

VI. CONCLUSION AND RECOMMENDATION

Top management commitment

The results of this study have delivered some insights on top management commitment and strategic information system implementation. Clearly, top management commitment has been cited by a number of studies as one of the important factors impacting the implementation of strategic information system.

Competitive environment in the current business world is ever changing since there are more competitors that offer the same products and services to customers. Therefore, it becomes utmost necessary for top management to embrace technological change since it will impact positively on SIS implementation. Further, there will be improved product and service quality, enhanced productivity, reduced cost and satisfied customers.

IT capability

Based on the findings, IT capability plays a remarkable role in SIS implementation. Particularly, a properly managed IT capability leads to the continuous implementation of new strategic information system to deliver sustainable economic advantage. Likewise, IT adoption and usage is significantly affected by the firm IT capability. However, it is noted that lack of financial resources and skills are the main barriers to ICT adoption.

It is evident that IT capability will radically improve SME performance and market responsiveness. It is therefore necessary for SMEs to combine a wide array of IT skills. Thus the path to enhance IT capability is through its human capital. SMEs should have ICT literate individuals since it is key in a firm's success and in its ability to use IT to the fullest extent possible.

External IT consultant

This study also examined the impact of external IT consultant on SIS implementation. From the findings, the lack of internal expertise seriously hinders IS sophistication and evolution within small firms. Therefore, it becomes utmost necessary to seek help from external sources or developing their own internal end-user computing skills. Similarly, external consultants and vendors are the main sources of external IS expertise regarding SIS implementation within small firms.

It is therefore necessary for SMEs to focus on communicating the value and strategic intent for IT to end-users through policies and procedures in order to foster short-term and long-term efficiency. Further, IT training and development should be enhanced by the SMEs. Training would impact positively on the knowledge base of employees in terms of IT, firms' culture and policies hence enhancing competitive advantage over its competitors and strategic information system implementation.

Correlation Analysis of Variables

	mean	SD	Implementation of strategic information system	Top management commitment	IT capability	External IT consultant
Implementation of strategic information system	2.11	0.172	1			
Top management commitment	4.31	1.011	0.954*	1		
IT capability	2.17	1.423	0.953*	0.452*	1	
External IT consultant	2.61	0.721	0.853*	0.481*	0.85	1

*Two tailed significance at 5% level of significance

Table I. Regression Results of Strategic Factors Against Strategic information system

	Unstandardized Coefficients		Standardized Coefficients		
	B	**Std. Error**	**Beta**	**T**	**Sig.**
Constant	5.678	6.222		0.912	0.37
Top management commitment	0.514	0.472	0.365	1.089	0.006
IT capability	1.9248	0.531	0.969	3.662	0.024
External IT consultant	1.201	0.528	0.787	2.275	0.031
R Square	0.787481				
Adjusted R Square	0.754786				
F	24.0855				
Sig.	0.000				

VII. REFERENCES

[1] Ghobakhloo, M., Arias-Aranda, D., and Benitez-Amado, J. (2011). Information technology implementation success within SMEs in developing countries: An interactive model Paper presented at the POMS 22nd Annual Conference: Operations management: The enabling link, Reno, USA, April 29to May 2, 2011.

[2] Basu, V., Hartono, E., Lederer, A. L. & Sethi, V. (2002)."The Impact of Organisational Commitment, Senior Management Involvement, and Team Involvement on Strategic Information Systems Planning," Information & Management, 39, 513-524.

[3] Bhagwat, R. & Sharma, M.K. (2007).Performance measurement of supply chain management using the analytical hierarchy process, Computers in Industry, 18(8), 666–680.

[4] Grandon, E., and Pearson, J. M. (2004), "Electronic Commerce Adoption: An Empirical Study of Small and Medium US Businesses", Information and Management, 42,197-216.

[5] Powell, P. &Woerndl, M. (2008). "Time to Stop Searching Important Things?," European Journal of Information Systems, 17,174–178.

[6] MacGregor, R.C. and Vrazalic, L. (2004) "Electronic commerce adoption in small topp. 532-541.Wellington, New Zealand 1-3 December medium enterprises (SMEs): a comparative study of SMEs in Wollongong(Australia) and Karlstad Sweden)"<http://www.uow.edu.ac/commerce/econ/csbrr/ pdf/E-commercestudy.pdf>(Accessed on 4 December 2006).

[7] Riquelme, H. (2002). Commercial Internet adoption in China: Comparing the experience of small, medium and large businesses. Internet Research, 12(3), 276-286.

