EFFECT OF TECHNOLOGICAL INNOVATIONS ON PERFORMANCE OF REAL ESTATE FIRMS IN KENYA: THE CASE OF REAL ESTATE IN NAIROBI COUNTY

BY

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UNITED STATES INTERNATIONAL UNIVERSITY - AFRICA

SUMMER 2019
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A Research Project Report Submitted to the School of Business in Partial Fulfilment of the Requirement for the Degree of Master of Business Administration (MBA)

UNITED STATES INTERNATIONAL UNIVERSITY - AFRICA

SUMMER 2019
STUDENT’S DECLARATION

I, the undersigned, declare that this is my original work and has not been submitted to any other college, institution or university other than the United States International University for academic credit.

Signed: ______________________  Date: _________________
George Kamau
654978

This project has been presented for examination with my approval as the appointed supervisor.

Signed: ______________________  Date: _________________
Dr. Joyce Ndegwa

Signed: ______________________  Date: _________________
Dean, Chandaria Business School
ABSTRACT

The general objective of this study was to determine the effect of technological innovations on performance of Real Estate firms in Nairobi County. The components of technological innovations are; internet innovation, building technology and operational integration. The specific objectives were to: determine how internet innovation affect performance of Real estate firms in Nairobi County; to assess how building technology affect performance of Real estate firms in Nairobi County and how operational integration affect performance of Real estate firms in Nairobi County.

To achieve the objectives, the study utilized a descriptive research design and a target population of 150 employees from different Real Estate firms. Probability sampling approach was utilized to determine the size of the sample. The sample size was found to be 109 employees; who worked for IT, Finance and Operations departments of Real Estate firms. Primary type of data was collected using questionnaires that were self-administered. Data was analysed using quantitative and qualitative forms of research. Quantitative method involved the use of descriptive statistics which included percentages, frequencies, mean and standard deviation while qualitative methods utilized content analysis. Regression analysis and correlation analysis were both used to establish existing relationships between technological innovations and performance of Real Estate Firms.

The study outcome revealed operational integration had the highest mean of 4.060 higher than its grand mean of 3.997, which means that operational integration had a significant on the performance of Real Estate Firms. The correlation findings of operational integration and performance equally recorded a strong positive correlation of R=0.841, which was higher than the other two variables. This meant that operational integration had the highest impact on performance. The coefficient for determination for operation integration was 69.7% and the significance value was 0.000 which is less than 0.05 which showed that there was a significance contribution to performance.

The outcome further revealed that internet innovation had a mean of 4.011 which was higher than its grand mean of 3.996. This means that internet innovation had a significant impact on performance. The correlation finding for internet innovation was R=0.658 which was second to the R value for operational integration meaning that it had the second highest impact on performance. The coefficient for determination for internet innovation was
69.7% and had the ANOVA analysis was 0.000 which is less than 0.05 showing that internet innovation had a significant contribution to performance.

The study also showed that building technology had a mean of 3.93 higher than its grand mean of 3.817 which included the various sub-variables under building technology. This showed that there was a significant impact of building technology on performance of Real Estate firms. R=0.594 was the correlation coefficient for building technology which was moderately strong. Building technology therefore had the least impact on performance. The coefficient for determination for building technology was 48.9%. The p-value from the ANOVA analysis was less than 0.05 (0.0000) which meant that building technology had a significant impact on performance.

The study concluded that operational integration was used significantly as a key contributor towards performance of Real Estate firms followed by internet innovation, and building technology. Additionally, it was found out that social media marketing had the highest determination for coefficient followed by operational integration and building technology. This means that those Real Estate firms that had a good combination of the three in the order of their level of significance had a better performance level. Internet innovations specifically social media marketing was noted to be highly important for any real estate firm that wanted to grow in terms of performance; Operational integration and most especially internal process integration was seen to have a huge impact on performance and Real Estate firms needed to engage more in improving their processes and building technology, most especially adoption of new and better construction technology techniques.

The study recommended that Real Estate companies should align their marketing strategies to social media. Social media should be structure in a manner that target markets in social media platforms including direct marketing in all their business segments. There is need for Real Estate firms to continuously invest in training and development programs to ensure employees knowledgeable and up-to-date on technological innovations in the Real Estate industry. Resources should be allocated to research and development to develop more innovative solutions for evolving needs of the customers. The researcher recommended that other industries should also do a replica of the study so as to find out what drives performance. Future researchers could also grow on the topic of technological innovation by researching on how it affects the competitive advantage of Real Estate firms.
ACKNOWLEDGEMENT

This research project could not have been a reality without the invaluable input of a number of individuals whom I sincerely wish to recognize. Firstly, I would like to thank God the Almighty for good health. Special appreciation goes to my supervisor, Dr. Joyce Ndegwa for her guidance and advice throughout the project.
DEDICATION

The project is dedicated to my parents for their love, support and emphasis to further my education. I also dedicate it to my friends and mentors for their continued encouragement and support in the accomplishment of these research works. Finally, to the Lord almighty for helping me through the course without major challenges.
TABLE OF CONTENTS

STUDENT'S DECLARATION ................................................................................. ii
COPYRIGHT ........................................................................................................ iii
ABSTRACT .......................................................................................................... iv
ACKNOWLEDGEMENT ......................................................................................... vi
DEDICATION .......................................................................................................... vii
TABLE OF CONTENTS ....................................................................................... viii
LIST OF TABLES .................................................................................................. x
LIST OF FIGURES ............................................................................................... xi
ABBREVIATIONS AND ACRONYMS .................................................................... xii

CHAPTER ONE .................................................................................................. 1

1.0 INTRODUCTION ........................................................................................... 1

1.1 Background of the Study .............................................................................. 1
1.2 Statement of the Problem ............................................................................. 5
1.3 General Objective of the Study .................................................................... 7
1.4 Objectives of the Study ................................................................................ 7
1.5 Significance of the Study .............................................................................. 7
1.6 Scope of the Study ....................................................................................... 8
1.7 Definition of Terms ..................................................................................... 8
1.8 Chapter Summary ........................................................................................ 9

CHAPTER TWO .................................................................................................. 10

2.0 LITERATURE REVIEW ............................................................................... 10

2.1 Introduction ................................................................................................ 10
2.2 Internet Innovation .................................................................................... 10
2.3 Operational Integration ............................................................................. 15
2.4 Building Technology .................................................................................. 19
2.5 Chapter Summary ...................................................................................... 24
LIST OF TABLES

Table 3.1 Target Population ........................................................................................................... 26
Table 3.2 Sample Size ....................................................................................................................... 27
Table 4.1 The Response Rate ........................................................................................................... 30
Table 4.2: Effect of Internet Innovation and Performance ................................................................. 34
Table 4.3: Tests of Normality ............................................................................................................ 35
Table 4.4: Correlation Analysis of Internet Innovation and Performance ......................................... 35
Table 4.5: Model Summary of Internet Innovation and Performance ............................................... 36
Table 4.6: Analysis of Variance of Internet Innovation and Performance ......................................... 36
Table 4.7: Coefficients of Internet Innovation and Performance ....................................................... 37
Table 4.8: Effect of Operational Integration and Performance of Real Estate firms ....................... 39
Table 4.9: Normality Tests ................................................................................................................. 40
Table 4.10: Correlation Analysis: Operational Integration and Performance ................................. 41
Table 4.11: Model Summary of the regression analysis between Operational Integration and Performance ........................................................................................................... 41
Table 4.12: Analysis of Variance of Operational Integration and Performance ............................... 41
Table 4.13: Coefficients of Operational Integration and Performance .............................................. 42
Table 4.14: Building Technology and Performance of Real Estate firms ......................................... 44
Table 4.15: Tests of Normality .......................................................................................................... 45
Table 4.16: Correlation Analysis: Building Technology and Performance ........................................ 45
Table 4.17: Model Summary of Regression Analysis between building technology and performance ........................................................................................................... 45
Table 4.18: Analysis of Variance between building technology and performance ............................. 46
Table 4.19: Coefficients of building technology variables and performance .................................... 47
LIST OF FIGURES

Figure 4.1: Respondents’ gender ................................................................. 31
Figure 4.2: Duration of Service ................................................................. 31
Figure 4.3: Education Level ................................................................. 32
Figure 4.4: Duration of Service in the Current Position ......................... 33
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GPS</td>
<td>Global Positioning System</td>
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<td>QR</td>
<td>Quick Response</td>
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<td>RFID</td>
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<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
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CHAPTER ONE

1.0 Introduction

1.1 Background of the Study

This chapter outlined the background of the study which basically talked about the motivation for the research. The problem statement was also outlined; the purpose of the study and research objectives were also outline on this chapter. The justification for this study was also included; the scope of the study, the definition of the various terms used and a chapter summary also included on this chapter.

The environment where firms do business is characterized by uncertainties and risks that forces firms to devise coping strategies for survival. Unlike the past, the current business environment is changing rapidly and this is forcing firms to embrace technological innovation to satisfy customer needs and enhance industry’s competition position (Cegarra-Navarro, Reverte and Wensley, 2016). Bigliardi (2013) indicates that technological innovation is successful implementation of creative ideas in the organisation. Rekik (2015) defines technological innovation as a process of developing opportunities into fresh ideas and applying them into widely used practice. Dhar and Sundararajan (2017) explain technological innovation as a process which entails technical, design, manufacturing as well as managing and commercial activities that are involved in marketing of a new or improved product. Ameme and Wikero (2016) argue that innovations do not necessarily have to be a breakthrough or a paradigm shift.

Dotzel, Shankar and Berry (2013) contend that overall management of technological innovations entails organising and directing human and capital resources in generating new knowledge and ideas aimed at developing ;new and improved products, processes of manufacturing and services, ideas into working samples and transferring them into manufacturing, distribution and use. Technological innovations are regarded as an importance source of sustainable advantage in an environment that is changing increasingly, because it contributes to product and process improvements, technological innovations makes continuous advances in enabling firms to survive and allowing them to grow quickly and efficiently to become profitable than non-innovators (Rekik, 2015). Fast pace of development across the world, technological advances and globalizations are forcing firms to invest on innovations to meet the growing need of customers (Przychodzen and Przychodzen, 2015). Thus, companies are making efforts to improve their products and
services or even introduce new products or even new services to meet increasing customer needs in this dynamic environment. These changes and differences in products, services and processes are critical for gaining competitive advantage and survival. As such, companies must adopt innovations so as to continuously meet the needs of the customers (Onal, 2011; Erdoğan, 2011).

Technological innovation is regarded as one of the key element of long-term success of the company. Hence, technological innovations play a critical role in sustaining the operations of the firm (Cortez and Pravini, 2015). The strategic importance of technological innovations has been accentuated in a complex context of successful technological revolutions that resulted to competition between firms in all sectors (Rekik, 2015). This is because, over the last decade; severe global competition, demanding markets and swift technological changes, technological innovation has become a key ingredient for firms’ survival to firms in all sectors. In particular, it has been broadly acknowledged that innovations impacts on organisational performance (Bigliardi, 2013). Performance can be defined as the ability of an organisation to make maximum utilization of its available resources such as knowledge and people to realize corporate goals and objectives (Neely, Adams and Kennerley, 2002). Organisations around the world are facing a hard time in developing cost-effective measures that can drive performance improvement without affecting performance negatively (Neely, 2005). A clear performance measurement allows managers to focus on key aspects of the organisation and move in the right direction. The most quoted performance definition is by Neely et al., (2002, p.13) who defines “performance measurement as the process of basically quantifying efficiency and effectiveness of past actions”.

Performance measurement can broadly be classified into financial and non-financial measures. Chatzoudes and Chatzoglou (2011) contend that performance measurement has evolved from purely financial performance measures such as return on assets, return on investment and return on capital employed. Non-financial measures include the following but not limited to; cost reduction, customer satisfaction, flexibility, quality, value addition and efficiency. This aspect of organisational performance enhances flexibility. Rojas (2011) argue that firms invest on technological innovations to reduce cost, improve efficiency and meet customer needs. Balanced Score Card (BSC) is a popular tool used to measure performance. It is used to align the organisation to new strategies to minimize cost and enhance internal firms operations as well as innovation through use of technological
innovations (Bhagwat and Sharma, 2007). To improve performance, firms need to develop innovative solutions because customers are more informed and knowledgeable hence they are keen on products and services that add value.

Firms are investing in technological innovations so as to develop products by collecting customer information and analysis of market patterns. When measuring performance, it is important to first design the right tools then assess whether the firm is achieving its goal or not. Both financial and non-financial measures must be applied when measuring performance even though many firms are reluctant to apply a balanced framework of financial and non-financial indicators (Schiff and Hoffman, 2006). Khan and Iftekhar (2010) did an investigation on the link between technological innovations and performance of real estate industry in Pakistan and the findings showed technological innovations improved performance through improved efficiency and reduced operational costs of real estate firms. In a study conducted in Nigeria, Siew et al. (2011) examined the link between technological innovations and performance of Real Estate sector and the findings established that use of technological innovations contributed positively towards improved performance. Subrahmanya (2011) studied the effect of technological innovations on performance of Real Estate industry and the findings established that use of technological innovations increased sales growth which in turn resulted to overall performance.

De Jonge and Van Der Voordt (2012) explored the link between technological innovations and organisational performance of China’s Real Estate industry and the results established that through technological innovations real estate companies were able to build sufficient capacity to accommodate the customer needs. This led to improved customer satisfaction resulting to improved performance of Real Estate firms. Letangule and Letting (2012) examined the impact of ICT integration on performance of Real Estate firms in Kenya. From the study, ICT integration was found to boost efficiency and minimize operational costs leading to improved performance. Silva and Yapa (2014) did an investigation on the relationship between technological innovations and performance of Sri Lank Real Estate sector and the findings established that use of technological innovations significantly minimized operational costs leading to improved performance. Oguko and Ragui (2014) studied the impact of process innovation on performance of Real Estate firms in Kenya and the findings established that process innovation was significantly related to performance. The findings further established that process innovation significantly reduced communication costs. Kyei, Thomas and Bayo (2017) did an investigation on the link
between technological innovations and performance of Ghanaian Real Estate firms and the results depicted that there was a significant association between technological innovations and performance.

