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Forces Driving ICT Adoption in Real Estate Firms in Kenya

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Abstract

ICT plays a significant role in real estate transactions, facilitating efficiency in transactions and reduction of costs. The adoption of the technology has however been sluggish despite its importance property transactions. This set out investigate the factors influencing ICT adoption in the sector, the literature highlighted key issues including and established four main factors with significant influence on ICT adoption- complexity, perceived user benefits, availability of skills and availability of ICT equipment within the firms. The study adopted a descriptive research design that entailed collection of data from a population of 124 comprising of real estate firms comprising of 83 professional firms and 41 real estate agents operating in Nairobi. A random sample of 63 was selected for investigation of the status of ICT adoption. Data was collected using questionnaires. Data analysis was undertaken using inferential and descriptive statistics to test the relationships between the various variables. In the end, the field survey established that these factors play varied significant roles influencing ICT adoption. In conclusion, it is clear from the study results that to enhance ICT adoption in Real Estate firms require a combination of efforts including enhancing user staff skills, acquisition of user friendly equipment, facilitating staff interactions between firms and staff from diverse firms. The study recommended that real estate firms be encouraged to engage ICT professionals who lead in enhancing their capacities and that a similar study covering other parts of the country should be undertaken to be able to generalize the results.

Keywords: Real estate, adoption, ICT, Kenya.

INTRODUCTION

Real Estate industry plays important roles in economies through its strong backward and forward linkages thereby stimulating sectors of an economy. In addition, it contributes significantly to the economy; for instance, its contribution to Gross Domestic Product for Kenya in 2021 was 7.5% while for 2022 is projected at 6.7% (KNBS, 2022). As Zhang et al. (2012) assert that it supports the growth of other sectors in the economy. However, growth and development of real estate sector is affected by several factors including low rate of adoption and use of ICT. The sector is in an ever changing environment thus the need to adapt to the changes including adoption of emerging technologies.

Furthermore, a consensus is emerging that the success and survival of real estate firms relies majorly on their innovative ability, and how products and services are delivered. This argument is reinforced by for instance, Gitau (2014) assertion that emerging trends in technology are shaping the real estate markets and development. This is reinforced by arguments by others such as Karbolo (2019) that assert that technology is already changing real estate sector. Munshifwa and Kopano (2019) further highlight the role of ICT in real estate transactions; that is; providing the industry with a system for collecting, analyzing and storing information related to real estate.

In summary, ICT is seen as facilitating mutual interactions – in the form of transactions and to minimize estate cost, points to the critical role of ICT in helping unlock the potentials of the real sector. In the long run, it needs to be appreciated that the advent of technology exposes the players to numerous challenges, as well as provides new opportunities to improve innovation, product development and customer support. The key to driving growth in such a scenario will nevertheless be dependent upon the willingness of real estate players to accept technologies and integrate them within their business operations (Syagga, 2009). Although there have been studies on ICT adoption in most sectors of the economy,

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real estate sector has had a limited focus. This paper aims to deepen our understanding of the forces driving adoption of ICT by real estate firms.

THEORY

ICT is variously defined, for instance Owuor (2004) sees it as the technology which supports activities relating to the design, storage, and transmission of data and voice, jointly with their interrelated methods. While Cats-Baril and Huber (1987) sees it as a system with a set of structured procedures which, when effected, gives information for decision making. Similarly, Olson and Gordon (1998) see it as an integrated user-machine system for providing information to support operations, management, analysis and decision-making functions in an organization. Essentially, ICT just as Munshifwa and Kopano (2019) asserts plays an enabling and facilitative role in real estate management, agency and development.

Several authors including Modimogale and Kroetze (2011), Ritchie and Brindley (2005) had earlier adopted this approach in defining ICT. Indeed, Ritchie and Brindley (2005) summarized it as, "an array of primarily digital technologies designed to collect, organize, store, process and communicate information within and external to an organization".

This reinforces arguments on the potential benefits of ICT adoption that Matlay and Fletcher (2000) and Chapman et al. (2000) argue would be available to firms. The potential benefits would include: economic, gain in managerial knowledge, skills and experience of owners of real estate firms as well as from assistance on how to link technology to specific operational aspects of the businesses. This is important given the significant role of integrated information system on organizational operations that include; production, marketing, communication and logistics among others. Increasingly, organizations are becoming dependent on ICT for gathering and distribution of data and information.

