ICT Attributes as Determinants of E-commerce Adoption by Formal Small Enterprises in Urban Kenya

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Abstract

In recent years, there has been increased Information Communication Technology (ICT) advancement in Kenya that provides opportunities for small enterprises to improve their business performance. In these regard, the purpose of this study is to gain a deeper understanding on the determinants of e-commerce adoption and usage by formal small enterprises in urban Kenya. The study examined relationship between e-commerce adoption and perceived ICT attributes. Previous studies carried out in Europe, America, Asia and South Africa have shown that innovative use of e-commerce is a crucial intervention tool that has catalytic effect on business performance. Stratified random sampling was used to select a sample of 400 small enterprises located in four main urban towns of Kenya. The survey instrument was a questionnaire administered to the business owners. Analysis of data was done using descriptive and inferential statistics. Results of the research show that small formal enterprises in urban Kenya are influenced to adopt e-commerce by being able to observe visible results emanating from its use such as simplification of work routines, efficient coordination among various value chain partners, increased productivity and improved customers services that leads to customer satisfaction. Majority of entrepreneurs viewed e-commerce as an avenue of venturing into new markets but not as a tool for developing new products and services. Based on the findings, the study recommends training institutions in collaboration with ICT board of Kenya and relevant line ministries to come up with ICT demonstration sites equipped with virtual businesses for entrepreneurs to train on effectively use e-commerce in their businesses.

Key Words: E-commerce, formal small enterprises, ICT attributes, adoption

1.0 Introduction

Growth of small enterprises is both horizontal and vertical. Horizontal growth is represented by new business entrants or micro enterprises graduating into small enterprises while vertical growth occurs when small enterprises graduate into medium enterprises. This growth is determined by decisions made by entrepreneurs on changes taking place in both external and internal business environments. One of such changes has been the rapid revolution of Information Communication Technology (ICT) that possesses both opportunities and threats to small enterprises. Wolf, (2001) found that in the 1990s, many small medium enterprises (SMEs) in East Africa, albeit in a limited scale, started to embrace ICT as a growth intervention tool.

Nowadays enterprises are increasingly adopting e-commerce due to the advent of personal computers and operational effectiveness (Alam & Noor, 2009). Alberto and Fernando (2007) argued that the use of e-commerce can improve business competitiveness with internet providing numerous opportunities for SMEs to compete equally with large corporations at local and international front. In Kenya, e-commerce infrastructure has dramatically changed in the recent years (Kemibaro, 2010) posing both opportunities to businesses that will quickly adopt the new technologies and threats to those who fail to adopt. The government of Kenya in its sessional paper number 2 of 1992 and sessional paper number 2 of 2005 emphasized the importance of small enterprises growth to the country's economic development. Further, in 2007 the government released its major strategic plan commonly referred to as Vision 2030 where ICT and SMEs have been identified as major driving forces for its realization. These underscore the importance of identifying determinants that lead to e-commerce adoption by small enterprises in Kenya.

2.0 Literature Review

Empirical research carried out world-over shows those small enterprises that adopt e-commerce perform better than those which fail to adopt because of its catalytic effect on business performance. However, e-commerce adoption is not automatic due to scarcity of resources for example financial, human resource with e-commerce skills, managerial capability just to mention a few that small enterprises have deal with on daily basis. Mutula and Brakel (2006) argued that the greatest opportunity for small businesses entrepreneurs will derive from their ability to participate in the regional and international market. Increase use of e-commerce in enterprises can lead to a generation of substantial returns for entrepreneurs that invest in it (Chowdhury & Wolf, 2003). E-commerce is often lauded as catalysts for development not only for industrial countries but also for developing countries (Esselaar, Stork, Ndiwalana, & Deen-Swarra, 2007). The importance of e-commerce as powerful intervention tool for socio-economic development is now widely acknowledged not only among large corporations but also in small business enterprises (Carbonara, 2005; Mutula & Brakel, 2007; World Bank, 2006). Denni (1996) argued that every business must bring e-commerce into their business operation and take advantage of the benefits they offer. This implies that entrepreneurs can no longer ignore the use of e-commerce as an innovative tool for growth.