[8] Madrid-Guijarro, A., Garcia, D., and Van Auken, H. (2009). Barriers to innovation among Spanish manufacturing SMEs. Journal of Small Business Management, 47(4), 465-488.

[9] Dibrell, C., Davis, P. S., and Craig, J. (2008). Fueling innovation through information technology in SMEs. Journal of Small Business Management, 46(2), 203-218.

[10] Thong, J. Y. L., Yap, C. S., and Raman, K. S. (1997).Environments for information systems implementation in small businesses. Journal of organizational computing and electronic commerce,7(4), 253-278.

Thong, J. Y. L. (1999).An integrated model of information systems adoption in small businesses. Journal of Management Information Systems, 15(4), 187-214

Thong, J. Y. L. (2001). Resource constraints and information systems implementation in Singaporean small businesses. Omega, 29(2), 143-156.

Thong, J. Y. L., and Yap, C. S. (1995).CEO characteristics, organizational characteristics and information technology adoption in small businesses. Omega, 23(4), 429-442.

[11] Wanjau K., Mbataru R., (2013). 'Role of Information System Security in the Growth of Small and Medium Enterprises in Kenya: A Survey of Information

Communication Technology Firms In Nairobi' European American Journals, Creative Commons Attribution-Non-Commercial-NoDerivs.

[12] Bruque, S., and Moyano, J. (2007).Organisational determinants of information technology adoption and implementation in SMEs: The case of family and cooperative firms. Technovation, 27(5), 241-253.

[13] Premkumar, G., and King, W.R. "Organizational characteristics and information systems planning: An empirical study," Information Systems Research (5:2) 1994, pp 75-109.

[14] Chi, L., Jones, K. G., Lederer, A. L., Li, P., Newkirk, H. E. & Sethi, V.(2005). "Environmental Assessment in Strategic Information Systems Planning," International Journal of Information Management, 25(3), 253-269.

[15] Fuller-Love, N. (2006). Management development in small firms. International Journal of Management Reviews, 8(3), 175-190

[16] Chuang, T.-T., Nakatani, K., & Zhou, D. (2009). An exploratory study of the extent of information technology adoption in SMEs: an application of upper echelon theory. Journal of Enterprise Information Management, 22(1/2), 183-196

[17] Drew, S. (2003). Strategic uses of e-commerce by SMEs in the east of England. European Management Journal, 21(1), 79-88.

[18] Cragg, P. B., and Zinatelli, N. (1995).The evolution of information systems in small firms. Information and Management, 29(1), 1-8.

[19] Foong, S. Y. (1999). Effect of end-user personal and systems attributes on computer-based information system success in Malaysian SMEs. Journal of Small Business Management, 37(3), 81-87.

[20] Amoako-Gyampah, K. (2007). Perceived usefulness, user involvement and behavioral intention: an empirical study of ERP implementation. Computers in Human Behavior, 23(3), 1232-1248

[21] Shin, I. (2006).Adoption of enterprise application software and firm performance. Small Business Economics, 26(3), 241-256

[22] Hong, W.; Zhu, K. Migrating to internet-based e-commerce: Factors affecting e-commerce adoption and migration at the firm level. Inf. Manag. 2006, 43, 204–221.

[23] Duncombe, R.; Heeks, R. Information and communication technologies (ICTs) and small enterprise in Africa: Lessons from Botswana. 2001. Available online: http://www.man.ac.uk/idpm (accessed on 1 September 2011).

[24] Morgan, A.; Colebourne, D.; Thomas, B. The development of ICT advisors for SME businesses: An innovative approach. Technovation 2006, 26, 980–987.

[25] Tarafdar, M., and Vaidya, S. D. (2005). Adoption and implementation of IT in developing nations: Experiences from two public sector enterprises in India. Journal of Cases on Information Technology, 7(1), 111-135.

[26] Nguyen, T. U. H. (2009). Information technology adoption in SMEs: an integrated framework. International Journal of Entrepreneurial Behavior and Research, 15(2), 162-186.

[27] Papke-Shields, K. E., Malhotra, M. K. & Grover, V. (2002). "Strategic Manufacturing Planning Systems and Their Linkage to Planning System Success," Decision Sciences, 33(1), 1-30.

[28] Al-Qirim, N. (2007). The adoption of eCommerce communications and applications technologies in small businesses in New Zealand. Electronic Commerce Research and Applications, 6(4), 462-473.

[29] Caldeira, M. M., and Ward, J. M. (2003).Using resource-based theory to interpret the successful adoption and use of information systems and technology in manufacturing small and medium-sized enterprises. European Journal of Information Systems, 12(2), 127-141.