The findings further established that use of technological innovations lowered marketing and communication costs of Real Estate firms. It also improved efficiency and processing speed and this improved overall productivity of Real Estate firms. Njoroge, Muathe and Bula (2016) explored the factors affecting performance of Real Estate firms in Kenya, and the findings revealed that the main challenges included inadequate finances to invest in innovation and research and development. Ngugi and Mutai (2014) explored the effectiveness of market innovation on performance of real estate firms in Kenya and the results showed that market innovation contributed positively to sales growth and significant reduction in marketing costs. Mathenge (2013) tested the link between information technology and performance of real estate firm in Kenya and the results established that information technology; reduced operational costs and improved processing speed and this impacted positively on organizational performance and the firm’s competitive advantage.

Today, the sector is embracing the digital world together with the benefits associated with it. There are notable trends and innovations experienced in the Real Estate industry. With the progress of technology annually, the Real Estate industry no longer relies on its traditional practices to meet or promote the expectations of new customers. As they relocate their operations to the digital world, players in the Real Estate sector expand their opportunities and at the same time manage to reach a broad audience through the use of the internet thus reaching markets that are far beyond their areas of operations (Appel-Meulenbroek, Kemperman and Vosters, 2018). Additionally, 71% of the Millennials have an interest in property acquisition and Real Estate agents should adapt to this growing customer base. Of all the generations, Millennials possess the highest consumer expectations, which extend just purchasing a property. They want adequate information as to whether the place they would settle down has other possibilities and amenities like walking areas, employment opportunities, shopping areas, and food provisions. It is for such reasons that agents must use big data so as to provide personalized offers on the basis of the customers’ preferences and offer detailed descriptions alongside developments in future areas (Pfeiffer and Pearthree, 2017). Increase in customer base and increased investor appetite has made a significant contribution to the continuous expansion of the Kenyan Real Estate industry. As this continues to happen, any Real Estate firm that wants
to maintain a competitive edge must embrace the change. No player in the Real Estate industry can ignore the shift towards Real Estate technology and survive.

As the sector continues to evolve, players must fight by providing solutions like renewable energy together with smart homes that extend the services and products provided by Real Estate in the quest to ensure customer loyalty (Ilondanga, 2018). With innovation and technology continuously shaping the Real Estate industry, emerging Real Estate tech firms are creating an opportunity that may help them to become leaders in the new Real Estate ecosystem characterized by digitalization. Although it is not a single technology that will replace Real Estate agents, Peter Williams, CEO Deloitte Digital claims that technology will influence changes in the sector and it is leaders who will embrace the technology that will be successful. Acquisition of hardware will not offer a solution; rather, it is the adoption of innovative solutions that will basically comprise of software, platforms, and applications that will serve as the solution. Slowly, shifts in consumer behaviors and the ever-changing market conditions are slowly redefining the Real Estate tech sector. This is not an indication that the Real Estate agents will be replaced by technology; rather, they will be replaced by agents with technology. As such, a single technological solution is inadequate to replace the Real Estate industry, but technology and its consequent embracement by leaders will lead to changes in the industry. Acquiring hardware will thus not serve as the solution because the solution rests in adopting innovative solutions that mostly will be software solutions, platforms, and applications. With the growth of investor appetite and customer base, the Real Estate industry in Kenya continues to expand. As this happens, change is inevitable for any Real Estate firm that intends to remain competitive. It is impossible to ignore the shift toward Real Estate technology. As evolution in the industry continues, individual firms will fight towards becoming undisputed leaders by providing solutions like smart homes and renewable energy that go beyond the Real Estate services and products so as to maintain a tight grip on the loyalty of consumers. With technology and innovation continually shaping the Real Estate sector, emerging Real Estate firms are creating an opportunity that will help them become leaders in the digital Real Estate industry (Roberti, 2015).

1.2 Statement of the Problem

Firms have been forced to invest in modern technologies and innovate to improve efficiency on how they do business, this involves use of integrated approach to systems and
processes that mitigate costs and enhance information sharing. Pulles and Schiele (2016) opine technological innovations involve developing superior products or services that can address customer needs efficiently while exploring the needs of untapped market segments to boost their level of satisfaction.

Ettlie and Rosenthal (2014) indicate that technological innovations is important for meeting diverse customer needs and competitiveness which results to improved performance. Nemati, Khan and Moazzan (2010) explored the link between technological innovation and performance of mobile phones in Pakistan and the findings established that technological innovations was significantly linked to performance. Folarin and Zubair (2015) did an investigation on the effect of technological innovation on performance among Tesco retail outlets in Malaysia and the findings showed that technology innovation was significantly linked to performance. The findings established that technological innovations of Tesco retail outlets recorded significant cost reductions and improved efficiency. In Africa, Ameme and Wikero (2016) explored the link between technological innovations and performance of commercial banks in Ghana and the findings established that use of technological innovations by commercial banks improved efficiency, convenience and cost savings. The results further revealed that continuous investment in technological innovations by commercial banks led to improved customer satisfaction and performance. Oyetunji, Ojo and Oyetunji-Olakunni (2018) examined the factors influencing development of ICT in Nigerian Real Estate practice and the findings established that technological infrastructure, efficiency in service delivery and productivity branding enhanced the use of ICTs in Lagos’ Real Estate industry. Olu (2018) tested the adoption of ICT in the Real Estate sector in Malawi and the findings revealed that building technology and electronic marketing significantly reduced construction and operational costs as well as marketing costs. In Kenya, Kanake (2017) examined influence of ICT technologies in Real Estate development in Kenya and the findings established that use of technology in real sector in Kenya improved the speed of construction, lowered labour costs, minimized defects and wastes and improved health and safety.

Wainaina (2014) studied the application of IT in Real Estate firms in Kenya and the findings established that the adoption of ICT by Real Estate firms had a significant impact on their operations by enhancing the quality of service delivery to customers and quality of construction design features. Kubuta (2014) explored the relationship between competitive advantage and performance of Real Estate firms in Nairobi Kenya and the findings
established that technological innovations played a significant role in enhancing the firms’ competitive advantage. Memia (2014) delved the effect of technological innovations on performance of commercial banks in Kenya and the findings showed established a positive relationship between technological innovations and performance.

Chomba (2013) researched on innovation strategies and growth of Real Estate Developers in Nairobi County and the findings established that innovation strategies: product and process were significantly related to growth of Real Estate developers in Nairobi County. Some studies on technological innovations were restricted to the banking industry, service and retail industries. Studies done in the context of Real Estate industry in Kenya did not zero in on the effect of technological innovations on performance of Real Estate firms. Instead, most of the studies focused on innovation strategies, competitive advantage and ICT adoption.

1.3 General Objective

The general objective of this study was to determine the effect of technological innovations on performance of Real Estate firms in Kenya.

1.4 Specific Objectives

The objectives of the study were to:-

1.4.1 Determine how internet innovation affects performance of Real Estate firms in Nairobi County

1.4.2 Determine how operational integration affects performance of Real Estate firms in Nairobi County

1.4.3 Determine how building technology affects performance of Real Estate firms in Nairobi County

1.5 Significance of the Study

1.5.1 Government and Policy Makers

The research is of value to the Government of Kenya especially in setting of policies and regulation of Real Estate industry. The study explores the main technological innovations that are useful and applicable to Real Estate in Kenya through policies that promote use of
technological innovations to boost performance of Real Estate companies by embracing modern practices.

1.5.2 Other Firms

Other players in the Real Estate industry will learn the various technological innovations employed by Real Estate firms and some of their best practices. Thus, other players such as Real Estate agents and construction companies might engage in partnerships with Real Estate companies and devise more innovative techniques for managing Real Estate companies.

1.5.3 Scholars and Academia

The study will make a significant contribution impact on technological innovations on performance of Real Estate in Nairobi County. The study further gives insights on the various contributions of technological innovations and their impact on efficiency and reduction of cost of Real Estate companies. Empirical findings obtained in this study can be utilized as a basis for further research.

1.6 Scope of the Study

The study is seeks to determine the effect of technological innovation on performance of Real Estate companies in Nairobi County. Specifically, the research seeks to assess the effect of internet innovations, operational integration and building technology on performance of Real Estate companies in Nairobi County. The study is targeting employees working for Real Estate companies in Nairobi County. Questionnaires will be used to collect primary data; the study will be conducted between January, 2019 and June 2019.

1.7 Definition of Terms

1.7.1 Internet Innovations: According to Wang (2015), internet innovations in the Real Estate refers to internet-enabled devices that has helped to make players in the Real Estate are more mobile and equally more connected than ever before, which means that agencies can operate at any place.

1.7.2 Performance: Performance is defined as meeting cost and time objectives while adhering to the products specifications. The key indicators of project performance include time, cost and quality (Muczyński, 2015).
1.7.3 Building Technology: Building technology relates to the use of technology as an asset for construction projects, which is commonly referred to as PropTech (Martin and Perry, 2019).

1.7.4 Operational Integration: According to Shanaka and Maier (2015), operational integration involves incorporating systems and processes to minimize costs and enhance efficiency of real estate firms. This results into improved customer satisfaction and competitive ability.

1.8 Chapter Summary
The chapter discussed the following subsections: background to the study; demonstrating how independent variables affect the dependent variable, problem statement, purpose of the study, research questions, importance of the study, scope of the study and definition of terms. Chapter two covered a conceptual and empirical discussion of the literature review in line with the research objective. The literature further discussed the various types of technological innovations in the Real Estate industry (internet innovations, building technology innovations and operational innovations) which formed part of the independent variables that influenced performance of Real Estate firms. Chapter three primarily described the research design together with the methodology that the researcher adopted to ascertain the effect of technological innovations on performance of Real Estate firms in Nairobi County. Chapter four covered data analysis, interpretation and discussion of findings while Chapter five provided a comprehensive summary of findings, conclusion, recommendations as well as areas for further research.
CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This section provides the conceptual discussion of various technological innovations used by Real Estate firms and their impact on performance. Specifically, the chapter focuses on internet innovation, building technology and operational integration as used by Real Estate firms to minimize operational cost, efficiency and customer satisfaction. The chapter also covers summary of the literature review.

2.2 Internet Innovation

2.2.1 Social Media Marketing

Social media marketing serves as a powerful way for organizations irrespective of their industry of operations to reach customers and prospects (Sheth, 2018). Just in the past few years, the Real Estate sector was very different from what it is today. In the past like one and a half decades, agents used to maintain physical offices in a suburb and it is this where homes were sold. A significant amount of valuable time was spent in property lists of homes for ‘rentals’ and ‘for sale’ as well as updating the window display in the quest to entertain passersby who stared at the information in the course of their daily routines. The office location played a critical role in an agency’s success. However, following the introduction of the internet, it has caused the extinction of these techniques that were once successful.

Today, web sites serve as the new brochure, the new business card, and the new office window. The Real Estate agencies that failed to adapt to the internet promptly no longer exist as the industry was sorted by a natural selection. Most Real Estate firms that were successful for years shut their operations, while their counterparts who adapted to the changes in the market flourished. In the modern Real Estate market, having an office shop front is no longer important as what is essential is a strong online presence. According to Rebitzer et al. (2016), today, around 92 per cent of buyers rely on the internet as the primary search tool to make purchasing decisions. This serves as a perfect indication that the internet has taken over the Real Estate industry and these changes are not to stop anytime soon. With the current market coupled with technological devices and platforms such as iPads, smartphones, YouTube, Facebook, Twitter, and QR codes, it signifies that Real Estate companies’ websites, as well as agents, must stay at the forefront of technology. For instance, Settler (2016) attributes the top three web sites in Australia (realestate.com.au,
domain.com.au and mcgrath.com.au) to have made it simple for buyers to search for properties with minimal effort.

These new searching ways have had a major impact on the marketing campaigns in the Real Estate sector. Currently, the need for the right copy, correct pricing, and brilliant photos have proved more crucial than it was in the past. In the case of wrong marketing in the initial weeks of the campaign can lead to a significant reduction of the end price (Aytekin and Keskin, 2017). To get the top dollar, Real Estate companies must thus select the right agents. Coincidentally, the internet has equally enhanced the process of finding the best Real Estate agent. Successful agents possess various platforms such as YouTube channels, Facebook pages, LinkedIn accounts, Twitter accounts, together with a blog, and or a website to inform the world about their successes and talents. These sites serve as great portals where clients and organizations use to choose the best agent. Before making a decision regarding the agent to work with, one may learn a lot about the agent through the internet or by following them on social media platforms (Vinson, 2019). Reviews in these platforms are scarily honest as opposed to the testimonials presented by individual agents thus making the web site the only way to get a true agent. If an agent has minimal information available online, then there is a high probability that the agent is not successful and thus such a choice is risky. With continuous technological development, there is a possibility that there will emerge cooler and essential tools that will have an impact in the Real Estate sector. It is the companies and agents that embrace these emerging tools that will remain competitive and manage to overcome the challenges of the ever-changing Real Estate world.