According to Ongori and Migiro (2010) the evolution of technology has affected the way businesses operate. First, it has changed the industry structures and altered the degree of competition. Second, it has created a competitive advantage for the businesses, which have adopted ICT in their business processes. Third, it has improved business operations by increasing the productivity, efficiency of internal business operations and connects SMEs more easily and cheaply to external contacts both locally and globally. Tan, Lin, and Eze (2009) citing International Telecommunication Union (ITU) reported that the number of internet users continues to grow exponentially with bigger increase reported from users in developing countries. Esselar et al. (2007) looked into the use of e-commerce and its impact on profitability of SMEs in thirteen African countries. Although the study shows that Africa may have the highest growth rate in mobile telephony, it is of a very low base whereby large numbers of Africans do not have permanent access to basic telephony and very few have access to the enhanced e-commerce services required for effective participation in the economy and society. The study concludes that high cost of communications services across the continent continues to inhibit uptake by consumers.

Although e-commerce adoption studies constitute a significant area of research within the information systems domain (Fichman, 2000), there continues to be a need for better understanding of the factors that drive or inhibit the adoption and use of e-commerce within the specific context of SMEs (Caldeira & Ward, 2002; Al-Qirim, 2004; Bharati & Chaudhury, 2006). Desktop literature review carried out by Ongori and Migiro (2010) with a focus on ICT adoption in Kenya concludes that there is a need to carryout empirical research in order to have a holistic view on its adoption by SMEs in the country.

2.1 Innovation Diffusion Theory (IDT)

The study used Roger's innovation diffusion theory (IDT) to test the hypotheses. The IDT model was introduced by Rogers (1983) and remains the most popular model in the investigation of the behaviour of users in adopting new technological innovation (Tan et al., 2009).

Roger (1983) defines diffusion as a process by which an innovation is communicated through certain channels over a period of time among the members of a social system while innovation is an idea, practice or object that is perceived to be new by an individual or other unit of adoption. He further argues that media and interpersonal contacts provide information that influences a person's opinion and judgment. Information filters through the networks and depending on the nature of networks and the roles of its opinion leaders, new innovations are either adopted of rejected. Opinion leaders influence an audience through personal contact while intermediaries such as change agents and gatekeepers also contribute to the process of diffusion (Manueli, Latu & Koh, 2008).

IDT is concerned with the manner in which new technological ideas migrate from creation to use and how technological innovation is communicated through particular channels, over time, among the members of a social system. There is a consensus among researchers that IDT is a suitable and valid theory for examining the process of adoption. It is recognized as the only theory which has been used to evaluate adoption on the individual and organizational level (Tan et al., 2009). Looi (2004) suggested that the Rogers' innovation diffusion theory is perhaps the most frequently cited theory in most research on diffusion of innovation. He stated that the theory is considered valuable because it attempts to explain the factors which influence the adoption of an innovation and the manner in which new innovations are disseminated through social systems over time. El-hadary (2001) emphasized that one of the major contributions of IDT is the innovation-decision process, which starts with one's knowledge about the existence of the innovation and ends with the confirmation of the adoption/rejection decision. IDT applies five constructs: relative advantage, compatibility, complexity, triability and observability of technology in determining its adoption/rejection by the user.

Relative advantage

Relative advantage is the degree to which an innovation is perceived as being superior to its predecessor in terms of economic profitability, low initial cost, a decrease in discomfort, savings in time and effort, and the immediacy of the reward. Gemino, Mackay and Reich (2006) highlighted that relative advantage is expressed by perceived benefits. Aghaunor and Fotoh (2006) elaborated that the perceived benefits by managers include cost savings, income generation, potential opportunities in new markets, marketing and publicity. Gemino et al. (2006) conveyed that research has found that relative advantage is the primary reason for encouraging ICT growth and a positive relationship has been identified between perceived advantages and adoption.

