2020

Factors that affect development of affordable housing in Nairobi County.

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FACTORS THAT AFFECT DEVELOPMENT OF AFFORDABLE HOUSING IN NAIROBI COUNTY

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93250

A DISSERTATION SUBMITED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION AT STRATHMORE UNIVERSITY BUSINESS SCHOOL

SEPTEMBER 2020

DECLARATION

Declaration by candidate:

The dissertation is my original work and has not been submitted for the assessment of a master's degree in any other university.

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Declaration by supervisor:

I confirm that the work in this dissertation has been submitted for examination with my approval as the university supervisor

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ABSTRACT

The challenge of affordable housing remains front and central not only in developing but also in established economies. It is however more pronounced in the former than the latter countries given the economic hardships faced by a relatively higher population. In Kenya, recent developments – such as the 2018 signing of a memorandum of understanding (MOU) between the United Nations Office for Projects Service and the Government of Kenya – indicate that initiatives are in place to address the challenge in the near future. However, despite government efforts, there are still over 2.2 million households without affordable housing. The author appreciates that such mainstream factors as inaccessibility to bank financing, prohibitive cost of building materials and government taxation are well researched. However, the impact of factors such as access to alternative financing options, use of nascent building technologies and unconventional government interventions, remain unaddressed. The objectives of this research therefore were; to establish the impact of alternative financing methods on provision of affordable housing in Nairobi county, to determine the impact of modern building technologies on provision of affordable housing in Nairobi county and to assess the impact of government interventions on the provision of affordable housing in Nairobi county. The researcher sought to collect data from 87 registered property developers in Nairobi county using structured questionnaires and to apply the use of multiple linear regression to assess the relationship between the variables. Given the three considered factors, access to alternative financing had the highest impact on the provision of affordable housing with modern building technologies presenting as the second most influential factor. Contrary to the researcher's expectations and extant literature, government interventions were deemed to be of trivial and unverified impact – at the 95% confidence level – on the provision of affordable housing in Nairobi county.

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LIST OF ABBREVIATIONS

GoK – Government of Kenya

IPDU - Integrated Project Delivery Unit

KEPSA - Kenya Private Sector Alliance (KEPSA),

KPDA - Kenya Property Developers Association

SDHUD - State Department of Housing, Urban Development

AAK - Architectural Association of Kenya

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ACKNOWLEDGMENTS

I wish to express my deepest gratitude to my supervisor, Dr. Simon Ndiritu, whose professional guidance, commitment, and invaluable support has led to the completion of this study. I further wish to acknowledge the sacrifice, great love and support of my family, my husband, Tim, and my son, Nathan. They kept me going and this work would not have been possible without their encouragement.

CHAPTER ONE: INTRODUCTION

1.0 Introduction

This chapter provides a background of the study and introduces the constructs considered. Additionally, the problem definition, research objectives, research questions, scope, and significance of the study are presented herein. The purpose of this chapter therefore is to provide the basis upon which the study is built.

1.1 Background of the study

The shelter crisis in the developing world is quickly spiraling into unmanageable levels. Perhaps the most telling indicator of this challenge is the growth in slums and overpopulated residential areas around cities in developing nations (World Bank, 2017). Housing projects available in towns and cities are under considerable pressure from rapid urbanization (Giddings, 2007). Quigley and Raphael (2004) observe that although the average expenditure on housing across the United States is 25 percent, urban areas experience increased expenditure with the housing allocation of income in some areas estimated as high as 65 percent. The challenge of affordable housing is more hard-hitting in developing nations as the economically marginalized grapple with the ever-increasing cost of land and construction of houses. The desperate situation therefore necessitates the development of innovative initiatives to summarily address the concern. According to Ackley, Teeling and Atamewan (2018), a myriad of factors impact on the availability of affordable housing; rural-urban migration, lack of planning, training and management, poor implementation of policy, difficulty in purchase, and high cost of materials, among others. The current study however focuses on novel approaches deemed influential to the provision of affordable housing in Nairobi with the factors under consideration being - alternative financing methods, modern building technologies and appropriate government interventions.

The 2018 signing of a memorandum of understanding (MOU) between the United Nations Office for Projects Service and the Government of Kenya highlights the government's efforts towards alleviating the shortage of affordable housing in the nation. The MOU involves the building of 100,000 green and energy-efficient homes for marginalized communities. Although similar efforts have been evidenced – a similar 100,000-homes project involving the State Housing Department and Sustainable Housing Solutions – the challenge of availability of affordable housing remains front and central to the nation given that 2.2 million homes are needed to address the shortage of affordable housing in the country (World Bank, 2017). The

highlighted need necessitates investigation into possible interventions as effected by stakeholders in the construction industry, in a bid to achieve ubiquitous affordability in housing. This study seeks impetus from this need centering on three factors – alternative financing methods, modern building technologies, and government interventions – as possible influencers of affordable housing in the Kenyan context.

1.1.1 Affordable housing

Stone (2006) defines housing affordability as "an expression of the social and material experiences of people, in relation to their individual housing situations". Given the difference in perception and subjectivity involved in quantifying social and material experiences, it is evident that arriving at an exact definition of an 'affordable task' is virtually impossible.

However, there are multiple indicators that are commonly used in quantifying affordability in housing. The most common approach in assessing affordability of housing centres on the ratio method; this involves assessing the fraction of one's income assigned to housing expenditure (Lane, 1981; Yip, 1995, Wilcox, 1999). In the United States, affordable housing was deemed to involve a less than 25% expenditure on total income with the figure changed to 30% after the 1980s (Stone, 2006). Quigley and Raphael (2004) highlight that in 2003, urban areas experienced increased housing expenditure of up to 65 percent.

Stone (2006) further asserts that the notion of affordability of housing cannot be limited to the physical structure; aspects relating to the decency, crowding conditions, tenure terms and accessibility of locations similarly speak to the affordability of housing. Thalmann (2003) includes considerations on security concerns as being informative of the affordability of housing, as the factor bears significance in determining the pricing, hence affordability, of housing. Acolin and Green (2017) assert that an alternative model for homeowners incorporates owner's equivalent rent inclusive of transport costs. The authors incorporate transport to the housing expense and urge governments to establish affordable housing in places that also have cheaper commutes.

This study therefore encapsulated affordable housing as entailing housing that – does not claim a higher than 25 percent expenditure of income, offers sufficient decency as perceived by the resident, does not present issues of overcrowding, has favorable tenure conditions, offers adequate security and is conveniently located (Stone 2006; Lane, 1981; Yip, 1995; Thalmann, 2003).

1.1.2 Alternative financing methods as a factor affecting affordable housing

Olanrewaju and Woon (2017) assess the various factors affecting development of affordable housing in Malaysia. Among the most pivotal factors emerging from the study is inaccessibility to financial services. This assertion is supported by Bagutaya, Ariffin and Raji (2016) in a study conducted similarly in Malaysia and additionally by Worthington and Higgs (2013) through a study conducted in Australia. The need for non-conventional financing is therefore of pivotal importance as, given the current situation of lack of housing facilities, it is inferable that traditional financing approaches (such as standard mortgages issued by banks) have fallen short in solving the problem.

According to Gichunge (2001), financing refers to the adequate provision of affordable funding from both public and private sources to support construction and development of housing. The lack of access to credit facilities forces low income earners to contend with inadequate resources, living in makeshift shacks, partly finished rooms, and temporary partitions for walls (Kakumu, 2016). Majority of developers target high- and medium-income earners on account of their ability to secure loans at tenable interest rates (Wahito, 2013). The resulting scenario is that lower income earners are marginalized on account of their inability to secure loans with the only options left available for them presenting in way of personal savings and private financiers who charge exorbitant prices for funds (Obaga, 2015).