A further review of literature highlights four factors that influence adoption of ICT to include: complexity, user skills, ICT perceived benefits and availability of ICT equipment in real estate firms. For instance, many authors argue that the complexity of new technologies limit their adoption (Bagozzo et al.; 1992). In their variousviews the complexities of the technologies present uncertainty to the users with respect to privacy and safety.

This is further affected by the lack of knowledge of the range of benefits that would accrue from adoption of new technologies. In addition, Demeke and Olden (2012) in their study on ICT adoption in Adds Ababa established that adoption of ICT is not only affected by the complexity but by economic, cultural and political factors that play a major role in the rate of diffusion of ICT in Addis Ababa. Besides, the study showed that the application and introduction of the ICT is highly influenced by user skills, ICT equipment and the benefits that are expected from the technology. Consequently, the said enterprises that had adopted ICT were benefiting in terms of cost reduction, efficiency, customer satisfaction and convenience and significant rise in profits. Modimogale and Kroeze (2011) concludes that the use of traditional tools in operations is a big challenge among medium scale enterprises in their attempts to create sustainable competitive advantage and that adoption of ICT would be a boost as well as a solution to the growth of firms irrespective of size to further reinforces this position. However, limited user skills remain a major obstacle to ICT adoption in many African countries (Apulu et al.; 2011; Ogova, 2016; Munshifwa and Kopano, 2019; Karbolo, 2019).

In addition, as Golding et al. (2008) agree that several factors contribute to limited ICT adoption in both developing countries. This is reinforced by Apulu; et al. (2011) findings, that it is not only lack of ICT user skills and training that affect ICT adoption, but other factors such as cost, inadequate infrastructure, lack of management support, policy and institutional framework that also hinder utilization of sophisticated ICT effectively in Nigerian SMEs. Yet given the technological advancements and globalization ICT remains a critical tool for development if organizations from developing countries have to be globally competitive. Real estate practice whether management, development and/or agency is a skill based practice and competitive. Thus it fits well within the realm of economies that are technologically radical as argued by Olusola et al. (2013). This is because Olusola et al. (2013) contend that most technologically radical economies are not only skills based but

is adopting knowledge economy aiming to make, gather and distribute knowledge. Real estate fall in this category, as the search for efficiency in production and operations remains in earnest. Several authors including Chau (1995); Knol and Stroeken (2001) and Duan et al. (2002) agree that lack of knowledge of ICT is a major barrier in ICT adoption but also that it is further compounded by the perceived benefits. Interestingly, this also affect firms in almost all European countries, particularly in the UK, Poland and Portugal. However, Cloete et al. (2002) looking at the case of SMEs in South Africa established that ICT adoption is significantly influenced by lack of access to computer software, other hardware, and telecommunication at a reasonable cost; security concerns and unclear benefits from ICT. In the case of Migiro (2006) established that limited diffusion of computers, high cost of internet access and a lack of online payment processes are the major factors that directly inhibit ICT adoption by SMEs. In addition, a study by Lal (2007) on globalization and the adoption of ICT in Nigerian SMEs established that poor physical infrastructure is a major factor inhibiting ICT diffusion.

There appears to be a consensus that the costs associated with ICT installation and staffing constitute barriers to ICT adoption in most SMEs (Arendt, 2008). Okwuonu (2013) on the other hand established that where intended users of ICT have the necessary skills; it is easier to introduce the anticipated technology with less resistance. It is clear that user skills coupled with perceived benefits have strong influence on ICT adoption globally. In addition to user skills, perceived benefits, physical availability and infrastructure further influence adoption of ICT. Indeed, Hennessy et al. (2010) observed that the availability of physical ICT structures, such as computer rooms and electricity influenced decisions by principals of schools in Africa on integration of ICT into their daily operations. Afshari et al. (2010); Gichoya (2005) as well as Olayemi and Omatayo (2012) all came to a similar conclusion.