Reviewed literature shows that the greater the benefits perceived by the entrepreneur, the higher the possibility of ICT adoption. Thus perceived benefits are some of the factors that could affect e-commerce adoption in an enterprise. According to Beckinsale and Ram (2006), perceived benefits of ICT adoption often include focus on improving business efficiency; operational effectiveness and the need to reach out for new markets and opportunities. Organization for Economic Co-operation and Development (OECD) (2004) found out that ICT offers improved information and knowledge management that includes increased speed and reliability of transactions for both internal and external transactions, real-time information access and immediate customer feedback. Earlier studies by Lauder and Westall (1997) found that ICT impacts include cheaper and faster communications, better customer and supplier relations, more effective and efficient marketing, product and service development and better access to information and training. The primary motivation for the small enterprises to adopt new technologies is their anticipated benefits (Premkumar & Roberts, 1999). However, although there are many perceived benefits that have been made available through e-commmerce adoption, there are still many small enterprises that are not taking advantage of ICT. Therefore, perceived benefits are taken into consideration as one of the factors that affects ICT adoption in small enterprises. In the literature on innovation, it is often assumed that an innovation is either adopted or not adopted by individuals or organizations depending on their motivations and beneficial expectations (Iyanda & Ojo, 2008).

Compatibility

Compatibility is the degree to which an innovation is perceived as being compatible with existing beliefs, experience and needs of potential adopters. A faster rate of adoption occurs when an adopter perceives an innovation as meeting the needs of the client. Alam, Khatibi, Ahmad and Ismail (2007) stated that an innovation is more likely to be adopted if it is compatible with individual job responsibility and value system. Alam et al. (2007) affirmed that organizations should determine the needs of their customers and then recommend innovations that fulfil those needs. It is therefore anticipated that as needs are met the adoption will occur.

Complexity

Complexity is the degree to which an innovation is perceived as being relatively difficult to understand and use. The perceived complexity of an innovation is negatively related to its rate of adoption. Alam et al. (2007) reported that previous studies on the adoption of innovations indicated that the adoption of complex technologies require organizational personnel to possess sufficient technical competencies.

Trialability

Trialability is the degree to which an innovation can be used on a trial basis before confirmation of adoption occurs. Rogers' (1995) studies found that "the trialability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption. Alam et al. (2007) suggested that trialability has become an important feature of innovation because it provides a means for prospective adopters to reduce their uncertainties regarding unfamiliar technologies or products.

Observability

Observability is the degree to which the potential adopter perceives that the results of an innovation are visible to others. Displaying an innovation's superiority in a tangible form will increase the adoption rate.

Based upon the literature reviewed, the following five null hypotheses have been constructed:

H_{01}: Relative advantage does not influence e-commerce adoption by formal small enterprises in urban Kenya
H_{02}: Compatibility does not influence e-commerce adoption by formal small enterprises in urban Kenya
H_{03}: Complexity does not influence e-commerce adoption by formal small enterprises in urban Kenya
H_{04}: Triability does not influence e-commerce adoption by formal small enterprises in urban Kenya
H_{05}: Observability does not influence e-commerce adoption by formal small enterprises in urban Kenya

3.0 Methodology

The research involved descriptive studies using survey strategy to establish relationship between dependant variable e-commerce adoption by formal small enterprises and the five independent variables. Quantitative data collection using a questionnaire was carried out in the urban towns of Nairobi, Mombasa, Kisumu and Nakuru. The population of the study comprised of all formal small enterprises in urban towns of Kenya who are registered by Kenya Revenue Authority (KRA) as active payers of value added tax (VAT) and have an annual sales turnover of between Kenya shillings five million and fifty million. A stratified random sample comprising of 400 small enterprises was drawn from the service sector and the manufacturing sector out of which 224 responded giving a response rate of 56% which is higher than the average response rate of 30% of survey research as stated by Saunders and Lewis, (2009). Research papers reviewed showed that the response rate varies a lot as shown in Table 1

Table 1: Survey Response Rate by Other Researchers

Researchers	No. of Questionnaires Given out	Questionnaires Returned	Percent Response
(Alam & Noor, 2009)	400	193	48.25 %
(Ssewanyana & Busler, 2007)	143	110	76.92 %
(Mutula & Brakel, 2007)	159	55	34.5 %
(Chiware & Dick, 2008)	398	232	58.29 %

The formulated hypotheses were tested using the Pearson correlations and logistic regression generated by SPSS version 17 at 5% level of significance.