Moko and Olima (2014), posit that the unfavourable lending conditions in the country necessitate innovation in finding approaches that would result in more accessible funding streams. Among the proposed options is that involving sourcing of funds from international lending organizations. Key players in this space are Development Finance Institutions (DFIs) that are reported to issue funds with interest rates lower than 10 percent (Olotua, 2010). The savings are then transmitted down to the consumer hence lowering the cost of the final purchased units.

Olotua (2010) presents another alternative. He proposes cash-flow-based financing options. A notable option to this effect is the home improvement loans assigned to low-income earners issued in the form of small, targeted disbursements; an example would be the issuance of loans to fix a toilet or construct a floor. The low amounts and the tethering to cashflow offer increased security for the loans. This option provides an avenue for improving homes without the added risk associated with high-value mortgages (Maigua, 2014).

Kangethe (2014) agrees with Olotua (2010), in addition he proposes incremental financing which involves funding a new home in series of stages to match the cash flow of the borrower. Clients may chip in their labour resources to build their desired houses. This often starts with a loan for the purchase of the land, followed by a separate loan to build the foundation, a loan for materials acquisition, a loan for the first floor and so on.

Noppen (2012) looks at the broader picture and puts forth several strategies that might allow low-income earners to access resources for affordable housing. Firstly, he proposes joint land purchases by groups of low-income households, this would make land affordable and reduce the risk to the lenders. Secondly, he advocates for finding of concessionary funding to on-lend from foundations and Development Finance Institution that would lead to reduced rates. Finally, he observes that financial institutions can utilise creative and informal mechanisms for collateralizing strategies such as requiring guarantors from the community.

Alternative financing methods are defined as non-traditional approaches to advancement of finances (Nappen, 2012). Alternative financing options proposed by authors operating in different contexts include – community-based funding, subsidized targeted loans by banks; Development Finance Institutions funding and cashflow-based funding (Jeffrey & Xin, 2018; Bagutaya, Ariffin & Raji, 2016; Moko & Olima; 2014, Noppen, 2012). The perceived impact of these alternative financing methods will be assessed in this study.

1.1.3 Modern Building Technology as a factor affecting affordable housing

Multiple modern building technologies have been suggested in a bid to lower expenditure of housing construction. They majorly center on alternative building materials. The premise behind sourcing of cheaper building materials is that cost-effective sourcing of materials would result in more affordable houses that would thus offset the needs of financially marginalized populations.

Modern building technologies cover a wide range of techniques and practices that encompass the latest developments in materials technology, design procedures, quantity surveying, facilities management, services, structural analysis and design among others. Modern technology can increase levels of quality, efficiency, safety, sustainability, and value for money. The adoption of advanced construction technology requires an appropriate design, commitment

from the whole project team, suitable procurement strategies, good quality control, appropriate training, and careful commissioning (Designing Building Wiki, 2017).

While documented research in this area shows promise, the trend in Kenya indicates preference for traditional building materials and techniques such as the use of stone and cement (Indeje, 2017). The challenge in advocating for the use of alternative building materials is however not peculiar to the country as clients the world over show a preference for building with locally acceptable materials. A shift towards preference of the materials by developers would require a pull factor with clients showing an appreciation for the utility of the materials (Alagbari, et al, 2012).

According to Noppen (2012), using alternative building technologies can be challenging in the Kenyan market, but if done correctly it has the potential to be an essential piece of bringing down the cost. For instance, interlocking bricks, in Kenya, presents as the most viable alternative for motor and stone. The option is cheaper to implement as the bricks can be made with locally available materials which often are less expensive. The building duration is less time-consuming owing to ease of assemblage.

Two of the most promising construction techniques are Slipform Technique and pre-cast concrete. According to Kamal, Hassan and Osmadi (2016), in the slipform technique of building, construction begins with the erection of the framework. This remains in place until the entire structure is set up. The approach allows for significant cost savings (Temba, 2015). Precast concrete and stone also present as viable options, besides the benefit of energy efficiency and aesthetic versatility, they provide excellent noise attenuation, outstanding durability and lead to reduced construction time (Kamal et, al, 2016).

Cook, Cripps, Irwin and Kolokatroni (2007) assert that the costs associated with building go beyond the financial implication of sourcing of materials and consideration of alternative building techniques; this, they argue, is because factors such as perceived risk, ignorance on benefits associated with new materials and perception of uncertainty of new technologies play a key role in adoption of alternative technologies. Harrison and Sinha (1995) nevertheless set forth that in India, a cost saving potential of 5 percent would justify a switch to innovative technologies thereby indicating that the context within which technologies are introduced play a pivotal role in determining acceptance or lack thereof of modern building technologies.

In this study, impact of modern building technologies was considered through a multifaceted approach involving consideration of both direct cost saving technologies and the associated implications of switching to such technologies. The itemization of the construct is therefore as follows - Cost savings associated with alternative materials (e.g. filler slabs, wood and soil cement blocks), comparative long-term cost effectiveness, training costs, and socio cultural shifting costs (Cook et al., 2007; Harrison & Sinha, 1995; Lu, El Hanandeh, Gilbert & Bailleres, 2017; Reddy & Jagadish, 2003).

1.1.4 Government interventions as a factor affecting affordable housing

Government interventions generally entail government policies and initiatives aimed at effecting affordable housing (GOK, 2009). Possible interventions by the government focus on the rates associated with land ownership, subsidization of building inputs and direct involvement in the creation of housing projects aimed at addressing the needs of those seeking affordable housing.

In Kenya, the government set up the National Housing Policy in 2003. The housing policy's purpose was to: facilitate the access to land and security of tenure for all socio-economic groups; to facilitate the availability of finance in the domestic market; and find ways of mobilizing capital from investment groups. It also encouraged the participation of private sector and other development partners in the planning, development, and management of housing programs (Omwenga,2013).

Prior efforts by the government to achieve affordable housing have had varying success. Magutu (2005) in an assessment of the Chaani low-income housing program, informs that the program was set up to benefit low-income households in the region. The author highlights that large sums were spent on the setting up of trunk infrastructure for water and sewers and electricity links without considerations on the affordability of the social amenities by the local population. The eventual outcome therefore was that the constructed houses were occupied by middle-income families with the low-income households left unattended to. His study illustrates the effects of inefficient management of government programs aimed at effecting affordable housing projects.

Several authors have put forth suggestions of what the pivotal role of government should be in the housing industry. San Ong (2013), highlights the implications of high real property gains tax (RPGT) arguing that lowering the tax would incentivize developers to generate lower-priced

homes which would in turn attract more buyers due to favorable pricing. Harelimana (2017), proposes that governments should encourage mixed-income developments. Developers should be allowed to build subsidies into their model. This can be in the form of a traditional cross-subsidy, where the affordable units make a loss that is subsidized by middle-income units. Alternatively, the affordable units can make a small margin while middle-income units make a larger margin.

Halachmi (2010) posits that the role of government is to provide incentives for the private sector and to further ensure the institution of sound regulations. Savas (2005), agrees with Halachmi (2010) and adds that Public, Private, Partnerships (PPPs) allow the government to conduct public projects through the strategic aid of private partners with competencies that the government would otherwise not provide. The overall effect is that the purchasing of a house under a PPP allows for more affordable units (Sengupta, 2006).

Watkins (2002) proposes that the government should take a pull approach in creation policy in that the entails of the policy would be determined by demand and not vice versa. Bramley (2007) disagrees with Watkins (2002), he points out that such an approach may result in construction of houses that are uncompetitively priced.