RESEARCH METHODS

The study adopted a descriptive research design, which as Mugenda (2008) highlights is a largecollection of data from members of the population to help establish a prevailing situation at a particular point in time. The approach facilitated collection of data across real estate firms and empirically tests the relationship(s). The total population was 124, comprising of 83 professional real estate firms and 41 real estate agents operating within Nairobi County. A stratified random sampling was adopted to classify the population into strata and select respondents. In the end, a total sample of 63 which is about 50% of the population was selected.

Data collection was undertaken using questionnaires which solicited information on demographic and operational characteristics of the respondents. Data analysis was undertaken using descriptive and inferential statistics and presented using, the mean, frequency, percentages and standard deviation while the inferential statistics include correlation analysis and regression analysis. The study sought to examine whether their existed any association between complexity, user skills, perceived benefits and ICT equipment. Correlation analysis was conducted to examine whether the association between the independent variable and the dependent variable was negative or positive. The results were presented in the form of graphs, pie charts and tables that illustrated the various relationships that emerged from the analysis.

Besides, the correlation analysis was conducted to examine whether there existed multicollinearity. Multicollinearity refers to a state where two or more independent variables are correlated. The regression analysis was conducted to examine the relationship between the independent variables (complexity, user skills, perceived benefits and ICT Equipment) and dependent variable (adoption of ICT). The regression analysis included model fitness, analysis of variance (ANOVA) and regression coefficient. The model fitness examined the percentage of the dependent variable's variations that is explained by the independent variables. Analysis of variance examined whether the independent variables were significant in determining the dependent variable. Lastly, the regression of coefficient evaluated the strength of the relationship between independent variables and dependent variable.

RESULTS

The aim of the study is to evaluate the factors influencing adoption of information and

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communication technology in real estate firms in Kenya. As such there were attempts to examine the relationships between the identified independent variables such complexity, user skills, perceived benefits and ICT Equipment and the dependent variable that adoption of information and communication technology. The results were complexity, user skills, perceived benefits and availability of ICT equipment explained 74.6% of the variations in ICT adoption among the real estate firms. Similarly, from the analysis of variance, complexity, user skills, perceived benefits and availability of ICT equipment were found to be good predictors explaining the ICT adoption in real estate firms in Kenya. This implied that before adopting the technology to the real estate companies, they needed to look at the key factors driving ICT adoption that include: complexity, user skills, perceived benefits and availability of ICT equipment. **Table 1** presents the results of the correlation analysis. It emerged from the results as illustrated in **Table 1** that complexity and ICT adoption were negatively and significantly associated (r= -0.523, p=0.000). The study further established that the user skills and adoption of the ICT were positively and significantly associated (r=0.724, p=0.000). Similarly, a positive and significant association was found between perceived benefits and adoption of the ICT (r=0.769, p=0.000). Lastly, the availability of the ICT equipment and adoption of the ICT was positively and significantly associated (r=0.554, p=0.000). The results also showed a lack of multicollinearity since none of the variables had a correlation coefficient of more than 0.8. This intimated that the complexity, user skills, perceived benefits and ICT Equipment were vital and determined the adoption of ICT by the real estate firms.

The results confirm findings of Chowdhury and Sudatta (2011) that established that ICT adoption was positively correlated to expansion and negatively correlated to internal rate of return. The results further reinforced Hennessy et al. (2010) finding that that availability of electricity

TABLE 1
Correlations analysis

Statement		Adoption of ICT	Complexity	User skills	Perceived benefits	ICT equipment
Adoption of ICT	Pearson correlation	1.000				
	Sig. (2-tailed)					
Complexity	Pearson correlation	-0.523**	1.000			
	Sig. (2-tailed)	0.000				
User skills	Pearson correlation	0.724**	-0.467**	1.000		
	Sig. (2-tailed)	0.000	0.000			
Perceived benefits	Pearson correlation	0.769**	-0.449**	0.580**	1.000	
	Sig. (2-tailed)	0.000	0.000	0.000		
ICT equipment	Pearson correlation	0.554**	-0.200*	0.445**	0.440**	1.000
	Sig. (2-tailed)	0.000	0.033	0.000	0.000	

Source: Field survey 2019

and the availing of ICT structure were positively and significantly correlated. In addition, the results corroborated Kottemann (2009) finding that expected benefits from adoption of technology highly influences its adoption in an institution.