4.0 Results and Discussions

4.1 Adoption of E-commerce

The study found out that 53.0% of the respondents were using E-commerce in their sale or purchase of products/services online.

Those who had adopted were required to indicate the number of years they have been using while those who had not were required to state the major reasons for not using it as presented in Figures 1 and 2 respectively. Small enterprises that have adopted e-commerce have done so in the last seven years with a peak in the last 2 to 4 years. This is could be attributed to improved internet communication due to the landing of three fibre optic cables in 2009, approval of ICT media bill in 2009 among other changes detailed by Kemibaro (2010). Small enterprises that are not using e-commerce sighted inconsistency with business needs (37.1%) as the major reason of not using it followed by no perceived benefit (22.5%). This confirms Bharadwaj and Soni (2007) findings in USA that the major reason for enterprises not engaging in e-commerce is their perception that it is not strategically important for them.

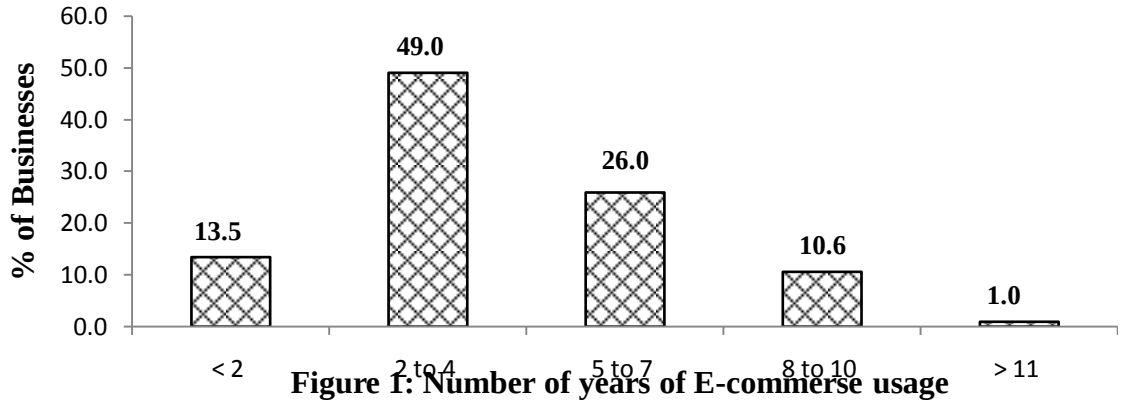

Figure 1: Number of years of E-commerse usage

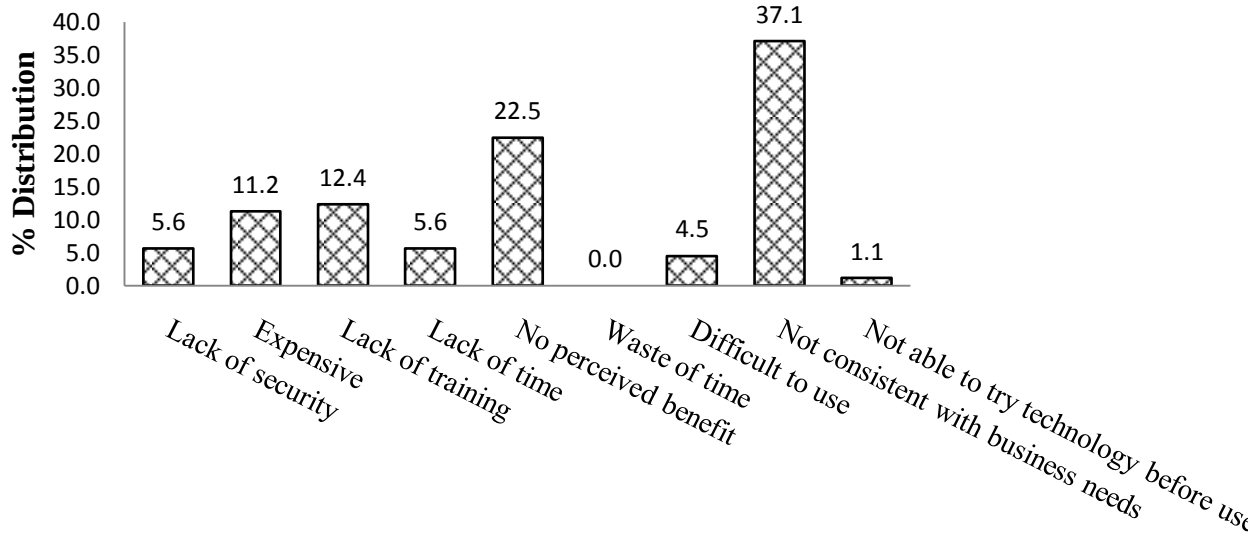

Figure 2: Reasons of not using E-commerce

4.2 Independent Variables

Table 2: Relative Advantage of Using E-commerce among small enterprises in urban Kenya

Level of Agreement	Level Of Agreement				
	%SD	%D	%UC	%A	%SA
E-Commerce has led to simplification of work routines	0.0	0.0	10.9	37.0	52.1
E-Commerce, has led to reliable business communications	0.9	0.0	14.0	38.1	47.0
E-commerce has led to efficient coordination among departments	0.0	0.0	18.7	46.3	35.0
E-commerce has improved customer satisfaction	0.5	3.3	17.6	44.3	34.3
E-commerce has provided new business opportunities	0.9	1.9	17.6	36.6	43.1
E-commerce has led to development of new product and services	1.9	4.7	20.6	34.6	38.3
E-commerce has led to reduction in operation costs	0.9	7.1	18.4	35.8	37.7
E-commerce has led to increased productivity	0.0	3.3	21.0	45.3	30.4

SD=Strongly Disagree, D=Disagree, UC=Uncertain, A=Agree, SA=Strongly Agree