Asperen (2014), postulates that the rigour by which governments enforce titling or land registration issues, determines the frequency and nature of investment, access to credit and overall tax collected from land and properties held. Deininger & Feder (2009), agree with Asperen (2014) and add that this is because a sound and defined registration environment limits uncertainty over land ownership hence spurring investment and minimizing land-related conflicts. Kgobetsi (2017) advocates for development industry calls for the awarding of contracts to persons deserving on account of their ability to build high-quality premises while adhering to set laws and regulations.

In this study, government interventions were assessed through various avenues ranging from actual creation of housing projects to facilitation of partnerships. This approach is taken as the researcher appreciates that the government plays a central role in orchestrating factors that eventually influence the price of homes. The specific aspects thus considered include - direct interventions through building schemes, tax lowering, subsidies for lower-income-based constructions and facilitation of multi-sector and NGO partnerships (San Ong, 2013; Lim, Olanrewaju, Tan, & Lee, 2018; Omwenga,2013; Magutu, 2005)

1.1.5 Kenyan Construction industry overview

As stipulated in Article 43 (1)(b) of the constitution of Kenya, the government is responsible for the provision of accessible and adequate housing with the constructed housing further offering reasonable sanitation conditions (GoK const. art. 43 (1)(b)). To this end, the development of the Kenya Affordable Housing Programme serves to detail the manner through which affordable housing is to be provided in a collaborative effort involving an array of stakeholders in the construction of homes (Kenya Affordable Housing Programme, 2018); these stakeholders include but are not limited to – Kenya Private Sector Alliance (KEPSA), Kenya Property Developers Association (KPDA), Architectural Association of Kenya (AAK), Federation of Kenya Employers (FKE), and the Central Organisation of Trade Unions (COTU-K). Among the stipulations put forward in the housing program is the requirement for collaboration between the government (actioned through the Integrated Project Delivery Unit (IPDU) of the State Department of Housing, Urban Development (SDHUD) and developers seeking to engage in the development of affordable housing units (Affordable Housing Programme, 2018).

With regard to the interaction between the government (IPDU) and developers, the former play the role of development of off-site infrastructure through the special purpose vehicle (SPV), provide access to a ready market, facilitate funds provision to the sector through the Housing Fund and third-party financiers, and de-risk projects and ensure quality housing (Affordable Housing Programme, 2018).

According to Indeje (2017), the World Bank and the UN have been instrumental in the development of 150,000 apartments in previous shantytowns. Likewise, funding from the Chinese government has allowed for invigoration of construction efforts in the country. The trend of increased development has been ongoing for the previous 5 years with the construction industry contributing 7 percent to the country's GDP. A steady growth of up to 8.7% was anticipated for the years leading up to 2026, a trend that would see the construction industry in the country surpass that of other sub-Saharan countries.

Housing is one of the pillars under the President's Big Four Agenda. The government is meant to provide 500,000 decent, affordable housing units by 2022. The project outlines three levels of housing types. The middle to high income range will cater to Kenyans earning between Sh50,000 to Sh99,000. Low cost will be for those earning between Sh15,000 to Sh49,000 while social housing will cover those with a monthly income of between Sh0 to Sh14,900. Under the affordable housing plan, a bedsitter will cost a maximum of Sh800,000 to purchase and Sh1

million for a 2bedroom, while a 3bedroom unit will cost Sh2 million. In social housing, the maximum selling price will be Sh600,000 for a 1 bedroom and Sh1million for a 2bedroom unit. (Affordable Housing Programme, 2018)

1.2 Problem Definition

Adequate, affordable, and decent housing within urban areas of developing economies has become a mirage with the most affected being the low- and middle-income earners who form majority of the population (Maigua, 2014). Though a necessity, housing is still considered a luxury to the middle- and low-income earners in Kenya. According to the 2008 census, the Kenyan population grew by approximately 25 percent, while the economy only managed to generate less than 100,000 housing units per year. It is instrumental to note that these less than 100,000 units cover the middle-class areas (KBS, 2008). This clearly indicates a huge housing deficit in providing adequate and affordable housing especially for low income earners in Nairobi County where informal settlements have been mushrooming.

Ideally, the state of increased urban population presents an opportunity for developers as it translates to increased demand for housing; however, this is not the case as a majority of the rural to urban migrants cannot afford to buy or rent the housing available in the city. Many developers have therefore concentrated on the upper and a proportion of the middle segments of the market with relatively little focus on the low-income market. To note, is that the availability of clients that can purchase or let the new developments is quickly diminishing thereby necessitating the move by developers to identify factors that can reduce construction costs so as to provide affordable housing to the majority of currently marginalized citizens (Indeje, 2017).

Additional studies conducted by authors; Maigua (2014), Moko and Olima (2014) and Omwenga (2013), on factors that can be adopted to reduce housing costs in developing economies, highlight factors such as: availability of financing options, availability and cost of land, availability and cost of building materials, infrastructure availability, building standards, codes and regulations and government taxations. Their focus was on mainstream prior-highlighted factors that have affected the provision of affordable housing for many years and have been extensively addressed. However, a gap exists in evaluating the effects of alternative financing methods, modern building technologies, and appropriate government interventions in the provision of affordable housing. This study therefore sought to fill this gap by evaluating a range of previously unaddressed factors.

1.3 Research Objectives

The general objective of the study was to establish the factors that affect the provision of affordable housing in Nairobi County. The study was therefore based on the following specific objectives:

i) To establish the impact of alternative financing methods on provision of affordable housing in Nairobi county

ii) To determine the impact of modern building technology on provision of affordable housing in Nairobi county.

iii) To assess the impact of government interventions on the provision of affordable housing in Nairobi county.

1.4 Research Questions

The study sought to answer the following research questions:

i) What is the impact of alternative financing methods on the provision of affordable housing in Nairobi County?

ii) To what extent do modern building technologies affect the provision of affordable housing in Nairobi County?

iii) What is the effect of government interventions on the provision of affordable housing in Nairobi County?

1.5 Scope of the Study

This study focused on all property developers registered by Kenya Property Developers Association (KPDA) and specifically those operating within Nairobi County; there are 87 such registered developers (KPDA, 2019). The study sought to establish the impact of alternative financing methods, modern building technologies and government interventions on the provision of affordable housing to clients, potential buyers as well as the public. The study further sought information from the management of organizations involved in the building and housing industry in Kenya. These respondents were perceived to have firsthand information and experience in the Kenyan housing industry. Although other industry players such as real estate agents, industry suppliers, project managers and contractors influence the price of housing affordability, this study will not focus on them.

1.6 Significance of the Study

This section provides a summary of the utility of study finding to various players in the housing industry.

1.6.1 To the policy makers

The understanding that there are factors that affect the provision of affordable housing to the Kenyan public can help policy makers, governments and other stakeholders to design targeted policies and programs that will actively stimulate the growth, viability and sustainability of the construction and housing industry in the country. The study findings can inform policy makers on areas of interest particularly within the financing industry, appropriate and innovative building technologies, and government interventions and incentives that will encourage provision of affordable housing to the Kenyan market.

1.6.2 To managers in construction firms

The study findings are beneficial to the management of organizations within the building and construction industry. The findings offer useful insights on appropriate factors and techniques that will spur the provision of affordable housing to Kenyan investors and homeowners. Local building and construction industry players need to adapt to the changing practices and techniques as well as the evolving consumer needs.