2.2.2 Use of Mobile Devices

The Real Estate industry has been revolutionized by wireless technology. Through the use of mobile devices, buyers can search for property listings at their convenient time across the globe. As opposed to traditionally where buyers used to make physical visits to Real Estate offices in order to search for available properties, with the use of mobile devices, this is no longer the case as physical visits are only done when essential. This saves on time and costs associated with physical visits while at the same time providing buyers with a variety of properties to choose from a host of agencies. The use of mobile technology in the Real Estate industry is not only beneficial to buyers, but also to agents in that it leads to flexibility while working. Furthermore, wireless technology has opened up a whole new
world of interactive marketing platforms, which comprise of property apps as well as social networking websites. Cellphones serve as one of the most useful tools of mobile technology for realtors in that it allows them to constantly contact prospective customers and vendors. Even in situations where the client is unavailable for direct communication, the realtor has various options to deliver the message such as sending a text message, leaving a voice mail message, or composing an email. Smartphones also provide access to the internet thus eliminating the need of moving with large office computers, have built-in camera/video, and equally enhances accessibility to hundreds of applications that comprise of GPS systems and maps (Patzold, 2017). With these devices, it makes it easy for realtors to work from home or in the field while using iPads with wireless printers or laptops. Most of the modern printers equally possess copying, fax, and scanning capabilities, which helps realtors to perform a lot of tasks using a single device thus saving on office space.

Real Estate professionals use hand-held devices for various purposes such as recording verbal notes regarding prospective property listing and storing video footage and photographs, which can then be transmitted to clients or the office through email. There is also appointment-planning software, which helps Real Estate professionals in time management and they as a result are on time for a meeting. Vinson (2019) claims that some organizations like Drive Buy Technologies and Cell Trust have come up with software systems that are specifically designed for use by realtors. These systems provide mobile marketing platforms that an entire sales team can use and they equally conform to match the existing branding of the Real Estate Company.

They also ensure that text and image transmissions are secured making it possible for contracts to be sent and signed electronically. Real Estate Information Systems (2018) (rismedia.com) asserts that close to 60 per cent of houses in the United States are bought by persons aged between the ages of 28 to 45 years. This age group mostly expect to access information instantly. Through the use of mobile devices, prospective property buyers manage to gain important details about properties and images without having to engage a Real Estate agent. With an internet-enabled mobile device, it is easy to access information. It is equally possible for a prospective buyer to sign up for a subscription with the Real Estate firm, which helps in ensuring that the client receives details of important listings once they are available in the market. In the case where a client wants to make an offer on a property, it is easier for the realtor to contact the vendor and have an immediate response.
Considering the highly competitive nature of the Real Estate sector, it is important for players to stay ahead of the game in order to ensure sustainability.

Players in the Real Estate industry are provided with a significant potential by mobile technologies for marketing their products and services to audiences across the globe through email campaigns and online advertising, which translates to increased brand awareness (Patzold, 2017). It is equally possible for Real Estate agents to establish databases that enable them to target particular properties for selected client groups. With Real Estate agents spending a lot of time out in the field showing or viewing properties, they manage to stay connected by using mobile devices. Especially with the latest models of mobile phones that are internet enabled, it helps agents to stay connected and equally undertake online advertisement faster and efficiently. All parties involved in the Real Estate industry can access the required information at any time of need at any location as far as they have a phone that has the capacity of mobile data. Mobile devices are arguably the most widely adopted of all the new technologies globally. Players in different industries have made efforts to make the most effective use of mobile devices in order to derive the associated benefits and the construction industry is not different (Kim, 2018). According to May et al. (2015), as a result of the associated easy-to-use applications, the devices enable workers in the construction industry to access, view, change, and equally share critical project information while at work.

Today, mobile devices are better adapted to the tough conditions of construction sites thanks to the rugged protectors and devices that are designed to prevent damage from dust and water and industry specifics such as barcode scanners as well as RFID readers that are used in tracking materials and equipment. With mobile devices, it is now easier to send emails from the work-site like in the case example where one is placing orders for materials as opposed to waiting until one gets back to the office, and as a result, saving time and money. It is equally important noting that communication is critical for every job site and mobile devices help managers, supervisors, and other employees to be accessible to each other through effective communication whenever needed thus streamlining operations. There other major benefits that have already been realized as a result of the use of mobile devices in the construction industry. When it comes to the job site, safety is paramount for all. Mobile devices have proved to be beneficial in boosting safety on the site by making it easier for construction managers to track training sessions, report incidents or near misses, and equally ensure compliance with regulations.
Furthermore, through the use of customizable mobile applications that make it easier for constructors to carry out safety inspection checklists together with identifying environmental and health issues (May et al., 2015). It is equally imperative where managers understand what the employees are doing all the time in order to ascertain whether they are on the right track towards realizing organizational or project goals. With mobile devices, it is possible for supervisors to utilize GPRS as well as other features to track workers and the time they spend on the job. The devices can equally be used in tracking inventory to avoid shortage and also in tracking equipment so that delays due to equipment breakdown are avoided (Zhang and Yu, 2011). Owing to the fact that construction managers are required to keep track of a lot of details, it always leads to an increased probability of human error. However, by using a mobile device in places where manual systems were used traditionally, it has helped to make the overall project organized and free from errors. Nowadays, mobile devices used in the construction sector are being transformed from gadgets that are hand-held to sophisticated wearable gears like hard-hats and smart glasses.

These apparatuses, which are attributed to represent the ‘next big thing’, will enable the construction industry to achieve unseen ways of augmenting reality. The tools will equally serve in providing the necessary advances in efficiency and accuracy, which will, as a result, translate to a reduction in construction costs. Hu (2015) claims that some of the devices already adopted by major construction organizations like smart watches, health trackers, and tech-enhanced safety vests have proved beneficial to site managers as they help in scrutinizing movements of workers to increase productivity and enhance safety. While there is no doubt that the use of mobile devices and especially the introduction of mobile applications have served in ensuring better connection between Real Estate firms/agents and potential clients, it has equally improved the efficiency of operations of Real Estate companies. For example, Sittler (2016) asserts that today, hiring contractors for small tasks in the Real Estate industry is 100 per cent enabled by mobile phone devices, with firms like Thumbtack serving as leaders in this trend. Initially, face-to-face conversations were required and this delayed projects especially where the Real Estate firm and the target contractor were in different geographical locations. Even for large-scale projects in the modern Real Estate sector where a word of mouth referrals and a personal touch is required, mobile devices still play a critical role in maintaining such relationships. This serves as an indication that the use of mobile devices has revolutionized the Real
Estate industry with benefits evidence in the form of efficiency and effectiveness, which as a result, translate to cost reduction.

2.3 Operational Integration

2.3.1 Integrated Internal Processes

With the many documents required to be kept on track both internally and externally, Real Estate tends to be a paper-heavy industry. For most firms in the Real Estate sector, they have already implemented electronic document management systems or are in the process. Agents save a significant amount of time where their documents are managed using digitized systems. Most notable systems used are mass-market document-sharing as well as digital collaboration tools such as Google Drive and Dropbox together with specialized management software for handling documents in the Real Estate sector like Rockend’s fileSMART (Nappi-Choulet and Ribeiro, 2018).

It also makes it easy to make financial transactions with cloud-based accounting software as well as online banking tools. These systems help in storing information and also ensuring security when sharing and the software update automatically while also serving in lowering the business accounting costs significantly. In an industry such as the Real Estate, where there are unique requirements, Rockend Company has come up with special accounting software. Just recently, Rockend moved into the cloud by designing the PropertyTree. According to Nappi-Choulet and Ribeiro (2018), there has also been remodeling of processes that surround the contact database as well as accessing or recording customer information with the advancement in technology. It is now possible for agents to take down the details of the potential customer through the use of smartphones, set up automated or regular messaging advising customers of new properties in the market as well as sending customers a text when their lease application or price has been approved.

With the numerous paperwork required in the traditional Real Estate firms management to ensure effectiveness of operations, it meant that space and the number of employees a firm had were critical. According to Pfeiffer and Pearthree (2017), by space, it refers to the physical resources that a Real Estate firm has, which comprise of structures that house the employees and other human resource personnel together with equipment and furniture in those structures. Owing to a lot of paperwork associated with the traditional Real Estate industry operations, the layout of a particular company was crucial in ensuring that all the
respective individuals and groups have the required areas ad facilities. Manual storage of files was equally associated with high risk of loss or displacement.

However, with the adoption of electronic document management systems by Real Estate firms today, the large office space and the number of employees required to carry out the manual paper work has reduced significantly. For instance, with the introduction of cloud technology, Real Estate firms today manage to save important data safely and a backup stored in a different location as opposed to being within a company’s premises. Real Estate agents can equally carry out most of their operations off-the office. While implementation of the electronic systems is associated with an initial high cost, it is beneficial in the long-run as it has proved effective in eliminating some forms of recurrent expenditure. Additionally, proof of payment is currently secured through the use of electronic systems, which is beneficial to all players in the Real Estate industry (Chan and Fang, 2017). With an integrated internal process due to the electronic systems and applications in place, Real Estate companies have improved on their efficiency and effectiveness of service, which contributes towards ensuring sustainability.

2.3.2 Improved Communication

The Real Estate industry involves people and thus communication is critical and with innovations in technology, it has improved opportunity for greater communication between clients and agencies. Initially, agents spent precious time engaging in face-to-face meetings with clients or playing phone tag, but this has now been replaced by emails or online contact forms as their first port of call as well as the primary form of communication (Nakajo et al., 2014). As a result, customers are finding it comfortable to access information regarding specific Real Estate offices, listings, and contact information of specific agents. Online listings have equally helped in streamlining the process of communication.

Most Real Estate firms have made use of remote network models with major success. This has led to reduction in the amount of office required to accommodate employees and is changing the dynamics of what is regarded as an idea location. With effective communication enhanced by various technological innovations, it means that clients no longer require making physical visits to Real Estate companies’ physical locations to make enquiries about the available listings. Prior to these innovations, the physical location of a Real Estate firm played a critical role in determining its success and competitiveness as it
had to be located in an area deemed ideal. Such locations comprised of notable buildings or avenues in urban areas, which were extremely expensive.

Although Real Estate organizations are still located in urban centers, no much effort is directed at the physical location as through effective communication, it is easier for potential clients to locate the office with ease. In addition to reducing the amount of office space that Real Estate organizations require as well as re-imagining the manner the space is used, technological innovations are equally bringing down the barriers between Real Estate owners and potential clients. For instance, mobile and social media platforms have led to cost-effective as well as real-time communication about property information, signifying that many leasing activities are taking place online. This makes it easier for potential clients to have the necessary information about the properties and agents they are interested in before making the actual decision of interacting with the agent. Again, clarification is sought between the agent and the potential customer and the agent before full commitment to the detailed process of buying or renting a property.

Where there is effective communication coupled with great imagery about a listing, potential buyers do not require contacting agencies to question about initial issues about the property, and most probably, the first contact will likely be about arranging for a viewing (Hügel, 2017). Customers are presented with an opportunity of conducting their personal research about a property of interest. Additionally, agents have an opportunity of steering customers in the right direction based on their knowledge of the local market, as well as specific property with the innovations in communication enabling to pass on further information and consequently close the sale. Irrespective of the innovations in communication it has never been easy to make peer-to-peer deals without having middlemen in place. According to Hugel (2017), this serves as a major threat to the Real Estate sector and most firms are reacting instinctively by making efforts to limit the amount of information shared about their listings and also looking for ways of disrupting the peer-to-peer process. The best idea is focusing on the service provided and adding value to the clients’ lives so that even if an agent makes a peer-to-peer sale, customers would still choose to make the trade through the agent’s firm. Improved communication is slowly changing the traditional role of brokers towards making them advisors, and the change is associated with reduced costs of properties and thus a wider market as most buyer will now have purchasing ability.
2.3.3 Sharing of Information

The new technology together with digital advancements does not only enable the agencies to remain in contact with customers and colleagues through the use of tablets and smartphones, but it also helps them to present information to potential clients or tenants in a new, innovative manner. Most digital clients are leaning towards video content as evidenced by a study conducted by Chan and Fang (2017) where the findings revealed that more than 55 per cent of Australians together with 73 per cent of those aged between 16 and 24 years choose to view video content as opposed to regular broadcast television. It is possible to utilize visual walk-throughs of properties on property listings effectively, which adds an extra element to the portfolio. Furthermore, there is increased use of video advertising, especially the use of social media platforms such as Facebook and YouTube, where consumers are presented with an opportunity of hitting play (Hugel, 2017). Embracing the new technologies can present agencies with an advantage over their competitors and at the same time help listings stand out to customers. Therefore, technology has revolutionized the manner agencies and their customers in the Real Estate can operate and communicate. For agencies that enjoy embracing the new technologies as well as incorporating various processes in their workflows have the chance of impressing clients and also tend to be a step or two ahead of fellow competitors.

Improvement in exchange of information in the Real Estate industry is beneficial for both the companies/owners and the clients. To the owners/agents, they are no longer required to make significant investments in marketing campaigns such as advertising using popular traditional popular mainstream media such as television, magazines, and newspapers among others, which are expensive, adding to the overall cost of a property. Such additional costs are transferred to the final customer and discourage purchasing. With the introduction of social media platforms, Real Estate organizations do not use them in informing potential customers about their products and services, but have also turned these platforms into full-time customer service platforms (Aytekin and Demirli, 2017). Through the platforms, clients are taken through everything related to the properties or services they may intend to know with a minimal cost. Other than the exchange of information between clients and Real Estate agents, these technologies have equally improved exchange of information between customers, which leads to informed decisions prior to making actual decision of purchasing or renting a property.
For example, through social media platforms such as Facebook and Twitter, potential, new, and existing customers exchange information about properties and expectations as well as trends in the market. This is unlike in the past where information sharing happened among a few parties thus denying others crucial insights about the industry. Today, customers can easily share information among themselves without involving Real Estate agents in their discussions and this limits the possibility of exploitation by middlemen. Exchange of information is further facilitated by technologies such as virtual reality (VR) as well as augmented reality (AR), which enable prospective customers to digitally tour pre-development or already completed units at any location across the globe (Kim, 2015). In the traditional Real Estate market, it is impossible for a client to visualize a property for rent or sale irrespective of the depictions in the brochure unless a physical visit to the location of the property is conducted. Physical visits are associated with longer sale-times and at the same time limit the ability of pre-selling properties. With AR and VR, prospective clients manage see what the complete product will look like and as such leaving a level of palpability, which increases the probability of making a sale. This is equally associated with speeding up of the property sale process. Through the use of real-time technology as well as devices such as Samsung Gear VR Virtual Reality headset, it is now possible for Real Estate developers to show potential customers the progress of the properties under development and the completed ones (Deaky and Parv, 2017). According to Deaky and Parv (2017), it is estimated that AR and VR market in the Real Estate sector will be in excess of $80 billion by year 2025 as a result of the anticipated technology growth. These technologies have played a major role in contributing to exchange of information, which has, as a result, driven the sale of properties and will continue to impact the industry in the near future. Exchange of information is equally associated with standardized prices of properties across different jurisdictions as it has become easier to compare the economic aspects and trends that impact the price of houses at any given country. Furthermore, exchange of information have enabled developers to learn from their competitors about the best technologies use in construction associated with improved efficiency and reduced costs.