Regression analysis

The regression analysis was conducted to examine the relationships between the independent variables (complexity, user skills, perceived benefits and ICT Equipment) and dependent variable (adoption of ICT). The regression analysis determines the influence of the independent variables on a dependent variable. The regression analysis included model fitness, analysis of variance (ANOVA) and regression coefficient. The model fitness examined the percentage of the dependent variable's variations that is explained by the independent variables. Analysis of variance examined whether the independent variables were significant in determining the dependent variable. Lastly, the regression of coefficient evaluated the strength of the relationship between complexity, user skills, and perceived benefits, availability of ICT Equipment and adoption of ICT. The results of Regression Analysis were presented in **Tables 2 to 4**.

The results from **Table 2** shows that complexity, user skills, perceived benefits and availability of ICT equipment were found to be satisfactory in explaining the ICT adoption in Real Estates in Nairobi County. This was supported by the coefficient of determination, also known as the R square of 0.746 (74.6%). This implied that complexity, user skills, perceived benefits and availability of ICT equipment explained 74.6% of the variations in the dependent variable, which is the adoption of ICT.

DISCUSSION

The model fitness showed that complexity, user skills, perceived benefits and availability of ICT equipment explained 74.6% of the variations in ICT adoption among the real estate firms in Nairobi County. Likewise, from the analysis of variance, complexity, user skills, perceived benefits and availability of ICT equipment were found to be good predictors explaining the ICT adoption in real estate firms in Nairobi County. This was supported by an F statistic of 80.133 and the reported p-value of 0.000, which was less than the conventional probability significance

TABLE 2
Model fitness

Model	R	R Square	Adjusted R square	Std. error of the estimate
1	0.864a	0.746	0.737	0.199776

A predictors: (Constant), complexity, user skills, perceived benefits, availability of ICT equipment.
Source: Field survey 2019

TABLE 3
Analysis of variance (ANOVA)

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	12.793	4	3.198	80.133	0.000[b]
	Residual	4.35	109	0.04		
	Total	17.143	113			

a Dependent variable: Adoption of ICT; b Predictors: (Constant), ICT equipment, user skills, perceived benefits, complexity.
Source: Field survey 2019

TABLE 4
Regression of coefficient

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.556	0.316		1.761	0.081
	Complexity	-0.066	0.027	-0.140	-2.470	0.015
	User skills	0.323	0.065	0.321	4.995	0.000
	Perceived benefits	0.399	0.058	0.436	6.889	0.000
	ICT equipment	0.203	0.059	0.191	3.424	0.001

Source: Field survey 2019

level of 0.05. In addition, the average mean score of the survey question relating to the complexity was 3.93, with a standard deviation of 1.06. This implied that the majority of the respondents agreed with the statement concerning complexity; nevertheless, their responses varied. Further, it was established that complexity and ICT Adoption was negatively and significantly associated (r=-0.523, p=0.000). Besides, complexity was negatively and significantly related to ICT adoption (β=-0.066, p=0.015). This was supported by a calculated t-statistic of 2.470 that is larger than the critical t-statistic of 1.96. This meant that an increase in complexity of technology leads to a decrease in the ICT adoption by the real estate firms in Nairobi County by 0.066 units holding other factors constant. The results concur with the findings of Demeke and Olden (2012) who noted that the application and introduction of the ICT is highly influenced by user skills, ICT equipment and the benefits that is expected from the technology. Modimogale and Kroeze (2011) also reported the major obstacle of adoption of ICT among Medium enterprises included a lack of necessary skills and knowledge about the strategic use of ICT.

Moreover, from the descriptive statistics, the average mean score of the survey questions concerning ICT user skills was 4.08, with a standard deviation of 1.05. This implied that the majority of the respondents agreed with the survey questions concerning user skills and the ICT use in the real estate firms but with differing opinions. Also, it was established that the user skills and adoption of the ICT was positively and significantly associated (r=0.724, p=0.000).