1.6.3 To academicians

This study created a reference point of information to academicians and scholars. Most importantly, this research will contribute to the literature on factors affecting the provision of affordable housing in the building and construction industry especially in developing countries like Kenya. It is hoped that the findings will be valuable and may provide useful research gaps that may stimulate interest for further research.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

The purpose of this chapter is to provide an exposition of literature pertaining to the factors that affect sustainable provision of affordable housing in Nairobi county. The chapter therefore seeks to highlight theories that are germane to the study showing how these (theories) shape the study. Additionally, empirical findings put forward are discussed herein with the purpose of highlighting the research gap and operationalizing the constructs under consideration in addressing the research objectives. This chapter is therefore subdivided into the following main sections – theoretical foundation, empirical review, research gap, conceptual framework, and operationalization of variables.

2.2. Theoretic frameworks

According to Moko and Olima (2014), theory helps make sense of complex situations by directing attention to key issues and by guiding methods of analysis. They address three aspects of science namely, explanation, prediction, and direction. This study focuses on the theory of demand and supply, its application to provision of housing and implications to affordability.

2.2.1. Theory of Demand and Supply

The theory of supply and demand traces its origins to an 1890 publication by Alfred Marshal in his seminal publication on the principles of economics (Marsha, 1920). According to Jain (2007), in a competitive market, variations are to be expected on the price for a good, service, commodity or other traded item; a variation that should persist until the price settles at a point at which the quantities supplied and demanded balance out. The law of supply and demand holds true in the property market. However, there are opposing views to this theory in its application to the housing industry. According to Arnott (1987) there are marked differences between the housing industry and typical commodity industries that are fittingly explained using the theory. Among the notable dispersions between the industry and others is the effect of government intervention which is predominant in the industry. The author goes further to explain that the currently advanced imperfect competitive and non-competitive theories offer better fitting alternatives to the elucidation of patterns in supply and demand within the housing industry. Additionally, Mankiw and Tailor (2011) postulate that markets are not always in equilibrium

due to mismatched levels of supply and demand in the economy. When supply is more than demand, a surplus ensues, which drives down the price of the good. Disequilibrium also occurs when demand is higher than supply, leading to scarcity and, thus, higher prices for that product.

The theory of supply and demand is chosen as the governing theory for this study. Essentially, the availability of financing allows for enhancement of supply, an oversupply translates to a reduction in price and an eventual increase in demand. Additionally, an increase in the uptake of modern building technologies would allow for substitution of more expensive building materials with less expensive ones, with the net effect being the lowering of prices of the eventual houses and an increase in demand. Finally, government incentives are generally targeted at addressing bottlenecks in the provision of affordable housing, most notably through tax cuts and tax exemptions. A lowering of expenditure for developers should translate into lower overall costs of building with the result being increased supply, reduced prices, and increased demand. Furthermore, the researcher asserts, as supported by other authors in the local context (Mwangi, 2005; Magutu, 2005) that there is explicit evidence of scarcity of housing despite the burgeoning demand for affordable premises; the general inference therefore is that supply and demand are shaping factors seeking assessment of the interaction between the two forces in the Kenyan context.

2.3. Empirical Literature Review

This section provides an insight into literature put forward by different authors assessing the dynamics of affordable housing in different contexts. The purpose of the section is to provide a backdrop of findings upon which the current study is built and to highlight the research gap that the researcher seeks to address. This section takes a more profound look into the various factors – alternative financing, modern building technologies, and government interventions – and their effects on provision of affordable housing.

2.3.1. Alternative financing methods as a factor affecting affordable housing

Olanrewaju and Woon (2017) in a study conducted in Malaysia assess the various factors affecting development of affordable housing in the country. The authors assess 468 households on the significance of 20 select factors deemed to be pivotal to the provision of affordable housing. Cross-sectional survey questionnaires were used as the data collection tool with factor

analysis utilized in segregating the various contributory factors into umbrella groupings based on covariance. Six factors emerged as most pivotal to the provision of affordable housing - general factor, financial factor, building factor, income factor, accessibility factor, market factor and location factor. Financial factors were cited as the second most prominent determinant with issues cited under the factor including unavailability of credit and a lack of financing options outside mainstream financing provisions. This study therefore highlights the pivotal role of alternative financing methods as a contributor to provision of affordable housing.

In a study conducted in a similar context – Malaysia – Jeffrey and Xin (2018) did a qualitative research study with ten industry participants from developer and real estate companies and the inclusion of validation by three industry experts. The financial factors, income, property price, and supply of affordable housing are deemed insufficient in addressing the needs of the market. This study employed a descriptive approach in analysis and arrived at similar conclusions to the foregoing one – specifically, that financial factors play a crucial role in determining provision of affordable housing hence the need for alternative sustainable approaches to the sourcing of funds. Among the highlighted alternatives is community-based funding.

In a study conducted in Saudi Arabia through survey responses with 14 consultants, sixteen contractors and 5 real estate investors; Sadi, Assaf, Abdulaziz, Bubshaitr and Fawaz Al-Muwasheer (2010) highlight that unlike in the study by Olanrewaju and Woon (2017), financing factors did not mitigate against provision of affordable housing. The authors assessed the significance of 34 different factors ranking and grouping them by order of importance as depicted in the severity index. The most noteworthy factors were inadequate labour availability, materials standards, design quality and design changes. The authors highlight that financial services provided through traditional approaches by institutions –such as the Real Estate Development Fund, public sector representation by Ministry of Housing, national banks, the private sector, joint stock companies and institutes – were sufficient in servicing the industry. This finding therefore indicates that the lack of alternative approaches to funding of affordable housing projects is not ubiquitous and mainly depends on the context of the country.

Bagutaya, Ariffin and Raji (2016) investigated problems facing middle-income individuals in Malaysia regarding affordability of housing. The data was collected from 50 respondents and was analysed through descriptive statistics. Findings revealed several challenges, the three most prevalent being loan availability, housing affordability and housing scheme policy. Their research shows that the high costs of securing housing is a major challenge to middle income

earners in Malaysia, a third world economy like Kenya. It thus underscores the need for affordable housing through alternative financing approaches that consider the financial ability of the targeted communities.

Worthington and Higgs (2013) in exploring the role of drivers of Australian housing affordability posit that the main drivers are housing finance, dwelling approvals, and financial assets. The authors employ an autoregressive distribution lag to model the housing affordability measures as stipulated in the Housing Affordability Index between the period 1985 to 2010. Additionally, the authors argue that delayed house approval rates further pose a persistent structural gap between supply and demand of affordable housing; this finding is in keeping the with asymptotic supply and demand model presented by Stone (2006).

Kieti and K'Akumu (2008) conducted a study aimed at identifying factors that caused unaffordable mortgages in Kenya. Primary data was collected via administration of questionnaires in Nairobi, Kenya, from 353 households, 117 of them being maisonettes and 48 being bungalows. Secondary data was collected from government publications including GDP per capita, unemployment rate and other data. Factors were derived from literature. Regression analysis was used to evaluate strengths of relationships between variables. It was found that interest on mortgage was the most strongly (and positively) correlated with affordability, followed by number of dependents and number of family members with income. This paper allows for an understanding of important factors that are correlated with the affordability of housing taken up by Kenyans hence is informative in determining alternative funding approaches that address the concerns.

Olotuah (2010) agrees with Kakuma (2016), in stating that one of the reasons for the inability to access loans is that a majority of individuals work in the informal sector, and as such are not able to provide employment documentation that would qualify them for a loan. Olotuah's (2010) study, which was conducted in Mombasa, Kenya, however, features no collection of primary data with inferences derived from the observation of secondary data on the performance of the industry in Nigeria.