Simplification of work
The results in Table 2 indicates an overwhelming 89.1% of the respondents either agreed of strongly agreed that use of e-commerce led to simplification of work routines. This is contrary to Alam and Noor, (2009) findings on ICT adoption in Malaysia who found that the respondents did not think that e-commerce led to simplification of their work.

Reliable communication
85.1% of the respondents either agreed of strongly agreed that e-commerce has led to reliable business communications. The findings are similar to those of Tan et al. (2009) on Internet based ICT adoption.

Coordination
81.3% of respondents agreed or strongly agreed that e-commerce has led to efficient coordination among department. The findings are similar to those of Beckinsale and Ram (2006) who concluded that ICT adoption often led to improvement business efficiency.

Improve customer satisfaction
78.6% of respondents either agreed or strongly agreed that use of e-commerce has led to improved customers satisfaction. Earlier studies by Lauder and Westall (1997) found that ICT impacts include cheaper and faster communications, better customer and supplier relations, more effective and efficient marketing.

New business opportunities
79.7% of respondents either agreed or strongly agreed that use of e-commerce provided new business opportunities. Earlier research by Beckinsale and Ram (2006); Giovanni and Mario (2003) found that ICT adoption led to development of new markets and opportunities.

New products and services
72.9% of respondents either agreed or strongly agreed that use of e-commerce has led to development of new products and services which agrees with OECD (2004) findings.

Reduction of costs
73.5% of respondents either agreed or strongly agreed that use of e-commerce has led to reduction in operating costs which agrees with Tan et al. (2009) findings.

Increased productivity
75.7% of respondents either agreed or strongly agreed that use of e-commerce and computerization of business operations has led to increased productivity which agrees with OECD (2004) findings.