2.4 Building Technology

As the demand for low-cost housing with less environmental impact increases, players in the Kenyan Real Estate sector are left without choice but to take into consideration innovative practices of constructing houses.
Notable areas of focus comprise of the use of prefab building material as well as modular construction where construction of buildings happens offsite with onsite work being assembly. In the year 2014, a Chinese construction firm, Winsum, pioneered a 3D printed house where they managed to save around 80 per cent of the construction costs together with 60 per cent on labor (Martin and Perry, 2019). These comprise some of the major innovative ideas that players in the Real Estate industry are exploring in the quest to reduce construction cost.

Generally, the real estate is on a trend towards achieving smart building technology. Today, smart building technology together with automation are making the traditional manual control of a building’s cooling and heating a thing of the past. With the commercial real estate adopting this technology, it is shaping the future of managing buildings. Modern and future smart cities require smart buildings. As countries, especially in North America and Europe seek to come up with smart cities, the process starts by coming up with smart buildings. On average, buildings are believed to consume around 30 per cent of the global energy (Xu, 2017). By improving on management of energy in these buildings will make significant contribution towards energy conservation as well as reducing costs globally. A smart building has a combination of technologies that automate the management of a business. Such example involves having in place software that manages the various variables of a building’s operation like lighting and temperature.

Further developments in building technology are evidenced in innovations like the self-heating concrete. According to Braun (2018), concrete serves as the most common building material used across the globe and also the second most from water in respect to utilization across the world. Buildings made by concrete have a risk of cracking, which results from exposure to chemicals and water. In the quest to address this problem, scientists have come up with self-heating concrete by incorporating bacteria into the concrete mixture prior to being poured. Activation of bacteria happens when water seeps into the resulting cracks leading to production of a limestone component referred to as calcite that serves in filling up the cracks completely. Although the product is yet to gain complete approval, it is considered to be a major innovation that will help in strengthening concrete structures thus improving on safety as well as preventing the environmental damages associated with the collapse of buildings as well as producing more concrete.
There is also the transparent aluminium that is being used by modern Real Estate developers to construct glass walled sky crappers because it is light and clear considering that less internal support is required unlike in the case of actual glass structures (Abidoye and Chan, 2018).

2.4.1 Construction Technology

The construction industry has been impacted by a technology revolution. Firms are beginning to integrate new innovations like onsite drones and robotics as well as building information modeling into normal construction practices. The benefits of such innovations have been realized in countries like the U.S where in the first six months of 2018 venture capital investments attracted more than $1 billion, which represents a 30 per cent increase while compared to the previous year (Martin and Perry, 2019). Construction Methods: A lot of residential home builders are making use of prefabrication in improving productivity and also in decreasing costs. For instance, modularization comprises of a subset of prefabrication construction where components of a structure are constructed in box-like portions, thus providing constructors with more opportunities to customize products and services (Egmond, 2012). The use of these processes is already being witnessed in India and has proved effective to combat the costs of raw materials. Building Technology: Contractors are making use of the internet, innovation, intelligence to develop modern buildings that are energy efficient. Incorporation of superior construction technology in the real estate sector has been found to enhance levels of efficiency, quality, safety, and cost for money as well as efficiency. An example of such computerized systems is Building Information Modeling (BIM), it facilitates data gathering about buildings under construction regularly. Other technologies like big data analytics and predictive analytics have considerably enhanced communication between designers and engineers working on the project. Players in the construction industry are relying on technology to make the real estate sector better. Young (2014), such an example is the case of Wallabe, a construction company with factory-built modular smart wall system that can be configured in different ways to meet various construction needs.
2.4.2 Access and Distribution

Some new technologies like virtual reality, interactive websites, and augmented reality are closing the gap between players in the construction industry and the end clients. There are also new cloud-based financing platforms that are helping also in limiting this gap.

Budget-conscious housing primarily comprises of mid to high-rise houses with relatively small units that are constructed with general inexpensive materials as well as comparatively minimal technology to make construction efficient and cost-effective leading to lower prices for the buyer (Peterson, 2015). Affordable housing in the modern era is known for creating good living spaces on a strict budget by using prefabricated components and modest materials. Until recently, the real estate industry was known through the behavior of companies where they would buy and sell all that territory with most of the company employees involved in working on detailed, manual processes that required a lot of papers. With technological innovations, newspaper listings and other advertisements have been replaced by real estate sites together with smartphone apps that provide virtual reality tours that have a richer stream of information comprised in a host of online databases (Nappi-Choulet and Ribeiro, 2018). Through virtual reality, clients manage to tour predevelopment or house units that are already developed from any corner globally. Real estate developers are enjoying this technology and extending it to the potential customers to help them view the product virtually. By using real-time technology as well as devices, it has helped real estate developers to show off the progress of properties under development and the completed units. Additionally, virtual reality enables prospective customers to walk through and equally experience the space even prior to the commencement of the construction process.

Access and distribution of properties in the Real Estate industry has further been facilitated by increased transparency that has resulted from technological innovations. Throughout the transaction process in the Real Estate sector, access and distribution of units is significantly dependent on more information. Where transparency is assured, all players are at ease of doing business and this increases the rate of sale and purchase of properties. Fintech-driven lenders are coming up with better businesses for all players in the industry based on provision of technology that offers greater information, efficiency, and speed (European Real Estate Society, 2018). There are also other technologies such as automated valuation models (AVM) such as Enodo that have served in improving the process of accessing and
distributing properties in the Real Estate industry (European Real Estate Society, 2018). Enodo provides for multifamily, which allows users to instantly produce expenses and revenue information required to analyze a deal. AVM is considered a crucial in improving access and distribution of properties as it will eventually replace the role of an analyst, while at the same time increasing objectivity and efficiency.

2.4.3 Supplier Landscape

Firms in the construction industry have been forced to search for means of completing projects with fewer workers due to stagnating productivity in the sector and continuous labor shortage. In the U.S for instance, 90 per cent of managers, builders, and contractors are experiencing challenges finding skilled employees (Coulson et al. 2018). This happens irrespective of the fact that the demand for houses continues to rise especially when it comes to home ownership. It is equally important noting that economic challenges limit individuals from owing houses. Therefore, although individuals and families want to own homes, they are equally considerate of the prices. To balance these challenges, real estate developers have no option but to seek technological practices that will help them come up with quality affordable units. As a result, players in the construction industry have resulted in integrating along their value chains and collaborate with newcomers in the industry that comprise of tech firms (Holt et al., 2015). For instance, Amazon has engaged in a partnership with Lennar to install Alexa devices in all the new units it constructs in the U.S. As humans change, flexible homes are designed in a manner that they change with them as they possess functions and designs that can be adapted, improved, or added whenever required. In some instances, constructors sell units while they are unfinished so that the new owners can redesign or design the interior. According to Hosseini and Chileshe (2017), examples of such properties are the Superloft residences in Amsterdam constructed by a Dutch developer. The firm relies on prefabricated concrete modules together with other modern construction technologies and practices to configure the units into townhomes, high-rises, and housing blocks. To curb the challenges associated with supply of skilled labor required to meet the growing demand in the Real Estate industry, robotic researchers at Harvard for instance have come up with robot swam construction (Makena, 2018). These robotic researchers have been inspired by the manner termites work to come up with mud structures thus managing to come up with small construction robots that are automated to work in the same manner as a swarm. These robots are programmed in a way that they build brick like walls where they pick a brick, climb the wall through the use of
wheels, and lay the brick in an open slot. To avoid collision with each other, the construction robots are fitted with sensors that have the ability of detecting the presence of other robots (Makena, 2018). This development will go a long way not only in addressing the labor supply problem, but also in reducing the cost of houses.

Human capital is usually expensive while compared to machinery/robots in that a quantifiable number of individuals are required to carry out a certain task that a single robot can handle and there are also issues of the number of working hours when it comes to humans, something not observed in robots.

2.5 Chapter Summary

The chapter reviews the literature by different scholars on technological innovations and performance of Real Estate companies. More specifically, the literature also reviews different types of technological innovations used by Real Estate firms and their effect on performance including a chapter summary. The components of technological innovation examined include; internet innovation, operational integration and building technology. The next chapter focused on the research methodology that covered the design of the study, target population, sampling, data collection methods and data analysis.
CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

The chapter provides the research methodology that was employed by the researcher to address the research questions. Research methodology acts as a guide on how a study was carried out in order to achieve the objective of the study. This chapter covered the following sub-sections: research design, target population, data collection methods, research procedures, data analysis approaches and chapter summary.

3.2 Research Design

According to Saunders, Lewis and Thornhill (2009) a research design is a set of methods and procedures that are utilized in collecting and analyzing measures of the variables identified in the research problem. This study adopted a descriptive research design. Burns and Grove (2010) define descriptive research as a design that is meant to provide a picture of a situation as happens naturally. The design is utilized to justify current practice, make judgment and develop theories. Robson and McCartan (2016), indicate that the main goal of a descriptive research is to demonstrate a clear profile of people, objects, events and situations in an investigation. It is important to have a clear picture of the phenomena on which you intend to collect data before data collection (Saunders et al., 2009). Since the main study variables in this study were clearly defined, the descriptive design was appropriate was for the study. This position has been supported by Cooper and Schindler (2003), who pointed out that descriptive design, is suitable for a study with clearly stated research questions. Previous researches (Kamau, 2015) have used descriptive design.

3.3 Population and Sampling Design

3.3.1 Population

Cooper and Schindler (2008) define population as a whole group of individuals, events or objects that possess similar attributes that fit to a specification. The study focused on employees working for real estate companies in Kenya particularly the heads of departments that worked for Operations, IT and Finance departments of Real Estate firms. A population is defined as a group of individuals having similar traits with whom measurements are obtained. In line with this study, the target population of the study
included 150 employees that worked for Real Estate companies at the headquarters in Nairobi County (Estate Agents Registration Board, 2019).

Table 3.1 Target Population

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations</td>
<td>60</td>
</tr>
<tr>
<td>Information Technology (IT)</td>
<td>55</td>
</tr>
<tr>
<td>Finance</td>
<td>35</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>150</strong></td>
</tr>
</tbody>
</table>

Source: Estate Agents Registration Board (2019)

3.3.2 Sampling Design

3.3.2.1 Sampling Frame

The chosen sampling frame for this study constitutes employees that worked for Real Estate companies in Nairobi County. The researcher considered this category of employees since they had a deeper understanding of how technological innovations impacted on performance of Real Estate companies. Sampling frame as a list of population that the researcher makes selection objectively. It comprised of a list of elements that the researcher sought to draw a sample.

3.3.2.2 Sampling Technique

Through studying a sample, the researcher got an opportunity to easily and conveniently analyse data and produce more accurate and reliable results that reflected the entire population. The advantage of using a sample was because it is cheap and data was easy to collect. The study adopted a stratified random sampling to select 109 respondents. Use of random sampling approach was considered suitable since it prevented sampling error in the population. This approach enhanced accuracy in estimation of methods used. Thus, it is essential to select a sample that represents the population when using a sampling frame (Polit and Beck, 2015). The sampling frame helps to select the needed number of respondents, subjects, elements, or organisations to make a sample. The respondents were stratified into three stratas consisting of 109 employees in operations, IT and Finance departments.
3.3.2.3 Sample Size

The sample frame contained a list of 150 Real Estate firms from which the researcher selected the respondents. Yamane formula to determine the size of the sample was as follows:

\[ n = \frac{N}{1 + N(e)^2} \]

Whereby;

- \( n \) = sample size (required)
- \( N \) = target population
- \( e \) = accuracy level (required)

Standard error = 0.05

Calculation of a sample

\[ = \frac{150}{1 + 150(0.05)^2} \]

\[ = 109.09 \]

\[ = 109 \text{ respondents} \]

Thus, with the help of Yamane’s formula, the size of the sample consists of 109 target respondents which represent 73% of the employees implying that the sample was an adequate representation of Real Estate firms in Kenya. This was also supported by Fink (2016) who recommends that the sample size should be between 10-50%.

Table 3.2 Sample Size

<table>
<thead>
<tr>
<th>Department</th>
<th>Frequency</th>
<th>Proportion</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations</td>
<td>60</td>
<td>73%</td>
<td>44</td>
</tr>
<tr>
<td>IT</td>
<td>55</td>
<td>73%</td>
<td>40</td>
</tr>
<tr>
<td>Finance</td>
<td>35</td>
<td>73%</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>150</strong></td>
<td><strong>109</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Author (2019)
3.4 Data Collection Method

The researcher used structured questionnaires to collect primary data. This approach was useful because it allowed the respondents to give feedback which was more detailed as opposed to use of structured questions. Secondly, the researcher found it simpler to quantify responses drawn from self-administered questionnaires as opposed to when unstructured questions were used. In view of this, Polit and Beck (2015) argue that data collection instruments play a central role in enabling the respondents to provide their personal opinions based on research objective. Questionnaires comprised of closed and open-ended questions to improve ease of collecting quantitative and qualitative data.