Kangethe (2014) in a study conducted in Kenya, purports that the challenge of building houses for the lower-income population stems from inability to secure loans on the grounds of insufficient collateral and information. The challenge of difficulty in securing debt in Kenya is compounded not only by the limiting interest rates but also by the bureaucratic processes involved in securing the loan (Giddings, 2007; Maigua, 2014). Maigua's study featured 120

property development entities in which collected data was assessed through bar charts, grouped frequency distributions and pie charts. As Maigua (2014) elaborates, challenges presented in delays in disbursement and hurdles to attain approvals, render the process cumbersome to those seeking to secure loans.

2.3.2. Effects of Modern Building Technologies on Affordable Housing

Cook, Cripps, Irwin and Kolokatroni (2007) assessed the factors affecting provision of affordable housing by determining the preferred use of alternative building technologies in constructions. The authors conducted a study in the UK and employed a qualitative secondary data collection approach in collection of data from building projects stakeholders in the UK, with descriptive statistics utilized in providing insights on the factors. The main factors deemed pivotal in determining uptake of alternative building technologies, as identified by the authors were – ignorance, perceived risk, and uncertainty on the reliability of the technologies. The authors further assert that the emphasis on cost must be taken considering the social and environmental implications of switching to alternative building technologies. The general inference from the study, therefore, is that the cost of alternative building technologies goes beyond payment for the materials involved in construction.

According to Harrison and Sinha (1995), in a study on alternative technologies in building, an overall saving of 5% in construction costs is sufficient in justifying a switch to alternative building technologies. The authors centred their study in Bangalore, India and relied on secondary data in assessing the costs of building using various materials. A descriptive statistics approach was used in comparing the various cost associated with various technologies. Findings from the study indicated that burnt clay bricks can be improved to a level where plaster finishes are unnecessary therefore resulting in significant cost savings. Additionally, the use of modified filler slabs was associated with up to 36% saving in comparison to the use of conventional slabs. The authors however highlight that the use of alternative technologies comes with the need for training and the costs associated with training must be taken into consideration in estimation of the actual costs of switching to new technologies.

Lu, El Hanandeh, Gilbert and Bailleres (2017) assessed the use of wood as an alternative building material to steel-based construction. The authors conducted their study in Australia and employed an in-vivo experimental design involving the tracking of the energy requirements involved in preparing a one-meter-long building-level hardwood piece. The authors surmise that

the energy required to create such a piece is 186.78 mega joules (MJ) and is therefore only marginally less than that required for the preparation of steel for the same purpose (216.86 mega joules (MJ). The energy requirement is however less than that required for concrete – 352.82 MJ. The general inference therefore is that the consideration of alternative building materials, regarding cost savings, must be made as informed by objective data.

Reddy and Jagadish (2003) in a study conducted in India highlight the need for alternative building technologies considering the need to minimize greenhouse gas emissions. The researchers compared the energy consumption in the creation of conventional building materials, such as cement and steel, to consumption associated with such alternative materials such as soil cement blocks. The authors found that soil-cement blocks allow for a 62% saving in energy and are just as effective in the construction of multi-storeyed buildings. The authors therefore concluded that the switch to the alternative building material is well supported both from a practical functionality and a cost-saving standpoint. This study therefore serves to provide an alternative building technology with justified practical application.

2.3.3. Effects of Government Interventions on Affordable Housing

San Ong (2013) investigated the macroeconomic and demographic factors that affect the price of housing in Malaysia. The author utilized secondary data obtained from various sources including the Department of Statistics of Malaysia. Following a review of literature, the author identified population, GDP, interest rate, labour force, inflation, and real property gains tax (RPGT) as potentially the most potent factors. Regression analysis revealed that RPGT, GDP and population had significant relationships with housing price in Malaysia. RPGT however had a negative correlation coefficient, which was contrary to previous studies. The factors mentioned here may have a significant impact on housing prices in Kenya, being a developing economy. Among the notable government interventions would be the lowering of real property gain tax or similar taxes in the local context.

Chan and Adabre (2019) highlight the critical success criteria (CSC) that are necessary for sustainable, affordable housing. The critical success factors were arrived at through literature review. The review revealed 20 Critical success factors (CSC). This list of CSCs was submitted to experts for editing and approval. A Kaiser-Meyer-Olkin (KMO) analysis was used to determine the appropriateness of the data for factor analysis. Finally, Principal Content Analysis was employed for extraction and Varimax with Kaiser Normalization for rotation to come up

with six CSC. These were: household satisfaction, quality, location affordability, stakeholders' satisfaction, housing operation cost and time measurement. This study therefore shows how the government can reduce the cost of affordable housing by ensuring sustainability. As shown by Mulliner et. Al (2013), success of affordable housing has not only been expressed by economic criteria but also social and environment criteria. The aforementioned criteria cover all these three categories, making it a posited framework and a noteworthy one in creating sustainable affordable housing.

Lim, Olanrewaju, Tan, and Lee (2018) investigated the factors that affect the demand for affordable housing in Malaysia. A review of literature was used to identify factors that may affect affordable housing demand. Residents at six apartments in Penang, Malaysia were then requested to gauge the importance of the factors through a Likert Scale. Emergent factors were transportation, repayment ability, limitation on consumables, satisfaction, neighbourhood security and debt impact. The study thus highlights important factors that affect demand, and hence pricing, of affordable housing. It would enable governments to improve affordable housing efforts by adopting a demand-led approach.

Maimun et al. (2018) published a study of the government of Malaysia's affordable housing policies. The authors put forth a framework to explain occupation of government-built housing projects via demand and site selection metrics incorporated in an artificial neural network (ANN) model. The model is selected for use chiefly because of its ability to identify trends and patterns that would otherwise be missed. In the proposed model, demographic data is fed in (data from the census), processed, modelled via ANN (through tests like Mean Absolute Percentage Error) and output. This paper provides a possible way to use census data to identify trends in real estate for affordable housing.

Midheme and Moulaert (2013) in an assessment of alternative approaches to funding in acquisition of affordable housing highlight the case of Tanzania-bonding community. The project was set through a partnership approach among multiple stakeholders; these included the government, the National Co-operative Housing Union (NACHU), University of Nairobi's Housing and Building Research Institute (HABRI), Barclays Bank, and Kituo cha Sheria – a legal NGO (Bassett and Jacobs, 1997; Yahya, 2002). These partners were responsible for setting up structures under a community land trust where the acquired land was deemed the property of previous squatters occupying the land; the land allotted required nominal fees in the tune of KES 3,500 in order to gain communal ownership of land. Selling of one's allotment therefore

involved the selling of the structure as opposed to selling of the land. The authors however observe that the success of such a project is dependent on the legal framework and institutional design – factors that can be difficult to ensure. Furthermore, effective leadership in such initiatives is often not easily guaranteed. This study therefore shows innovative partnership involvements spearheaded by government in the bid to provide affordable housing to marginalized communities.

2.4. Research Gap

As highlighted in the foregoing discussion, there is an apparent need for innovative approaches in addressing the need for affordable housing. The apparent effectiveness of the various prescribed approaches to affordable housing (e.g. through alternative financing as compared to traditional financing) are context specific and therefore interventions should be as such. This study sought to assess the specific factors peculiar to the market in Kenya regarding the provision of affordable housing. The study sought to fill the gap of divergence in findings on the applicability of alternative financing options, appropriateness of modern building technologies, and possible government interventions as assessed from the perspective of property developers. The forthcoming findings therefore serve to highlight the peculiarities of drivers of affordable housing in the Kenyan context and as perceived by developers in the space.