Similarly, the findings showed that user skills and ICT adoption were positively and significantly related (β=0.323, p=0.000). This was supported by a calculated t-statistic of 4.995 that is larger than the critical t-statistic of 1.96. This suggested that one unit's improvement in user skills will lead to an increase in the ICT adoption within the real estate firms in Nairobi County by 0.323 units holding other factors fixed. The results concur with the findings of Apulu et al. (2011), pointed out that deficiencies in ICT user skills are one of the factors that have hindered adoption or effective utilization of ICT. Okwuonu (2013) also found that user skills influence the ICT adoption among institutions in Nigeria positively in that when those intended to use technology have the necessary skills, it becomes easy for the institution to introduce the anticipated technology with less resistance.

Furthermore, based on the descriptive statistics, the average mean score of the survey questions concerning whether perceived benefits influenced the ICT adoption was 3.86, with a standard deviation of 1.09. This implied that the majority of the respondents agreed with the survey questions; however, their responses varied. Similarly, a positive and significant association was found between perceived benefits and adoption of the ICT (r=0.769, p=0.000). Moreover, it was established that ICT's perceived benefits were positively and significantly related to ICT adoption (β=0.399, p=0.018). The findings implied that when the perceived benefits of ICT are increased by one unit by holding the other factors constant, the ICT adoption will increase by 0.399. The results

are inagreement with the findings of Kottemann (2009), which revealed that the expected benefits from a technology to be introduced profoundly influence its adoption in an institution.

Likewise, from the descriptive statistics, the average mean score of the statement concerning the availability of ICT equipment and ICT adoption was 4.02, with a standard deviation of 1.01. This implied that the majority of the respondents agreed with the survey questions, but their opinions varied. In addition, the availability of the ICT equipment and adoption of the ICT was positively and significantly associated (r=0.554, p=0.000). Furthermore, the availability of the ICT equipment and ICT adoption was positively and significantly related (β=0.203, p=0.000). This implied that when the availability of the ICT equipment increases by one unit, the ICT adoption will also increase by 0.203 units holding other factors constant. The results concur with the findings of Hennessy et al. (2010) revealed that the availability of electricity and the availing of ICT structures were positively and significantly correlated. Further, Afshari et al. (2010) indicated that the main factors that influenced the principals' adoption of ICT in the management and administration of schools were the availability of ICT infrastructure.

Complexity and ICT adoption

The study established that the mean score of the survey questions relating to the complexity was 3.93, with a standard deviation of 1.06. In essence, the result pointed out a strong link between complexity of software and hardware and consequently the need to review the complexity of the software and hardware before making the purchases. Likewise, correlation results showed that there was a negative and significant association between complexity and ICT Adoption (r=-0.523, p=0.000). Moreover, regression results indicated that complexity was negatively and significantly related to ICT adoption (β=-0.323, p=0.015). This implied that a unitary increase in the technology system's complexity leads to a decrease in the ICT adoption by the real estate firms in Nairobi County by 0.323 units holding other factors constant.

The results concur with the findings of Modimogale and Kroeze (2011) that reported a major obstacle to adoption of ICT among medium enterprises included a lack of necessary skills and knowledge about the strategic use of ICT. Golding et al (2008)also revealed that factors that increase the adoption of ICT to firms include relative advantage, complexity, compatibility, trialability observability, and managerial characteristics such as age and attitude.

ICT user skills and ICT adoption

The study results further established that response on questions relating to ICT user skills had a mean score of 4.08, with a standard deviation of 1.05. This showed that training is one factor that needs to be given priority in the institutions prior to introducing new technology. Training increases the skills and understanding in matters to do with the adoption of the technology. These skills are needed to efficiently use the elementary functions of information and communication technologies to retrieve, assess, store, produce, present, communicate and participate in collaborative networks through the internet.

Moreover, correlation results showed that user skills and ICT adoption were positively and significantly associated (r=0.724, p=0.000). Similarly, regression results showed that user skills and ICT adoption were positively and significantly related (β=.323, p=0.000). This implied that one unit's improvement in user skills will lead to an increase in the ICT adoption within the real estate firms in Nairobi County by 0.724 units holding other factors fixed. The results concur with the findings of Okwuonu (2013) found that user skills influence the ICT adoption among institutions in Nigeria positively in that when those intended to use technology have the necessary skills, it becomes easy for the institution to introduce the anticipated technology with less resistance. Similarly, Apulu et al (2011) established that that lack of ICT user skills and training, cost, inadequate infrastructure, management support, policy and institutional framework are among factors that hinder the utilization of sophisticated ICT effectively in Nigerian SMEs.