The structure of the questions was structured in a way that ensured that the questions addressed the research questions. Qualitative type of data was collected using open-ended questions; these questions provided an in-depth understanding of Real Estate firms in light with the study variables and the objective. In order to collect the right information from the sections of the questionnaires, the questionnaire was divided into five important sections. Section A covered the demographic data of the respondents; Section B covered the effect of internet innovation on performance of Real Estate companies, Section C covered questions on the effect of operational integration on performance of Real Estate companies and Section D comprised of questions on the effect of building technology on performance of Real Estate companies in Kenya, whereas, section E consisted of questions on performance of Real Estate companies in Kenya.

3.5 Research Procedures

Collection of data was conducted through self-administered in order to collect the right information. To ensure that all the questionnaires presented to the respondents were returned, the researcher exercised care and control. Questionnaires were administered using a ‘drop and pick later’ method. This was achieved through maintaining a register of questionnaires, monitoring the administered questionnaires against the ones returned. Validity and reliability of data was ascertained to ensure that the research instrument measured what it was intended to measure and that the study was able to produce similar results upon repeated tests. A pilot study was conducted to identify any form of possible weakness in design and instrumentation and the need to provide proxy data for selection based on a sample probability. Pilot study was conducted by administering the questionnaires to at least 10 respondents who did not form part of the final study.
This enabled the researcher to refine the questions in the questionnaires and observe efficiency and objectivity when administering the questionnaires. To effectively complete responding to the questions on the questionnaires, it was estimated that the respondents took fifteen minutes on average.

3.6 Data Analysis Methods

The data collected was cleaned, sorted and coded into a statistical programme for processing. Data sets were modeled into time series in line with the objective for this study. Data analysis was carried out through a series of procedures. Upon successful collection of data, the data was verified to ascertain that it is complete and consistent. Descriptive statistics inform of mean and standard deviation was used to analyse data. Trend analysis was used to explain the trend of the study variables and qualitative data was analysed using content analysis. Correlation analysis was used in establishing the relationship between the variables. Regression analysis was used to establish the link between technological innovations and performance of Real Estate firms in Kenya.

3.7 Chapter Summary

Chapter three of this study provides research methodology that was used by the research accomplish the objective of this study. The research design, the population and sampling design, data collection method, research procedures and data analysis methods were covered in the chapter. Descriptive study design was adopted to enable the researcher to explore the current and existing conditions of the study as well as establish existing relationship between technological innovations and performance of Real Estate companies in Nairobi County. Primary data was collected using semi-structured questionnaires which were administered by dropping the questionnaires and picking them later. Data was analysed using descriptive and inferential statistics. The next chapter covered data analysis and interpretation of findings accompanied by discussions based on the research questions.
CHAPTER FOUR

4.0 RESULTS AND FINDINGS

4.1 Introduction

The chapter covers the analysis of the data, presentation and interpretation of the same as brought together from the field done in line with the broad objective of this study which was to determine the effect of technological innovations on performance of Real Estate firms in Nairobi County. The research employed a descriptive research design and primary data was collected with the help of questionnaires.

4.2 Demographic Information

4.2.1 Response Rate

109 questionnaires were distributed to the respondents, 92 were successfully filled and returned to the researcher. This represents a response rate of 84.4% that was considered to be a sufficient representation of the entire population. This response rate is consistent to the suggestion of Sekaran (2008) who indicated that a response rate of 50% and above was a sufficient representation of a sample from the whole population. 17 questionnaires (15.6%) were not responded to. Table 4.1 outline the response rate.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responded</td>
<td>92</td>
<td>84.4%</td>
</tr>
<tr>
<td>Non-response</td>
<td>17</td>
<td>15.6%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>109</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

4.2.2 Gender of the Respondents

The respondents were requested to indicate their gender. From the questionnaires collected, (58%) of the respondents were male and the rest (42%) were female. This was an indication that there was a good representation of both genders from the data collected. This implied that there was a good representation of both genders, therefore, the data was not biased to a particular gender. The results are depicted in Figure 4.1
Figure 4.1: Respondents’ gender

4.2.3 Duration of service in the organisation

The respondents were asked to indicate the duration that they had served in the organisation. In Figure 4.2, most (54%) of the respondents served between 7-9 years, 33% of the respondents served between 3-6 years, 10% respondents served for more than 10 years while 0.05 respondents between 0-2 years. This implied that majority of the respondents had been in the real estate firms long enough to give informed responses. The results are illustrated as shown in Figure 4.2.
4.2.4 Education Level

The study participants/respondents were asked to indicate their education level. The findings show that majority (62%) of the study participants were holders of bachelor’s degree, 33% of the study participants had a master’s degree, 3% of the participants had diplomas and none of the participants had a certificate or a doctorate. This imply that many of the participants had a proper understanding of the questionnaires as they were literate enough. The results are captured in Figure 4.3.

Figure 4.3: Education Level

4.2.5 Period of Service in the Current Capacity

The study participants were asked to indicate the period that they had served in the current position. The findings demonstrated that 50.05 of the study participants had served in their current position for 3-6 years, 23% of the participants had served for 7-9 years, 20% of the participants had served for 0-2 years and only, 2% of the participants had served in their current position for over 10 years. This imply that most of the participants had acquired adequate experience in the field where they were in the organizations. The results are provided in the Figure 4.4
4.3 Internet Innovation and Performance of Real Estate Firms in Kenya

The respondents were requested to indicate the extent to which internet innovations influenced performance of Real Estate firms in Kenya. The mean of social media marketing was 4.011 whose value is greater than the grand mean of 3.996 implying that SMM contributed greatly to Performance. As to whether SMM was used to boost performance of Real Estate firms, the respondents strongly agreed that SMM comprise of sites and portals to enable clients and other firms to access any information (4.55).

The respondents further agreed that SMM; has enhanced the search of engine ranks and reduced traffic on websites, improved brand authority, searching for the best real estate agent, platforms are used for marketing for example sale of property and marketing of rental houses and tailored response to clients (M=3.99, M=3.92, M=3.89, M=3.88 & M=3.84, respectively).

The findings further established that the mean of mobile technology was 3.980 whose value was close to the grand mean of 3.996. These imply that use of mobile devices contributed to performance. On the extent to which use of mobile devices influenced performance, the respondents agreed that the use of mobile technology; made it easy to contact prospective vendors and customers, clients could easily send emails and sharing information from sites, enabled supervisors to apply GPRS among other traits for monitoring employees, saved time and costs linked to physical visits, allowed buyers to search for property listings easily.
and conveniently and flexibility (M=4.45, M=4.11, M=3.98, M=3.83, M=3.80 & M=3.71, respectively). The results are provided in Table 4.2

**Table 4.2: Effect of Internet Innovation and Performance**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of social media marketing enables the client to find the</td>
<td>92</td>
<td>3.89</td>
<td>0.567</td>
</tr>
<tr>
<td>best real estate agent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The firm has sites with portals where clients and other firms</td>
<td>92</td>
<td>4.55</td>
<td>0.641</td>
</tr>
<tr>
<td>can easily access information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The firm uses social media to market rental houses or sale of</td>
<td>92</td>
<td>3.88</td>
<td>0.692</td>
</tr>
<tr>
<td>property</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The firm has gained more brand authority by regularly</td>
<td>92</td>
<td>3.92</td>
<td>0.727</td>
</tr>
<tr>
<td>interacting with customers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social media has enabled personalized response to clients</td>
<td>92</td>
<td>3.84</td>
<td>0.964</td>
</tr>
<tr>
<td>The firm has formally improved search engine rankings and</td>
<td>92</td>
<td>3.99</td>
<td>0.744</td>
</tr>
<tr>
<td>traffic to business websites</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of mobile phones allows buyers to easily search for</td>
<td>92</td>
<td>3.80</td>
<td>0.755</td>
</tr>
<tr>
<td>property listings conveniently</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of mobile phones to search for available properties saves</td>
<td>92</td>
<td>3.83</td>
<td>0.812</td>
</tr>
<tr>
<td>time and costs associated with physical visits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of mobile technology gives Real Estate agents a flexible</td>
<td>92</td>
<td>3.71</td>
<td>0.791</td>
</tr>
<tr>
<td>working environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With the help of mobile technology, it is easy to contact</td>
<td>92</td>
<td>4.45</td>
<td>0.554</td>
</tr>
<tr>
<td>prospective customers and vendors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of mobile devices allows clients to easily send emails</td>
<td>92</td>
<td>4.11</td>
<td>0.634</td>
</tr>
<tr>
<td>from the work-site for instance when one is placing an order</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>for materials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With mobile devices, it is possible for supervisors to use</td>
<td>92</td>
<td>3.98</td>
<td>0.532</td>
</tr>
<tr>
<td>GPRS and other features to monitor workers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grand mean</strong></td>
<td>92</td>
<td>3.996</td>
<td>0.701</td>
</tr>
</tbody>
</table>
4.3.1 Normality Test

Normality tests were done to establish whether the data was aligned to a normal distribution and find out the likelihood of a random variable that underlies the data to be normally distributed. The findings revealed that use of social media marketing and mobile devices assume a normal distribution curve since their significance levels (p-value) exceed 0.05 (0.619 & 0.589, respectively). The output is provided in Table 4.3.

Table 4.3: Tests of Normality

<table>
<thead>
<tr>
<th>Tests of Normality</th>
<th>Kolmogorov-Smirnov&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Shapiro-Wilk</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic df Sig.</td>
<td>Statistic df Sig.</td>
<td></td>
</tr>
<tr>
<td>Social media marketing</td>
<td>.182 92 .200*</td>
<td>.949 92 .619</td>
<td></td>
</tr>
<tr>
<td>Use of mobile devices</td>
<td>.209 92 .200'</td>
<td>.861 92 .589</td>
<td></td>
</tr>
</tbody>
</table>

*. This is a lower bound of the true significance.

<sup>a</sup> Lilliefors Significance Correction

4.3.2 Correlation Analysis of Internet Innovation and Performance

Correlation analysis was done to detect the association between internet innovation and performance. Correlation analysis between social media marketing and performance reveals existence of a strong positive correlation of 0.658. Utilization of mobile devices and performance demonstrated a moderately strong positive correlation of 0.582. The findings reveal that social media marketing had a higher correlation to performance of Real Estate firms than use of the use of mobile devices. The outcome is illustrated in Table 4.4

Table 4.4: Correlation Analysis of Internet Innovation and Performance

<table>
<thead>
<tr>
<th>Performance</th>
<th>Use of social media marketing</th>
<th>Use of mobile devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Use of social media marketing</td>
<td>0.658**</td>
<td>1</td>
</tr>
<tr>
<td>Use of mobile devices</td>
<td>0.582**</td>
<td>0.098</td>
</tr>
</tbody>
</table>
4.3.3 Regression Analysis: Model Summary of Internet Innovation and Performance

Regression analysis was carried out to detect the association between internet innovation and performance. The findings in Table 4.5 show the model summary outcome that was derived from the regression test done between internet innovation versus performance. The computation infers the R-value to be 0.763 and the r-square value to be 0.621. This therefore mean that internet innovation strategy accounts for 62.1% in variability in performance with 37.9% variability ascribed to other factors external to internet innovation.

Table 4.5: Model Summary of Internet Innovation and Performance

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.763a</td>
<td>.621</td>
<td>.298</td>
<td>.315</td>
</tr>
<tr>
<td>a. Predictors: (Constant), Internet innovation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.3.4 Analysis of Variance of Internet Innovation and Performance

The ANOVA test results outlined on Table 4.6, show that the F-statistic value is 2.713 with a p-value of 0.000. This depict that; F (2, 89) = 2.713, p = 0.000 (p< 0.01). This depict that there is a substantial variance between the independent variable which is internet innovation and the dependent variable performance. Additionally, the test is statistically significant at 0.000, significance level.

Table 4.6: Analysis of Variance of Internet Innovation and Performance

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean of Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>2.411</td>
<td>2</td>
<td>0.689</td>
<td>2.713</td>
<td>.000b</td>
</tr>
<tr>
<td>Residual</td>
<td>22.321</td>
<td>89</td>
<td>.254</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>24.732</td>
<td>91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Dependent variable: performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Predictors: (Constant), Internet innovation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.3.5 Coefficients of Internet Innovation and Performance

Social media marketing and use of mobile devices were related positively to performance (0.032 & 0.389, respectively). This means that an increase in a single unit of each of these variables led to a corresponding increase in performance. Social media marketing and mobile devices recorded a significant relationship with performance as evidenced by the p-values which were less than 0.05 (0.000 & 0.001, respectively). The table 4.7 outlines these results.

Table 4.7: Coefficients of Internet Innovation and Performance

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized coefficients</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>.009</td>
<td>.789</td>
<td></td>
<td>1.089</td>
</tr>
<tr>
<td>Social media marketing</td>
<td>.032</td>
<td>.115</td>
<td>.051</td>
<td>2.287</td>
</tr>
<tr>
<td>Mobile devices</td>
<td>.389</td>
<td>.105</td>
<td>.399</td>
<td>1.411</td>
</tr>
</tbody>
</table>

Dependent variable: performance

4.4 Operational Integration and Performance of Real Estate firms

The respondents were asked to indicate the level at which operational integration influenced performance of Real Estate firms in Kenya. The results further discovered that the mean of integrated internal processes was 4.060 which is higher than the grand mean of 3.997. This means that integrated internal processes significantly led to performance. As to whether integrated internal processes impacted on performance, the respondents agreed that Real Estate firms; significantly minimized paper work, utilized modern collaboration tools such as Google driver and Dropbox, increased time savings, designed automated feedback mechanisms for emerging property markets and huge and secure data base for storage and sharing of information (M=4.39, M=4.05, M=4.00, M=4.00, M=3.95 & M=3.91, respectively).