Table 2.1 Research gap illustrated

S.No	Variables	Previous authors focus	Current research focus
1.	Affordable housing	Housing that: - utilizes the ratio method (less than 25% expenditure on total income, figure changed to 30% after the 1980s, went up to 65% in 2000s) - considers; repayment ability, satisfaction, and debt impact -includes; financial factor, building factor, income factor, accessibility factor, market factor and location	Housing that: - does not claim a higher than 25 percent expenditure of income, - offers sufficient decency as perceived by the resident, - does not present issues of overcrowding, - has favorable tenure conditions, - offers adequate security - conveniently located

		factor.	
2.	Finance	Finance provided through: - Mortgages - Loans - Savings	Finance provided through: - community-based funding, -subsidized targeted loans by banks - Development Finance Institution funding - cashflow-based funding
3.	Building costs	Cost associated with: - availability of building materials. - Use of steel and cement - ignorance, perceived risk, and uncertainty on reliability of technology	Cost savings associated with: - alternative building materials (e.g. filler slabs, wood and soil cement blocks), - comparative long-term cost effectiveness, - training costs, - socio cultural shifting costs
4.	Government role	Interventions through: - Tax reductions - Provision of land - subsidization of building inputs - infrastructure availability, - building standards, - codes and regulations	Direct interventions through: - building schemes, - tax lowering, - subsidies for lower-income-based constructions - facilitation of multi-sector and NGO partnerships

2.5. Conceptual Framework

The conceptual framework presented here shows the interaction between factors affecting housing costs as the independent variables and provision of affordable housing in Kenya being the dependent variable. The implementation of the independent variables (alternative financing methods, modern building technologies and government interventions) is proposed to have a significant effect on the provision of affordable housing especially to low income earners.

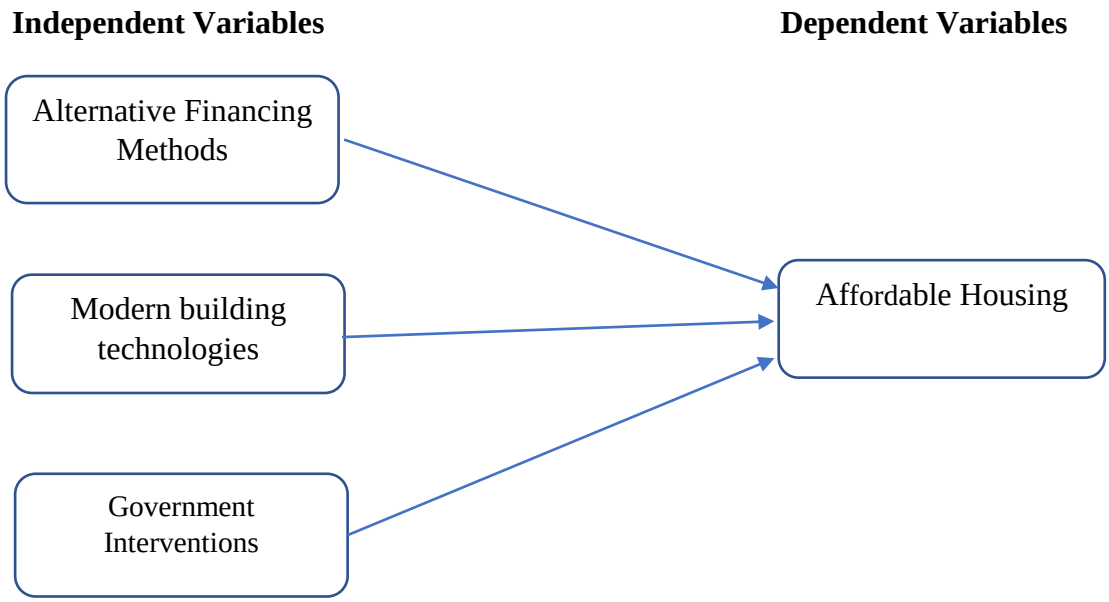

Figure 2.1 Conceptual Framework
Source: Author, 2019

2.5.1. Operationalization of variables

This section presents the variables under study, their definition and constructs, measurement and sourcing.

Table 2.2 Operationalization of variables

Variables	Definition	Constructs	Measurements	Source
Dependent Variable **Affordable Housing**	Defined as "an expression of the social and material experiences of people, constituted as households, in relation to their individual housing situations".	Expenditure percentage vis-à-vis 25% expenditure of income; Sufficiency of decency as perceived by the resident; Overcrowding; Tenure conditions; Security; convenience of location	**Five-point Likert Scale**	(Stone 2006; Lane, 1981; Yip, 1995; Thalmann, 2003).
Independent Variables				

Alternative financing methods	Provision of alternative affordable funding from public and private sources to finance construction and development of housing. (Gichunge, 2001)	Community based funding; subsidized targeted loans by banks; Development finance institution funding; Cashflow-based funding;	**Five-point Likert scale**	Jeffrey and Xin (2018) Bagutaya, Ariffin and Raji (2016) Moko and Olima (2014) Noppen (2012)
Modern Building Technology	Use of alternative materials and approaches in construction of homes (Giddings, 2007)	Cost savings associated with alternative building materials (e.g. filler slabs, wood and soil cement blocks); Comparative long-term cost effectiveness; Training costs; Socio cultural shifting costs	**Five-point Likert scale**	Cook et al., 2007; Harrison and Sinha (1995) Lu, El Hanandeh, Gilbert and Bailleres (2017) Reddy and Jagadish (2003)
Government interventions	Government policies and initiatives aimed at effecting affordable housing (GOK, 2009)	Direct interventions through building schemes; tax lowering; subsidies for lower-income-based constructions; facilitation of multisector and NGO partnerships	**Five-point Likert scale**	San Ong (2013) Lim, Olanrewaju, Tan, and Lee (2018) (Omwenga,2013). Magutu (2005)

2.6. Summary

This section has provided an explanation of theories pertaining to affordable housing and extant literature pertaining to the same. The section has further highlighted the main drivers of

affordable housing in Kenya and provided operationalization of variables to be considered in determining the impact of the various drivers on provision of affordable housing.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The objectives of the study were: To establish the impact of alternative financing methods on provision of affordable housing in Nairobi county, to determine the impact of modern building technology on provision of affordable housing in Nairobi county and to assess the impact of government interventions on the provision of affordable housing in Nairobi county. This chapter therefore was a blueprint of the approach that was used to answer the research questions. The research methodology is presented in the following order: research design, target population, sampling procedure, data collection methods, and instruments of data collection and finally data analysis and presentation.

3.2 Research Design

According to Saunders, Lewis, and Thornhill (2009), there are three general types of research designs – exploratory, descriptive and causal research designs – that researchers can use to fulfill their objectives. The exploratory design emphasizes on gaining ideas and insights, whereas descriptive design seeks to determine the frequency with which a phenomenon occurs or the extent to which two variables co-vary. Causal design has its major emphasis on determining cause-and- effect relationships (Donald, 2006).

The researcher utilized descriptive research design. The main aim of this research was to provide an accurate and valid representation of the factors that affect provision of affordable housing in Nairobi County. A descriptive survey seeks to ascertain respondents' perspectives or experiences on a specified subject in a predetermined structured manner. According to Kothari (2004), a descriptive design involves planning, organizing, collection and analysis of data so as to provide information being sought. These designs were therefore considered appropriate for this study because they explored and showed the correlation between factors that influence provision of affordable housing in Nairobi County.

3.3 Target Population

A population is a complete set of individuals or objects with common observable characteristics that the researcher wants to generalize the results of the study to (McBurney and White, 2010). Mugenda & Mugenda (2003) further state that wherever possible and resources allow,

population studies are more representative because everyone has equal chance to be included in the final sample that is drawn.