Perceived benefits and ICT adoption

On the question of perceived benefits in the adoption of ICT in real estate firms in Kenya, the results were averages mean score of 3.86, with a standard deviation of 1.09. This implied that when the perceived benefits seem to be high; companies are motivated to introduce the technology. In contrast, when the benefits seem insignificant, companies may not be willing

to advance their organizations' technology. Therefore, companies need to evaluate the benefits expected from introducing a particular technology before the initiation process.

Likewise, correlation results showed a positive and significant association between perceived benefits and adoption of the ICT (r=0.769, p=0.000). Furthermore, it regression results established that ICT's perceived benefits were positively and significantly related to ICT adoption (β=0.399, p=0.000). The findings implied that when the perceived benefits of ICT are increased by one unit by holding the other factors constant, the ICT adoption will also increase by 0.399 units. The results are in agreement with the findings of Eldred et al. (2011) revealed that the usefulness of the technology is essential and should be critically evaluated before purchasing. In addition, Asogwa (2011) reported that the importance of the technology is given a priority before coming to a consensus of introducing to the departments.

Availability of ICT equipment and ICT adoption

In looking at the role of availability of ICT equipment on adoption of ICT by real estate firms in Kenya, the study results had an average mean score of t 4.02 and a standard deviation of 1.01. This illustrated that introduction of technology is essential and broadens the investment opportunities. The availability of effective ICT equipment enhances the easy adoption of modern technology. Thus, real estate firms need to emphasize the ICT equipment within their institutions to strengthen ICT adoption and expand their performance.

Besides, the correlation results indicated that availability of ICT equipment and the adoption of ICT were positively and significantly associated (r=0.554, p=0.000). Furthermore, regression results revealed the availability of the ICT equipment and ICT adoption was positively and significantly related (β=0.203, p=0.001). This implied that when the availability of the ICT equipment increases by one unit, the ICT adoption will also increase by 0.446, holding the other factors constant. The results concur with the findings of Olayemi and Omatayo (2012), who revealed that the availability of ICT equipment was an important factor that influenced the effectiveness of ICT adoption in the school. Further, Hennessy et al. (2010) established that the availability of electricity and the availing of ICT structures were positively and significantly correlated.

CONCLUSION

Based on the study results, the four factors that is; user skills, complexity, availability of ICT equipment and perceived benefits all have strong linkages with ICT adoption and contribute significantly to the technology adoption. This clearly points to the need for enhanced skills and/or capacity of ICT staff. This is because staff with ICT skills will enhance adoption and use of ICT equipment. In addition, the issue of complexity would need to be addressed at two levels – building capacity of staff and acquiring user friendly equipment. It is clear that real estate firms will need to undertake capacity needs assessment, developing capacity building programs and train staff based on the identified needs. In addition, the study established that adoption of ICT led to enhanced customer service, reduction in costs and efficiency and consequently enhanced profitability of the firms.

Lastly, based on the correlation analysis, the study concluded that the availability of ICT equipment and the adoption of ICT were positively and significantly associated. Furthermore, the regression analysis showed that the availability of the ICT equipment and ICT adoption was positively and significantly related. In summary, the study concluded that online listing had enhanced communication between home buyers and home sellers; led to increased investments real estate firms; contributed to improved quality of real estate development and made the sector more competitive. In the end adoption of ICT by real estate firms has the potential to improve efficiency and profitability levels of real estate firms and therefore the need to support its adoption.

RECOMMENDATIONS

Based on the findings, the study recommended that real estate firms should be encouraged to employ qualified ICT professionals with experience and skills to handle both hardware and software compatibility within the firms. The ICT professional should provide targeted training to staff within the real estate firms and help the firms improve their visibility; customer service delivery, and communication with the clients using ICT. It is

further recommended that a similar study covering other parts of the country should be undertaken. The results will help with generalization of the study as it will be a reflection of the country.

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