Mean of communication innovations was 3.753 which is slightly lower than the grand mean of 3.997. These imply that communication innovations had the least effect on performance in comparison to integrated internal processes and information sharing. Concerning the extent of use of communication innovations by Real Estate firms, the respondents agreed
that; there was limited one-on-one communication between the clients and Real Estate firms since most of the information was shared using technological innovations; there was real-time communication about property information, all information on Real Estate was easily shared and that the conventional roles of brokers as advisors was fading away, and this significantly reduced property costs (M=3.95, M=3.80, M=3.65 & M=3.61, respectively).

The mean of information sharing was 4.163 which is slightly higher than the grand mean of 3.997. These imply that information sharing largely contributed to performance of Real Estate firms. Regarding information sharing, the respondents strongly agreed that through technological innovations, it was easy to maintain interactions between the clients and agents including colleagues and other stakeholders through mobile devices (M=4.51). The respondents further agreed that Real Estate firms; did advertisements with the help of social media platforms for example Facebook and You Tube, minimized costs of advertising and made accurate and reliable decisions (M=4.15, M=4.10 & M=389, respectively). The results are shown in Table 4.8.
Table 4.8: Effect of Operational Integration and Performance of Real Estate firms

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real estate agents save a lot of time when documents are managed using digitized systems</td>
<td>92</td>
<td>4.00</td>
<td>0.565</td>
</tr>
<tr>
<td>The firm use digital collaboration tools like Google driver and Dropbox</td>
<td>92</td>
<td>4.05</td>
<td>0.631</td>
</tr>
<tr>
<td>The firm is able to store bulk information and maintain security when sharing that information</td>
<td>92</td>
<td>3.91</td>
<td>0.672</td>
</tr>
<tr>
<td>Paper work has been reduced which is associated with traditional Real Estate industry operations</td>
<td>92</td>
<td>4.39</td>
<td>0.723</td>
</tr>
<tr>
<td>Real estate agents have developed automated messaging to advise customers on new properties in the market</td>
<td>92</td>
<td>3.95</td>
<td>0.954</td>
</tr>
<tr>
<td>Face-to-face communication between clients and Real Estate has significantly reduced due to information sharing</td>
<td>92</td>
<td>3.95</td>
<td>0.744</td>
</tr>
<tr>
<td>Customers can easily share information on Real Estate offices, agents and listing</td>
<td>92</td>
<td>3.65</td>
<td>0.755</td>
</tr>
<tr>
<td>Mobile and social media platforms allow real-time communication on property information</td>
<td>92</td>
<td>3.80</td>
<td>0.802</td>
</tr>
<tr>
<td>Increased communication has slowly changed traditional roles of brokers as advisors: this has lowered costs of properties and thus widening the market for buyers since many can afford</td>
<td>92</td>
<td>3.61</td>
<td>0.771</td>
</tr>
<tr>
<td>With the new technology, agencies remain in contact with the customer and colleagues using mobile devices</td>
<td>92</td>
<td>4.51</td>
<td>0.992</td>
</tr>
<tr>
<td>The firm does video advertising using social media platforms: You Tube and Facebook</td>
<td>92</td>
<td>4.15</td>
<td>0.882</td>
</tr>
<tr>
<td>The firm has lowered advertising costs</td>
<td>92</td>
<td>4.10</td>
<td>0.693</td>
</tr>
<tr>
<td>The firm makes accurate and reliable decisions</td>
<td>92</td>
<td>3.89</td>
<td>1.002</td>
</tr>
<tr>
<td><strong>Grand mean</strong></td>
<td><strong>92</strong></td>
<td><strong>3.997</strong></td>
<td><strong>0.784</strong></td>
</tr>
</tbody>
</table>
4.4.1 Normality Tests

The study finds it’s necessary to do normality tests and find out whether data used in the study is normally distributed and to compute the possibility of existence of random variables that may underlie the data to be normally distributed. Results depict that internal process, communication and sharing of information assume normal distributed as revealed by their p-values that exceed 0.05 (0.204, 0.721 & 0.189, respectively). The results are presented in Table 4.9.

Table 4. 9: Normality Tests

<table>
<thead>
<tr>
<th>Tests of Normality</th>
<th>Kolmogorov-Smirnov(^{a})</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>df</td>
</tr>
<tr>
<td>Internal processes</td>
<td>.132</td>
<td>92</td>
</tr>
<tr>
<td>Communication</td>
<td>.198</td>
<td>92</td>
</tr>
<tr>
<td>Information sharing</td>
<td>.343</td>
<td>92</td>
</tr>
</tbody>
</table>

\(^{*}\). This is a lower bound of the true significance.

a. Lilliefors Significance Correction

4.4.2 Correlation Analysis of Operational Integration and Performance

Correlation type of analysis was conducted to establish the link between operational integration and performance. Correlation results between internal process and performance depict presence of a strong correlation as revealed by the correlation coefficient of 0.841. Communication and sharing of information depicted moderately strong correlations with coefficients of 0.641 and 0.619. These means that internal process recorded the highest impact on performance followed by sharing of information and then communication attained the least impact on performance. The outcome is captured in Table 4.10.
Table 4.10: Correlation Analysis: Operational Integration and Performance

<table>
<thead>
<tr>
<th></th>
<th>Performance</th>
<th>Internal process</th>
<th>Communication</th>
<th>Information sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal process</td>
<td>0.841**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>0.619**</td>
<td>0.604**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Information sharing</td>
<td>0.641**</td>
<td>0.098</td>
<td>0.151</td>
<td>1</td>
</tr>
</tbody>
</table>

4.4.3 Regression Analysis: The link between Operational Integration and Performance

Regression analysis was carried out to detect the association between internet innovation and performance. The findings in Table 4.11 show the model summary outcome that was derived from the regression test done between operational integration versus performance. The computation infers the R-value to be 0.832 and the r-square value to be 0.679. This therefore mean that internet innovation strategy accounts for 67.9% in variability in performance with 32.1% variability ascribed to other factors external to operational integration.

Table 4.11: Model Summary of the regression analysis between Operational Integration and Performance

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.832a</td>
<td>.679</td>
<td>.462</td>
<td>.281</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Operational integration

4.4.4 Analysis of Variance of Operational Integration and Performance

The ANOVA test results outlined on Table 4.12, show that the F-statistic value is 2.889 with a p-value of 0.000. This depict that; F (3, 88) = 2.889, p = 0.000 (p< 0.01). This depict that there is a substantial variance between the independent variable which is operational integration and the dependent variable performance. Additionally, the test is statistically significant at 0.000, significance level.
Table 4.12: Analysis of Variance of Operational Integration and Performance

ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean of Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>2.115</td>
<td>3</td>
<td>0.705</td>
<td>2.889</td>
<td>.000</td>
</tr>
<tr>
<td>Residual</td>
<td>21.441</td>
<td>88</td>
<td>.244</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>23.556</td>
<td>91</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent variable: performance
b. Predictors: (Constant), Operational integration

4.4.5 Coefficients of Operational Integration and Performance

Internal process and information sharing were positively linked to performance (0.067 & 0.359, respectively) while communication was inversely linked to performance (-0.142). This means that a unit increase in each of these variables leads to a corresponding increase in performance and similarly, a unit decline in each of the variables resulted into a corresponding decline in performance. Internal processes, information sharing and communication were significantly linked to performance since their p-values were less than 0.05 (0.000 & 0.004 & 0.005, respectively). Table 4.13 has these results.

Table 4.13: Coefficients of Operational Integration and Performance

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>.021</td>
<td>.692</td>
<td>1.200</td>
<td>.115</td>
</tr>
<tr>
<td>Internal processes</td>
<td>.067</td>
<td>.105</td>
<td>.056</td>
<td>2.321</td>
</tr>
<tr>
<td>Communication</td>
<td>-.142</td>
<td>.142</td>
<td>.302</td>
<td>1.295</td>
</tr>
<tr>
<td>Information sharing</td>
<td>.359</td>
<td>.132</td>
<td>.139</td>
<td>0.894</td>
</tr>
</tbody>
</table>

a. Dependent variable: performance
4.5 Building Technology and Performance of Real Estate firms in Kenya

The respondents were asked to indicate the level at which building technology influenced performance of Real Estate firms in Kenya. The mean of construction technology was 3.93 which is higher than building technology grand mean of 3.817; this implies that construction technology greatly contributed to performance. Concerning use of construction technology, the respondents agreed that the firm: used software to monitor building operations: lighting and temperature, modeled building innovations to enhance efficiency, did energy conservation during in all its construction activities and prefabrication to mitigate costs (M=4.10, M=3.92, M=3.90 & M=3.80, respectively).

The mean of access and distribution was 3.813 which is slightly lower than the grand mean of 3.817. These imply that access and distribution had the least effect on performance compared to construction technology. Regarding the extent to use of access and distribution by the firm, the respondents agreed that the firm; utilized virtual reality to allow prospective clients to have a bigger picture of the housing units: designs and space prior construction, utilized innovation in developing new buildings that were energy efficient and use of sophisticated technology for enhanced safety and quality (M=3.99, M=3.92 & M=3.54, respectively).

Supplier landscaping mean was found to be 3.67 which was lower than the overall grand mean which was 3.817. These is an indication that supplier landscaping had the least effect on performance compared to construction technology and access and distribution. Concerning Supplier landscaping, the respondents agreed that the firm; developed modern and spacious house units at cheaper costs, collaborated with developers in the value chains to develop modern houses and use of real-time innovations to depict the progress of construction projects and finished units (M=3.91, M=3.65 & M=3.45, respectively). The results are shown in Table 4.14.
Table 4.14: Building Technology and Performance of Real Estate firms

<table>
<thead>
<tr>
<th>Description</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The firm observes energy conservation in its construction projects</td>
<td>92</td>
<td>3.90</td>
<td>0.772</td>
</tr>
<tr>
<td>The firm has put in place a software to effectively manage building’s operations like lighting and temperature</td>
<td>92</td>
<td>4.10</td>
<td>1.011</td>
</tr>
<tr>
<td>The firm integrates innovations such as onsite drones, building information modelling to boost efficiency in its construction activities</td>
<td>92</td>
<td>3.92</td>
<td>0.781</td>
</tr>
<tr>
<td>The firm uses prefabrication to boost productivity and reduce costs</td>
<td>92</td>
<td>3.80</td>
<td>0.585</td>
</tr>
<tr>
<td>Contractors use innovation to develop modern buildings that are energy efficient</td>
<td>92</td>
<td>3.91</td>
<td>0.786</td>
</tr>
<tr>
<td>The firm uses superior construction technologies for improved quality and safety</td>
<td>92</td>
<td>3.54</td>
<td>0.346</td>
</tr>
<tr>
<td>The firm uses virtual reality to enable prospective customers to experience housing units’ designs and space before the start of the construction process</td>
<td>92</td>
<td>3.99</td>
<td>0.544</td>
</tr>
<tr>
<td>The firm develops modern affordable housing that is spacious at lower costs</td>
<td>92</td>
<td>3.91</td>
<td>0.993</td>
</tr>
<tr>
<td>The firm uses real-time technologies to show and report progress of properties under development including completed units</td>
<td>92</td>
<td>3.45</td>
<td>0.918</td>
</tr>
<tr>
<td>The firm collaborates with developers in their value chains to build modern houses</td>
<td>92</td>
<td>3.65</td>
<td>0.445</td>
</tr>
</tbody>
</table>

**Grand mean** 92 3.817 0.718

4.5.1 Tests of Normality

The results in that Table 4.15 depict that construction technology, access and distribution and supplier landscape are normally distributed because their p-value is above 0.05 (0.181, 0.498 & 0.696, respectively).
Table 4.15: Tests of Normality

<table>
<thead>
<tr>
<th>Tests of Normality</th>
<th>Kolmogorov-Smirnov$^a$</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>df</td>
</tr>
<tr>
<td>Construction technology</td>
<td>.196</td>
<td>92</td>
</tr>
<tr>
<td>Access and distribution</td>
<td>.159</td>
<td>92</td>
</tr>
<tr>
<td>Supplier landscape</td>
<td>.172</td>
<td>92</td>
</tr>
</tbody>
</table>

4.5.2 Correlation Analysis of Building Technology and performance

A correlation analysis was conducted to test the link between building technology and performance. Correlation analysis results between construction technology and performance depict presence of a moderately strong correlation ($R=0.594$). Access and distribution and performance showed a weakly moderate correlation ($R=0.545$) while supplier landscape and performance established a weak correlation ($R=0.350$). These imply that construction technology attained the highest effect on performance followed by access and distribution and supplier landscape had the least effect on performance. The outcome is provided in Table 4.16.

Table 4.16: Correlation Analysis: Building Technology and Performance

<table>
<thead>
<tr>
<th></th>
<th>Performance</th>
<th>Construction technology</th>
<th>Access and distribution</th>
<th>Supplier landscape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction technology</td>
<td>0.594**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access and distribution</td>
<td>0.545**</td>
<td>0.311</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Supplier landscape</td>
<td>0.350</td>
<td>0.081</td>
<td>0.141</td>
<td>1</td>
</tr>
</tbody>
</table>

4.5.3 Regression Analysis on the link between building technology and performance

Regression analysis was carried out to detect the building technology internet innovation and performance. The findings in Table 4.17 show the model summary outcome that was derived from the regression test done between building technology versus performance.
The computation infers the R-value to be 0.642 and the r-square value to be 0.489. This therefore mean that building technology strategy accounts for 48.9% in variability in performance with 51.1% variability ascribed to other factors external to building technology.

Table 4.17: Model Summary of Regression Analysis between building technology and performance

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.642(^a)</td>
<td>.489</td>
<td>.314</td>
<td>.281</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Building technology

4.5.4 Analysis of Variance between building technology and performance

The ANOVA test results outlined on Table 4.18, show that the F-statistic value is 2.470 with a p-value of 0.000. This depict that; F (3, 88) = 2.470, p = 0.000 (p< 0.01). This depict that there is a substantial variance between the independent variable which is building technology and the dependent variable performance. Additionally, the test is statistically significant at 0.000, significance level.