The target population of this study was 87 registered property development entities in Nairobi County as listed by the Kenya Property Developers Association (KPDA, 2019) (including those on the waiting list). The organization formed the body of focus in the current study as it is the largest entity representing property developers in the most populous county of the nation – Nairobi. The unit of study in analysis was therefore the property development agency as represented by a person occupying a managerial position and specifically a decision maker. The choice of the position was informed by the observation that such individuals would have an accurate understanding of the factors assessed in this study due to their involvement in the operations of the respective companies. The Research was specifically conducted in Nairobi county due to time and cost limitations.

3.4 Sampling

3.4.1 The sample size

The sampling design describes the sampling procedures and how the sample size for the study is achieved. The sampling frame consists of all population units from which the sample was selected (Cooper & Schindler, 2003). Due to the entire population of developers registered at KPDA being 87 (including some on the waiting list), to obtain a sample size that has an adequate size relative to the goals of the study, the researcher adopted a census study.

3.5 Data Collection Tool and procedure

The study relied on primary data collected from the census. The primary data collection tool was a structured questionnaire. According to Hennings (2004), a structured questionnaire is one of the most appropriate tools used to elicit self-report on opinion, attitudes, beliefs, and values.

The questionnaire was structured to give a brief introduction of respondents and was divided into sections representing the various research questions under study. The researcher clarified to the respondents the overall purpose of the study to enhance the understanding of the respondents on the content of the study to extract relevant information for the study. The respondents were top management in their selected firms. Each section included many closed structured questions and a few continuous variable questions (Creswell. 2009).

Given the worldwide Covid-19 pandemic, and the subsequent measures enacted to combat the virus such as reduced physical contact, the questionnaires were distributed online initially.

KPDA communication department emailed the questionnaire to all its members. The response rate was very low, forcing the enumerators to individually call the firms and conduct phone interviews. Although many complied with this, others failed to respond citing privacy concerns. A few agreed to appointments. Depending on the mode used and the level of engagement by the respondent, the questionnaires took 10-20 minutes.

3.6 Data Analysis and Presentation

Data collected was analyzed and edited for accuracy, consistency and completeness to inform. The data was coded to generate quantitative reports.

Data collected was analyzed descriptively through graphs, statistical measures including measures of central tendency and further summarized into frequency distribution tables for ease of understanding, analysis and comparison.

Data was analysed to show correlation between variables. Multivariate analysis was conducted using the regression equation as follows;

$$Y = \beta 0 + \beta 1x1 + \beta 2x2 + \beta 3x3 + \varepsilon$$

Where: Y is the dependent variable – Affordable housing

β_0 is the constant

β_1, β_2 and β_3 are the regression coefficients for the independent variables: alternative financing methods, modern building technologies, and government interventions.

x_1, x_2, x_3 are the aforementioned independent variables

ε is the error term

3.7 Research Quality

Validity indicates the degree to which an instrument measures what it purports to measure; the accuracy, soundness, and effectiveness with which an instrument measures what it is intended to measure (Kothari, 2004)

Internal validity:

To ensure the research instrument can measure what it purports, various methods were used. A pilot study was conducted from a small survey sample which is representative of the target

population. This featured developers from 10 select institutions. Respondents were required to comment on the fit between the constructs under assessment and the respective questions included in the questionnaires. This aided in identifying any challenges/problems that were present the questionnaire. The questions were rewritten to capture the sentiments put across by the respondents.

External validity:

To ensure the extent to which the data from a study can be generalized across settings, data was collected from a representative sample using the sampling methods discussed. The census approach allowed for generalizability of the findings to the property development sub-sector of the industry.

Reliability

This is a measure of the degree to which a research instrument yields consistent results after repeated trials (Nsubuga, 2006). To ensure consistency of measurement criteria, the instrument used a standardized structured questionnaire which was piloted prior to actual data collection. All scales employed were indicated, except for modern building technology, Cronbach Alpha ratings were higher than the requisite 0.7 score.

Table 3.1 Cronbach's Alpha

Alternative Financing	0.7
Modern building Technology	0.5
Government Interventions	0.8
Affordable housing	0.9

3.8 Ethical Considerations

The goal of ethics is to ensure that no one is harmed or suffers adverse consequence from the research activities. Given the often-sensitive relationships between researcher and respondents, reasonable safeguards were built in this study based on ethical considerations and requirements. This research conformed to ethical standards by protecting human subjects: autonomy of respondents was respected; deception was avoided, and privacy was protected. Participants in this research signed a consent letter to show their willingness. Participants were not required to

disclose their names (anonymity). The data collected was not linked to specific individual respondents (confidentiality). Finally, the researcher sought requisite documents e.g. Ethical approval letter from the university and NACOSTI authorization certificate for the data collection exercise.

CHAPTER 4: ANALYSIS AND PRESENTATION OF FINDINGS

This chapter provides a presentation of results following analysis of data in accordance with the study objectives. Five main sections constituted in the chapter include – response rate, descriptive statistics, diagnostic tests, regression analysis and summary of findings.

4.1 Response rate

At the time of data collection, the KPDA members in good standing had reduced from 87 in 2019 to 77 in 2020. A 20 percent increase was made to the sample size to account for the exceptionally low response rate. The additional companies were sought from KPDA's overarching waitlist. The low response was as a result of a combination of factors namely; restrictions imposed by the authorities because of the Corona Virus pandemic that had plagued the world; concerns over the confidentiality of the exercise; and the general increase in apathy in participating in academic studies. A total of 80 companies were reached bringing the total response rate to 87%. The response rate was thus deemed sufficient given that it was higher than the stipulated 70% (Saunders, Lewis, Thornhill, 2009).

4.2 Descriptive statistics

This section provides findings on the respondent's profile and the general trends observed in data collected on the variables of the study.

4.2.1 Company information and respondents' profile

Four questions were included to provide insight into the characteristics of the organizations and respondents contacted for the study. The first question assessed the sub-sector within which the respondents operated. The modal response category was construction with 39.7% of the respondents picking the response category. Information communication, information management, information technology (TNT unit) and technology were the least represented sub-sectors. The inference of the study was thus mostly representative of the construction, sales and management, surveying and ICT respectively (table 4.1).

Table 4.1 Subsector representation

Variable\Statistic	Categories	Frequency per category	Rel. frequency per category (%)
Sub-sector of construction industry	Architecture	12.00	16.44
	Construction	29.00	39.73
	Development	2.00	2.74
	ICT	5.00	6.85
	IFMIS	1.00	1.37
	Information communication technology (TNT) unit	1.00	1.37
	Information technology	1.00	1.37
	Procurement	2.00	2.74
	Sales & Management	13.00	17.81
	Surveying	6.00	8.22
	Technology	1.00	1.37

There was a widespread gap in the number of years of operation within the respective organizations. The longest serving respondents had worked for 50 years whereas the least reported duration in a company was 10 months (rounded up to one year). The mean time of service was however 8.8 years thus indicating that most of the respondents were knowledgeable of the operations of their respective companies (table 4.2).

Table 4.2. Experience

Statistic	Number of observations	Minimum	Maximum	Mean	Variance (n-1)	Standard deviation (n-1)
Time in operation	80	1	50	8.85	61.43	7.84

Generic managers accounted for 26 percent of the respondents whereas directors accounted for 17 percent of the total responses. Other represented dockets were design, development, and ICT managers, amongst others. Regarding the level of management represented, the modal

category was senior level management with 35 respondents with middle and operational level managers accounting for 45 respondents (table 4.3). The findings were thus derived from a broad representation of management levels hence findings derived from the collected data are representative of the general state of the organization as perceived by broader leadership teams.