Table 3: Compatibility / complexity / triability and observability of e-commerce among small enterprises in urban Kenya

Level of Agreement	**Level Of Agreement**				
	%SD	%D	%UC	%A	%SA
E-commerce is compatible with business needs	0.9	4.6	14.8	43.1	36.6
It is easy to implement e-commerce	6.5	18.1	29.6	31.9	13.9
It is easy to test e-commerce before full implementation	1.0	15.1	37.1	34.6	12.2
Positive results of using e-commerce are clearly visible	0	3.3	16.7	54.4	25.6

SD=Strongly Disagree, D=Disagree, UC=Uncertain, A=Agree, SA=Strongly Agree

Results in Table 3 indicates that 79.7% of respondents agreed that e-commerce is compatible with their business needs which concurs with Tan et al. (2009) findings. Only 45.8% of the respondents felt the same in the case of ease of implementation of e-commerce while 29.6% were uncertain. This could be due to the fact that business normally first computerizes their operations before the move to higher level of ICT adoption as cited by Zappala and Gray (2006).

46.8% of the respondents either agreed or strongly agreed that it is easy to implement e-commerce before full implementation. However, 37.1% were uncertain. This coupled by the fact that over 18.1% also disagreed that it's easy to test e-commerce before full implementation means that decisions about adoption may take longer than if they were able to pre-test. 80.0% of the respondents either agreed or strongly agreed that positive results emanating from use of e-commerce are clearly visible. Limthongchai and Speece (2003), Slyke et al. (2004b) and Tan et al. (2009) had similar results.

4.3 Hypotheses Testing

H_{01}: Relative advantage does not influence e-commerce adoption by formal small enterprises in urban Kenya

There was weak significant positive correlation between six predictors of relative advantage and adoption of e-commerce as shown in Table 4. Logistic regression results in Table 5 indicate that there is significant positive association between increased productivity and e-commerce adoption. On the other hand, development of new products and services is negatively associated with e-commerce adoption. Thus we reject the null hypothesis and conclude that relative advantage positively influences adoption of e-commerce by formal small enterprises in urban Kenya. Previous researchers (Alam & Noor, 2009; Beckinsale & Ram, 2006; Gemino et al., 2006; Giovanni & Mario, 2003; Lauder & Westall,1997; OECD, 2004; Premkumar & Roberts, 1999 and Tan et al., 2009) had varying results on perceived e-commerce attributes that influenced its adoption.

H_{02}: Compatibility does not influence e-commerce adoption by formal small enterprises in urban Kenya

There is a weak significant positive correlation of 0.156 between compatibility of e-commerce with business needs and its adoption as shown in Table 4. The regression results yielded no significant association thus we fail to reject the null hypothesis and conclude that compatibility does not influence e-commerce adoption.

H_{03}: Complexity does not influence e-commerce adoption by formal small enterprises in urban Kenya

H_{04}: Triability does not influence e-commerce adoption by formal small enterprises in urban Kenya

Correlation and regression results in Table 4 and 5 respectively shows no significant association between triability and complexity of e-commerce on its adoption by formal small enterprises. Thus we fail to reject null hypotheses H_{03} and H_{04} and conclude that triability and complexity of e-commerce do not influence its adoption by formal small enterprises. This concurs with Tan et al. (2009) study on internet based ICT adoption in Malaysian SMEs where they found that trialability had no significant association with ICT adoption.

H_{05}: Observability does not influence e-commerce adoption by formal small enterprises in urban Kenya

There is significant positive correlation of 0.300 between observability of visible e-commerce effects on business and its adoption as shown in Table 4.

Regression results in Table 5 shows there is positive significant association between observability and e-commerce adoption. Thus we reject the null hypothesis and conclude that visible results of implementing e-commerce positively influences its adoption. Limthongchai and Speece (2003), Slyke et al. (2004b) and Tan et al. (2009) had similar results.