Table 4.18: Analysis of Variance between building technology and performance

<table>
<thead>
<tr>
<th>ANOVA(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Regression</td>
</tr>
<tr>
<td>Residual</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

a. Dependent variable: performance

b. Predictors: (Constant), Building technology
4.5.5 Coefficients of building technology variables and performance

Construction technology, access and distribution and supplier landscape were all positively related to performance (0.089, 0.481 & 0.159, respectively). This implies that a rise in one unit of each of these variables results into a corresponding increase in performance. Construction technology and access and distribution were linked significantly to performance since their p-values were less than 0.05, (0.07 & 0.024, respectively). But supplier landscape was insignificantly associated to performance since its p-value was higher than 0.05, (0.052).

Table 4.19: Coefficients of building technology variables and performance

<table>
<thead>
<tr>
<th>Coefficientsa</th>
<th>Unstandardized Coefficients</th>
<th>Standardized coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>.045</td>
<td>.581</td>
<td>1.200</td>
<td>.115</td>
</tr>
<tr>
<td>Construction technology</td>
<td>.089</td>
<td>.109</td>
<td>.076</td>
<td>2.321</td>
</tr>
<tr>
<td>Access and distribution</td>
<td>.481</td>
<td>.145</td>
<td>.292</td>
<td>1.295</td>
</tr>
<tr>
<td>Supplier landscape</td>
<td>.159</td>
<td>.138</td>
<td>.141</td>
<td>0.894</td>
</tr>
</tbody>
</table>

a. Dependent variable: performance

4.6 Chapter Summary

The chapter consisted of the results and the findings on the effect of technological innovation on performance of Real Estate firms in Kenya (The case of Nairobi County). The main areas covered include; the demographic details of the respondents, the descriptive statistics for all the independent variables which are; internet innovation, operational integration and building technology and their impact on performance. The section also covered the inferential statistics which was implemented using regression test. The next section (Chapter five) shall cover the summary, discussion, conclusion and the recommendations of the study.
CHAPTER FIVE

5.0 DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter summarizes the findings on the impact of technological innovations on performance of Real Estate firms in Kenya. The chapter further gives a comprehensive summary of the findings, discussions conclusions and recommendations for the study.

5.2 Summary

The primary purpose of this study is establishing the impact of technological innovations on performance of Real Estate firms in Kenya. The research sought to find answers to these questions: impact of internet innovation on performance, impact of operational integration on performance and impact of building technology on performance. The chapter further covers a summary, conclusion, recommendations and discussion. Descriptive research design was used and primary data was collected from employees of Real Estate firms with the help of self-administered questionnaires. Semi-structured questionnaires were employed to collect primary data from a sample of 109 respondents, out of which, 92 of these respondents successfully filled and gave back questionnaires representing a response rate of 84.4% that was considered a sufficient representation of the entire population. Data collected was later analysed using SPSS and then presented in the form of Tables and Charts.

Internet innovation mean was recorded at 4.011, whereas the grand mean was 3.996, an indication that SMM made a significant contribution to performance. The respondents were strongly in agreement that SMM has portals and sites that enable customers and organizations to access information (4.55). The respondents were further in agreement that SMM has contributed in enhancing search on engine ranks as well as reducing traffic on websites, improving brand authority, and search for the best real estate agent, with the platforms equally being used for marketing for instance tailored response and sales of property (M=3.84, M=3.88, M=3.99) respectively.

Regarding use of mobile devices to improve performance, there was consensus among the respondents that customer interaction and access to vendors was easy and convenient through use of mobile device. They also reported that it was easier for customers to easily
share information from sites, send emails, enabled the use of GPRS by supervisors, saved
time together with costs associated with physical visits, allowed customers to search for
property listings with ease and also flexibly and conveniently with means of (M=4011,
M=4045, M=3.98, M=3.83, M=3.80 & M=3.71) in that order.

It was further found out that integrated internal process had a mean of 4.060, a figure higher
than 3.997, which was the grand mean. This reveals that performance was significantly
influenced by integrated internal processes. Regarding the impact of internal processes on
performance, the respondents were in agreement that Real Estate organizations had secure
database for storage, sharing of information, came up with automated feedback
mechanisms for emerging property markets, contributed to time-saving, utilized tools of
modern collaboration, and to a significant level minimized paperwork (M=3.95, M=3.91,
M=4.00, M=4.00, M=4.05 & M=4.39) respectively. Grand mean was 3.997, which was
slightly higher than the communications innovations mean of 3.753. The variation reveals
that internet innovations least impacted performance while in comparison with information
sharing and internal processes. Sharing all information on Real Estate was done with ease,
this reduced property cost, and the traditional role of middlemen as advisors was on the
decline (M=3.95, M=3.80, M=3.61 & M=3.65) respectively.

Information sharing mean was 4.163 and the grand mean at 3.997, revealing that
performance was fueled by information sharing. The respondents were strongly in
agreement that due to technological innovations, maintaining interactions was easier
among parties through the use of mobile devices (M=4.51). Correlation results found that
internal process and performance were strongly correlated (R=0.841), sharing of
information and communication approach revealed a moderately strong correlation as
follows (R=0.619 & R=0.641, respectively). This implies that internal process had the
highest impact on performance compared to sharing of information and communication
approach.

Construction technology had a mean of 3.93 and a grand mean of 3.817, an indication that
performance was significantly influenced by construction technology. The respondents
were in consensus that the firm: used prefabrication to mitigate cost, energy conservation,
modeled building innovations, and used software to monitor temperature and lighting in
buildings (M=3.80, M=3.90, M=3.92, & M=4.10) respectively. Grand mean was at 3.817,
which was slightly higher than access and distribution mean of 3.813, indicating that
performance was least affected by access and distribution. Supplier landscaping mean was 3.67, whereas the overall grand mean was 3.817. This revealed that while compared to access and distribution together with construction technology, landscaping impacted performance the least.

In respect to supplier landscaping, there was a general agreement from the respondents that the organization; collaborated with developers in the sector to develop modern houses, used real-time innovations in ascertaining construction project progress as well as finished units and constructed modern houses at cheaper costs (M=3.65, M=3.45, & M=3.91) respectively. Correlation output between construction innovations and performance showed presence of a moderately strong correlation (R=0.594). Distribution and access and performance revealed a weak but moderate association (R=0.545) while supplier landscape was weakly associated to performance. Findings also established that construction innovations and access and distribution were significantly linked to performance because their probability values were lower than 0.05 (0.007 & 0.024) nonetheless, supplier landscape was related insignificantly to performance since its p-value exceeded 0.05 (0.052).

5.3 Discussion

5.3.1 Impact of Internet Innovation on Performance

There was a strong agreement that there is a significant contribution of Social Media Marketing (SMM) to the performance of real estate firms. This was in line with the reasoning brought about by Felix (2017), whose works on Branding Property reveal that digital marketing and social media marketing greatly contributed to the performance of the real estate firms that he had under study. This therefore means that our findings were in line with some published works. This was our expected finding as we went out to the field as the researcher had observed that the trend by most organizations to use social media and digital marketing was highly growing. Social Media Marketing was therefore concluded to be a very important tool as far as promoting marketing of property is concerned.

The use of social media was also observed to limit the huge traffics on the various property firm’s websites as most clientele would contact these individuals on social media platforms which then led to lowering of costs of manning the websites. It also promoted the interaction level between the customers and the firms without the firms having to invest in
websites that have all these benefits and real time communication that have been brought about by social media platforms. These resources could therefore be directed to better use in terms of promoting the marketing of properties. The huge savings made as a result of social media platforms have helped those firms that have embraced them and led them to saving more and getting better at their marketing compared to those firms that have not promoted their social media. This finding is in line with the suggestions made by Lim (2016) his works titled Real Estate Marketing which argued that social media has had a huge effect on saving costs of maintaining websites of the various firms thus limiting the moments when the websites are down. It is therefore very important to note that the use of social media has not only had positive impact on the performance and betterment of the real estate firms but has also had a positive impact on the overall saving of costs by the real estate firms.

The study further revealed that the use of mobile devices greatly contributed to the performance of the firms through enhanced information sharing and the use of tools like GPRS. These findings are in line with the suggestions of Kubuta (2014), who argued that the adoption of mobile devices and the use of social media marketing have contributed significantly to the performance and firms have gained competitive advantage due to the effective utilization of technological innovations. This therefore meant that it is very important for firms that are looking forward to bettering their performance ensuring that they have proper and better devices that allow them to have a competitive advantage over their competitors. They can do this by ensuring that they continuously conducting research on what is happening in the world of social media and mobile devices hence save more and more as they get more and more clients.

Due to the costs of marketing being saved by the coming up of social media marketing, Real Estate firms are now able to price their products lower and lower as they save more on marketing as it was more expensive initially to market due to the high expenses of radio and television marketing, which were the dominating mass marketing products. Social media marketing has therefore led to firms saving a lot when it comes to costs of marketing. As stated earlier, the costs of running, maintaining and managing the websites have gone lower; the costs of marketing have also gone lower but the impact of the new forms of marketing (social media marketing) has led to growth in the aggregate performance of firms. Use of already established social media platforms is also apparent in the industry at very low costs as it is easier to understand the level of impact that a certain platform has by
checking these agents up on social media and the comment section. This is in line with the Vinson (2019) who states that it is now easier to know whether a marketing agent is effective by accessing their social media. Use of mobile devices and social media marketing are therefore very effective and should be highly embraced as they have led and are leading firms to become more competitive and lower the costs.

In a nutshell, the more the social media markets are developing, the better and more efficient are the real estate firms moving with this innovation are becoming. This has led to lower and lower costs in marketing compared to the former modes of marketing that were more pertinent in the real estate industry which included use of print media and televisions as a mode of marketing which was very expensive as well. The impact of social media marketing has been noted to be more efficient and cheaper. The more firms utilize internet innovation strategies in their marketing, the more they become competitive and the more they save. It is therefore a very productive activity if firms embrace the various internet innovations options discussed in these studies, the major ones being social media marketing and use of mobile devices to ensure that they continue reaping the various benefits discussed from the use of the various options discussed.

5.3.2 The Impact of Operational Integration on Performance

The study respondents were in agreement that integrated internal processes impacted the performance of Real Estate firms due to measures such as minimizing paperwork, utilization of collaboration tools, and designed automated feedback mechanisms. The respondents reported that there was limited face-to-face communication between Real Estate firms and customers because technological innovations were used to share most of the information. Information sharing had a huge impact on the grand mean, an indication that the performance of Real Estate firms was influenced by information sharing. The respondents concurred that as a result of technological innovations, interactions between agents and clients were made easier. The respondents further reported that Real Estate companies relied on social media platforms to conduct advertisements.

These findings are in line with the views of Kreutzer (2018) that found that the performance of Real Estate firms was influenced by the use of social media platforms like Facebook, YouTube, and Twitter in advertising. Kreutzer further argued that these platforms were way cheaper to utilize as compared to use of traditional methods of integration. Use of Whatsapp as a means of communication especially forming of groups where the various
stakeholders were involved created more real time and faster means of communication hence promoting integration of communication as these platforms allowed clarification in cases where communication was not clear hence bettering the traditional use of emails. Other outcomes from the study conducted by Nakajo et al. (2014) support the role of internal processes in improving performance. Nakajo had also argued that the failure of companies to have proper internal processes would have a negative ripple effect on how the company dealt with its customers leading to unclear and ambiguous mean of dealing with various issues. He was of the opinion that poor internal processes had a negative impact on performance as a result of the internal issues brought about by the lack of efficiency. The correlation coefficient between performance and internal process was a strong one. This therefore highly support the argument that there is a strong correlation between Operation Integration and Performance. The study by Nakajo et al. (2014) had internal process as one of the most significant factor of success of any organization as they argued that if there was poor coordination and control of the internal processes, an organization cannot perform as internal activities of the organization has a huge impact on how the organization deliver their promises to organizations. The study showed that there was a significant and huge input that internal integration had on the performance of the firms. It was seen that it was a major success factor as the better an organization was in its internal processes, the better it was easier to grow as each activity that the organization was.

Communication was also found to be a very important element as far as the success of an organization was concerned. This is both internal and external communication. The internal processes helped refine the processes and changes but these needed to reach the stakeholders and the various customers that the firms had and hence it was found that communication is a critical success factor for any real estate firm that wished to succeed. The results of the analysis strongly supported that communication was a critical success factor as it showed a positive correlation to performance. The findings on the positive correlation of communication to performance were in line with the argument by Hugel (2017), who argued that poor communication with the middle-men would spoil many deals hence it was paramount to have a good communication channel that would limit disagreements and wars between the organizations and the outsiders who are both customers, partners and stakeholders. Hugel further argued that most organizations would perform poorly because they failed to involve the proper stakeholders. Use of middlemen
would greatly affect the impact on communication and more often than not, poor communication led to poor deliverables. More often than not, customers would get the wrong deliverable leading to dissatisfaction which would essentially lead to the loss of those customers and finally the organization would perform poorly.

Information sharing was also seen to be very critical as far as the performance of real estate firms is concerned. Failure to pass on proper information was seen as a major challenge as real estate involve a lot of information sharing. It was found that there need to be proper and quality means of passing on information through the organization to avoid conflicts which would then lead to wastage of resources and poor performance. This was in line with the argument by Kim (2015), who argued that proper information needs to be sent out and shared between organizations to avoid conflicts and wastage of time as the mess brought about by poor information sharing is being taken care of. Some of the critical facts would be lost in the process during information sharing especially when poor modes of sharing are used. This led to the companies wasting resources and customers which essentially led to the organizations performing poorly. It was seen to be paramount that an organization should ensure that they use efficient modes of sharing information to avoid the many disadvantages brought about by the contrary. Proper information sharing is a critical component of any successful firm.