Table 4: Pearson correlation results between perceived ICT attributes and adoption of E-commerce

N=224 ICT Attributes	Correlation Coefficient	Sig. (2-tailed)
Relative Advantage		
1.Simplification of work routines (PICTA1)	.299**	.000
2.Speedy and reliable business communications(PICTA2)	.201**	.003
3.Efficient coordination among departments(PICTA3)	.314**	.000
4.Improved customer satisfaction(PICTA4)	.330**	.000
5.Provided new business opportunities(PICTA5)	-.060	.382
6.Development of new product and services (PICTA6)	.090	.187
7.Reduction in operation costs(PICTA7)	.267**	.000
8.Increased productivity(PICTA8)	.387**	.000
Compatibility		
9.Compatible with business needs(PICTA9)	.156*	.021
Complexity		
10. Easy to implement e-commerce (PICTA10)	.077	.261
Triability		
11. Easy to test e-commerce (PICTA11)	.034	.623
Observability		
12.Positive results of using e-commerce are visible(PICTA12)	.300**	.000

**significant at 0.01, *significant at 0.05

Table 5: Logistic regression results between perceived ICT attributes and e-commerce adoption

	β	S.E.	Wald	df	Sig.	Exp(β)
Relative Advantage						
1.Simplification of work routines PICTA1	.400	.328	1.487	1	.223	1.492
2.Speedy and reliable communications(PICTA2)	.052	.244	.046	1	.831	1.053
3.Efficient coordination among departments(PICTA3)	.417	.303	1.896	1	.169	1.517
4.Improved customer satisfaction(PICTA4)	.480	.263	3.344	1	.067	1.616
5.Provided new business opportunities(PICTA5)	-.233	.188	1.537	1	.215	.792
6.Development of new product & services (PICTA6)*	-.533	.237	5.067	1	.024	.587
7.Reduction in operation costs(PICTA7)	.114	.224	.260	1	.610	1.121
8.Increased productivity(PICTA8)**	.953	.288	10.950	1	.001	2.593
Compatibility						
9.Compatible with business needs(PICTA9)	-.156	.261	.357	1	.550	.856
Complexity						
10. Easy to implement e-commerce (PICTA10)	-.010	.233	.002	1	.965	.990
Triability						
11. Easy to test e-commerce (PICTA11)	-.491	.263	3.491	1	.062	.612
Observability						
12.Positive results of using e-commerce are visible(PICTA12)**	.708	.287	6.103	1	.013	2.030
Constant**	-7.472	1.622	21.233	1	.000	.001

**significant at 0.01, *significant at 0.05

Conclusion

The study concludes that small formal enterprises in urban Kenya are influenced to adopt e-commerce by being able to observe visible results emanating from its use such as simplification of work routines, efficient coordination among various value chain partners and improved customers services that leads to customer satisfaction.

This implies small enterprises that are not using e-commerce are likely to adopt in the near future as more positive results from those that have adopted becomes available. Further small enterprises perceived that use of e-commerce leads to increased productivity. This could be as a result of the ability of e-commerce to like-up suppliers and customers in different geographical location through cyberspace at minimum cost. The study further concludes that small enterprises in urban Kenya do not view e-commerce as a means for developing new products and services rather they use mainly it to sell their current products/services in new markets.

Recommendations

The study recommends training institutions in collaboration with ICT board of Kenya and relevant line ministries to come up with ICT demonstration sites equipped with virtual businesses that could be used to train young entrepreneurs on how to effectively use ICT and indeed e-commerce in their businesses. This would help them to try various ICTs, see positive results and be able to resolve issues of business compatibility before launching them in their businesses.

Entrepreneurs should capitalize on enormous business opportunities provided by use of e-commerce to develop new products for the new e-markets which will help them to increase their sales turnover and profitability. To achieve this, high degree of creativity and innovations will be required plus reduced time-to-market of their new products due to likelihood of increased competition. Thus a versatile innovation management system must be put in place in order fast track new product development processes. This would help to solve the problem of inconsistency with business needs and no perceived benefit sighted as the main reason of not using E-commerce.

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