5.3.3 The Impact of Building Technology on Performance

The study revealed that construction technology has a significant contribution on performance. Firms that used construction technology more tend to perform better as technology saves on costs, leading to a larger customer base as the customers end up getting quality, on time and reasonably priced products. This in in line with the arguments by Makena (2018) who indicated that construction technology was significantly linked to performance of Real Estate firms. She further argued that, the use of proper technology would really impact on the performance of the firms as construction technology used has a huge impact on the costs of development which in turn have an effect on the pricing of the final product. Use of the wrong technology would lead to high costs which in turn lead to unnecessarily expensive end products. Real Estate firms that adopted modern construction technologies benefited by coming up with more quality and spacious houses that were less costly. She further argued that the new technology was making it possible to deliver properties faster and also making it easier to make amends when errors have been made.
The Real Estate firms that utilized the new technology were able to deliver houses to clients on time and sometimes before the agreed upon timing leading to happy clients and more referrals which therefore meant better performance. Supplier landscaping was also noted to be lower than the overall grand mean which meant that there was no proper contribution of supplier landscape to performance. Muczyński’s (2015) findings support the findings of the current study in that the researcher established that supplier landscaping together with access and distribution had a minimal impact on Real Estate firms’ performance.

The use of technology to show the deliverables also highly contributed to the performance of the Real Estate firms as noted by the findings of the study. This is in line with the argument brought forth by Hosseini and Chileshe (2017), who argued that use of tools such as virtual reality develops the confidence in clients as they are now able to visualize the final product of the building industry which has then led to better performance of the organization and eventually led to more clientele. Use of technology to also develop efficiency in construction has also led to improved performance as noted by the study. It has become easier to structure the work and plan for the projects from initiation to completion by using software’s that have helped the organizations to stay accountable to their customers as they are able to continually access their performance versus the promises that they made to their clients. This is in line with the argument of Nappi-Choulet and Ribiero (2018), who argued that the use of online databases and software development has helped firms continually access where they are as far as customer satisfaction is involved which has further helped them in ensuring that they deliver as per the promises made to customers. The firms are also able to critique where they are at as far as customer satisfaction is concerned. The new technology is highly assisting in ensuring that the customer and the firms have clarity on the requirements therefore leading to limited conflicts which therefore leads to resources being used better. This therefore means that the new technology not only saves on the costs but betters the customer-firm relationships leading to a double profit to the firm hence better performance. The court litigations that would lead to extra loss of resources have also been limited as a result of these clarities brought about by construction technology.

Access and distribution were also noticed to highly contribute to the performance of real estate firms. Some new technologies such as interactive websites, augmented reality were noted to help to close the gap between the players in the construction industry and the end clients. These technologies were noted to be continuously on the rise as far as Real Estate
firms are concerned leading to better performance by the Real Estate firms. This was in line with the argument by Peterson (2015), who argued that accountability was one of the key elements of success for any Real Estate firms which therefore meant that there is a great need for Real Estate firms to work hard in ensuring that they show a high level of accountability. Peterson further noted that, most of the real estate firms would have these issues to do with accountability due to the lack of means of controlling the funds. The new construction technologies are allowing the formation of escrow account leading to funds being released when the customer is fully satisfied of the end product which is increasing the level of accountability by firms. Clients cannot change their minds on payment as the new technologies also allow for a third party to analyse the requirements versus the delivered item and determine where the problem is.

The use of the various technologies suggested not only led to customer satisfaction, but also led to a better performance as there were more referrals to those real estate firms that took accountability seriously and involved their stakeholders at every point of their activity. In a nutshell, the use of building technology through its various variables had a huge impact on performance and firms that have adopted it have become better in performance and have also had more satisfied customers and stakeholders.

5.4 Conclusions

5.4.1 Internet Innovation and Performance

Internet innovation contributed to performance. Social media marketing was found to have a significant impact on performance. The respondents were in agreement that social media marketing enabled firms and clients easy access to information, it was utilized as a platform for marketing especially sale of properties and tailored customer feedback.

Mobile technology was the other component of internet innovation that significantly contributed to performance. The respondents were in a consensus that use of mobile innovations made it easier to keep customer/vendor database and to contact prospective clients and vendors using emails and sharing of information through websites. It also saved huge costs previously associated with physical visits for search of property listings.

5.4.2 Operational Integration and Performance

Operational integration was a key contributor to performance. An integrated internal process was an integral component of operational integration which had a significant effect
in improving performance; through reduction of paper work and utilization of modern collaborations tools like Google driver and drop box as well as use of integrated customer feedback mechanisms for upcoming property markets and customer data base. Information sharing and communication were also found to be significantly related to performance through improved efficiency in sharing information through mobile phones and social media platforms.

Communication costs were reduced significantly between the client and Real Estate firms, one-on-one meetings were unnecessary since most of the information was shared through technological innovations: social media platforms: Facebook, WhatsApp, emails etc.

5.4.3 Building Technology and Performance

Building technology was significantly linked to performance. Construction technology and access and distribution were important aspects of building technology that were significantly linked to performance of Real Estate firms. Use of construction technologies enabled Real Estate firms to monitor operations within the building particularly temperature and lighting as well as ensuring energy conservation. Access and distribution enabled the firm to make use of virtual reality to give customers a picture of what to expect on completion of the house units, it also improved quality and safety in construction of buildings. The other aspect of building technology was supplier landscaping that was insignificantly linked to performance. Through supplier landscaping, Real Estate firms were able to design cheaper and spacious housing units through collaboration with developers in value chains.

5.5 Recommendations

5.5.1 Recommendations for Improvement

5.5.1.1 Impact of Internet Innovation on Performance

The study recommends the need for Real Estate firms to integrate their internet innovation with their core functions and align their business to global space. This will widen their target market and create a wider market for their businesses and contribute towards increased sales. Real Estate firms needs to structure their marketing departments to integrate social media marketing. They can structure their social media platforms by having target markets in each of their social media platforms and have directed marketing to each of their segments. Also, there is need to have manpower with technical skills and
experience in social media to effectively exploit these platforms for improved and efficient marketing strategies. Real Estate firms should practice continuous training to equip their online marketers with skills and knowledge on online marketing so as to effectively cope with changing needs of the customers.

5.5.1.2 Impact of Operational Integration on Performance

There is need for efficient and timely communication between the developer and the client to ensure congruence between the requirements and the deliverables. This prevents incidences of miscommunication that might result to conflicts, client dissatisfaction and project failure. Real Estate firms needs to adopt escro account between the Real Estate firm, the client, the bank, independent assessors and the developer; this is meant to ensure that all the parties abide to the contract and the client is satisfied with the final product.

There is need for Real Estate firms to invest on continuous training and development programs to ensure that employees are updated and conversant with new systems and processes. This will improve employees’ skills and knowledge resulting to improved efficiency in service delivery, operational processes and clarity on processes and procedures. Real Estate firms should adopt better business models periodically to accommodate technological innovations so as to remain competitive and relevant in the industry. There is a great need for firms to put in resources to improve the operations and ensure growth of organizations. This will ensure that Real Estate firm’s embrace contemporary practices that enable them to meet international standards.

5.5.1.3 Impact of Building Technology on Performance

There is need for Real Estate firms to reduce building and construction costs through use of modern building technologies for example prefabricated materials and precast concrete panels. Buildings and construction projects made from these materials could last for longer periods. Real Estate firms should allocate more funds and resources to Research and Development to analyze ten technological trends to avoid absorption of fake or substandard precast and prefabricated materials to ensure that they give value to customers.

5.5.2 Recommendations for Further Research

Future researchers need to do a replica of this research in other industries other than Real Estate firms. Other sectors of importance might include the banking sector that has similar areas of intervention considering stiff competition facing the industry. This will give a
detailed review on the nature of the relationships found in a study. Technological innovations impacts on efficiency, cost reduction and value addition which are essential indicators of performance. There’s need for future researchers to do a study on how technological innovations affects competitive advantage then findings can be compared after which a plausible conclusion might be drawn.
REFERENCES


APPENDIX I: COVER LETTER

George Kamau

United States International University

P.O.BOX 14634-0800

NAIROBI

Dear Respondent,

REF: REQUEST FOR YOUR PARTICIPATION

I am a Masters of Business Administration student at the United States International University Africa, majoring in Strategic Management. As a requirement before graduation, is to do a thesis of which I chose the topic, “Effect of technological innovations on performance of real estate firms in Kenya.”

You have been chosen to take part as a respondent in my study and this is a kind request for you to help and participate in filling the questionnaire. The information that shall be provided will be treated with utmost confidentiality and shall only be used for academic purposes. If you would like to receive a copy of the research after completion, kindly indicate so by writing your email address on the back side of the questionnaire,

Yours sincerely,

George Kamau
APPENDIX II: QUESTIONNAIRE

Kindly tick appropriately

Part A: General Information

1. State your gender
   Male ( )
   Female ( )

2. How long have you been working in the organization
   0-2 years ( )
   3-6 years ( )
   7-9 years ( )
   Above 10 years ( )

3. Indicate your level of Education
   Certificate ( )
   Diploma ( )
   Bachelor’s Degree ( )
   Master’s Degree ( )
   Doctorate ( )
   Others________________________

4. How many years have you worked in your current position
   0-2 years ( )
   3-6 years ( )
   7-9 years ( )
   Above 10 years ( )

Part B: Internet Innovation and performance of Real Estate firms in Kenya

5. What is your level of agreement on the following statements about the effect of internet innovation on performance of Real Estate firms in Kenya? Using the scale 1- strongly disagree, 2- disagree, 3- moderate, 4-agree, 5-strongly agree.
<table>
<thead>
<tr>
<th>Statements</th>
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<th>2</th>
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<tbody>
<tr>
<td>i) Use of social media marketing enables the client to find the best real estate agent</td>
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<td>ii) The firm has sites with portals where clients and other firms can easily access information</td>
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<td>iii) The firm uses social media to market rental houses or sale of property</td>
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<td>iv) The firm has gained more brand authority by regularly interacting with customers</td>
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<td>v) Social media has enabled personalized response to clients</td>
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<td>vi) The firm has formally improved search engine rankings and traffic to business websites</td>
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<td>vii) Use of mobile phones allows buyers to easily search for property listings conveniently</td>
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<tr>
<td>viii) Use of mobile phones to search for available properties saves time and costs associated with physical visits</td>
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<td>ix) Use of mobile technology gives Real Estate agents a flexible working environment</td>
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<td>x) With the help of mobile technology, it is easy to contact prospective customers and vendors</td>
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<td>xi) Use of mobile devices allows clients to easily send emails from the work-site for instance when one is placing an order for materials</td>
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<td>xii) With mobile devices, it is possible for supervisors to use GPRS and other features to monitor workers.</td>
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6. Indicate any other effects of social media marketing on performance of Real Estate firms in Kenya

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Part C: Operational integration and performance of Real Estate firms

7. What is your level of agreement on the following statements about the effect of operational integration on performance of Real Estate firms in Kenya? Using the scale 1-strongly disagree, 2-disagree, 3-moderate, 4-agree, 5-strongly agree

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<tr>
<td>i.) The firm observes energy conservation in its construction projects</td>
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<td>ii.) The firm has put in place a software to effectively manage building’s operations like lighting and temperature</td>
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<td>iii.) The firm integrates innovations such as onsite drones, building information modelling to boost efficiency in its construction activities</td>
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<td>iv.) The firm uses prefabrication to boost productivity and reduce costs</td>
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<td>v.) Contractors use innovation to develop modern buildings that are energy efficient</td>
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<td>vi.) The firm uses superior construction technologies for improved quality and safety</td>
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<td>vii.) The firm uses virtual reality to enable prospective customers to experience housing units’ designs and space before the start of the construction process</td>
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<td>viii.) The firm develops modern affordable housing that is spacious at lower costs</td>
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<td>ix.) The firm uses real-time technologies to show and report progress of properties under development including completed units</td>
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<td>x.) The firm collaborates with developers in their value chains to build modern houses</td>
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8. Indicate any other effects of operational integration on performance of Real Estate firms in Kenya.

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Part D: Building technology and performance of Real Estate firms in Kenya

9. What is your level of agreement on the following statements about the effect of building technology on performance of Real Estate firms in Kenya? Using the scale 1-strongly disagree, 2-disagree, 3-moderate, 4-agree, 5-strongly agree

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<tr>
<td>i.) Real estate agents save a lot of time when documents are managed using digitized systems</td>
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<td>ii.) The firm use digital collaboration tools like Google driver and Dropbox</td>
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<td>iii.) The firm is able to store bulk information and maintain security when sharing that information</td>
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<td>iv.) Paper work has been reduced which is associated with traditional Real Estate industry operations</td>
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<td>v.) Real estate agents have developed automated messaging to advise customers on new properties in the market</td>
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<td>vi.) Face-to-face communication between clients and Real Estate has significantly reduced due to information sharing</td>
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<td>vii.) Customers can easily share information on Real Estate offices, agents and listing</td>
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<td>viii.) Mobile and social media platforms allow real-time communication on property information</td>
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<td>ix.) Increased communication has slowly changed traditional roles of brokers as advisors: this has lowered costs of properties and thus widening the market for buyers since many can afford</td>
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<td>x.) With the new technology, agencies remain in contact with the customer and colleagues using mobile devices</td>
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<td>xi.) The firm does video advertising using social media platforms: YouTube and Facebook</td>
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<td>xii.) The firm has lowered advertising costs</td>
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<td>xiii.) The firm makes accurate and reliable decisions</td>
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</table>
10. Indicate any other effects of building technology on performance of Real Estate firms in Kenya.

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THANK YOU FOR YOUR COOPERATION