Table 4.3 Managerial level

Variable\Statistic	Categories	Frequency per category	Rel. frequency per category (%)
What is your managerial level in the company?	Operational level	20.00	25.00
	Middle Level	25.00	31.25
	Senior level	35.00	43.75

4.2.2 Affordable housing descriptive statistics

This section provides descriptive statistics of the variables included in the study in testing the relationship between the dependent variable, affordable housing, and the independent variables – alternative financing, modern building technologies and government interventions. Six questions were included in assessing the implications of the construct, affordable housing. The highest ratings were observed on the question assessing issues of overcrowding with 61.25 percent of the respondents indicating that they agreed with the statement and 15 percent indicating that they strongly agreed. Most of the respondents generally were neutral or agreed with the view that their organizations provided affordable housing for the population. Table 4.4 provides a summary of responses for each category. It was thus apparent that the property developers generally deemed themselves as satisfactorily addressing the challenge of insufficiency of affordable housing by their construction of suitable homes. This observation contrasts with statistics indicating shortage in housing facilities thus suggesting a lack of understanding of the status quo among property developers in the country.

Table 4.4 Affordable housing

Variable	Total	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Less than 25% income of middle-class and lower-class populations	80	6.25	15	15	51.25	12.5
Decent homes	80	5	11.25	8.75	58.75	16.25
No overcrowding	80	3.75	3.75	16.25	61.25	15
Favorable tenure/occupancy conditions	80	8.75	7.5	12.5	56.25	15
Secure	80	6.25	2.5	12.5	60	18.75
Convenient location via transport	80	5	6.25	17.5	52.5	18.75

The construct alternative financing was assessed through four questions. Utilization of community-based funding was the least used mode of financing availed to the industry as most respondents disagreed with the view that the approach was used (table 4.5). The use of subsidized government banks appeared to be the most used financing option among the respondents with 62.50 percent of the respondents indicating that they used the provision. The predominance in use of government subsidized options points to a lack of impact of the approach in that despite the provision, the situation in the country remains such that most people are without permanent residence. This suggests that there is need for new approaches to financing thus financiers should consider the fit between the current market and the available options.

Table 4.5 Alternative financing

Variable	Total	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Community-based funding	80	15	30	20	30	5
Subsidized government loans	80	3.75	11.25	22.5	51.25	11.25
Development Finance Institution funding	80	1.25	13.75	26.25	55	3.75
Cashflow-based funding	80	3.75	10	28.75	48.75	8.75

4.2.3 Modern building technology descriptive statistics

The construct 'modern building technology' was assessed via four questions as depicted in table 4.6. Findings indicated that 62.5 percent of respondents agreed that comparative long-term effectiveness of alternative materials and technologies would allow for building of affordable houses. Training costs, at 61.25 percent response, were deemed not to be a hinderance to the construction of affordable housing. Overall, responses, indicated that the technologies were of no impact or had a reasonable impact on the industry. It is thus apparent that developers are currently not centred on alternative building materials as an avenue for cost reduction in the industry. It may therefore be necessary that policies be put in place to ensure that alternative building technologies are leveraged in a bid to ensure construction of sufficiently priced premises. An alternative approach to enhancing uptake would be through the issuance of incentives that would subsidize taxation on account of using more affordable building materials.

Table 4.6 Modern Technology

Variable	Total	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Alternative materials	80	13.75	20	12.5	41.25	12.5
Long-term cost effectiveness of technologies	80	5	11.25	21.25	55	7.5
Training costs	80	3.75	15	20	48.75	12.5
The socio-cultural shifting costs	80	3.75	16.25	21.25	43.75	15

4.2.4 Government interventions descriptive statistics

The lowering of taxes was reported to be the most impactful way to foster the development of affordable houses; the question assessing this aspect under the construct government interventions had the highest overall rating with 72.15 percent of the respondents indicating that they agreed or strongly agreed with the view that the provision was beneficial. The lowest rating was observed for the question assessing the impact of housing schemes with 50 percent of the respondents indicating that they strongly disagreed or were neutral to the usefulness of the provision. Findings thus indicate that housing schemes were not beneficial to the respondents. The finding, therefore, is that government wields a reasonably impactful tool – taxation – that can be used to incentivise developers to produce more affordable housing for the populace.

Table 4.7 Government interventions

Variable	Total	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Housing schemes	80	7.5	30	12.5	38.75	11.25
Lowering taxes	80	2.53	8.86	16.46	51.90	20.25
Subsidies	80	3.75	18.75	18.75	50	8.75
Facilitation of multi-sector and NGO partnerships	80	10	13.75	17.5	51.25	7.5

4.3 Diagnostic Tests

Four tests were performed to assess the applicability of the assigned analysis approach – regression analysis; the tests are as follow – linear relationship between the dependent and independent variables, a check for outliers, test of multicollinearity, test of normality. Findings for each test were subsequently presented.

4.3.1 Linear relationship

Both probability (p-p plot) and scatter plots indicated that there was a liner relationship between the variables. The observed and expected probability points indicated conformance to a linear association as depicted in figure 4.1. No data points fell outside the -3 and +3 regions (figure 4.2) of the scatter plot thus indicating a linear association between the two variables.

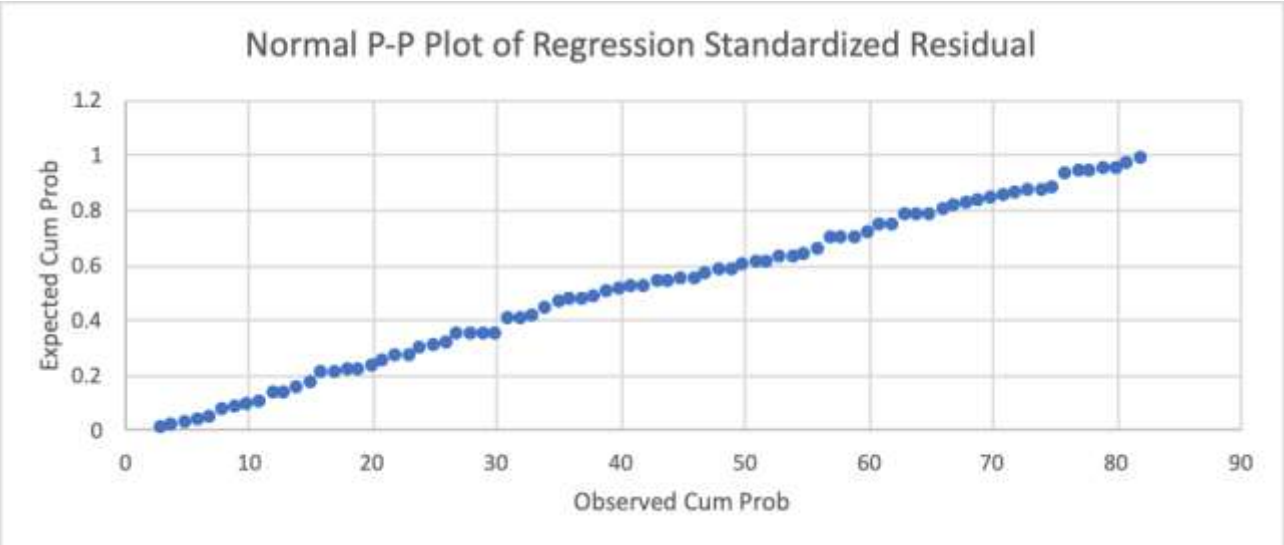

Figure 4.1 Normal probability plot

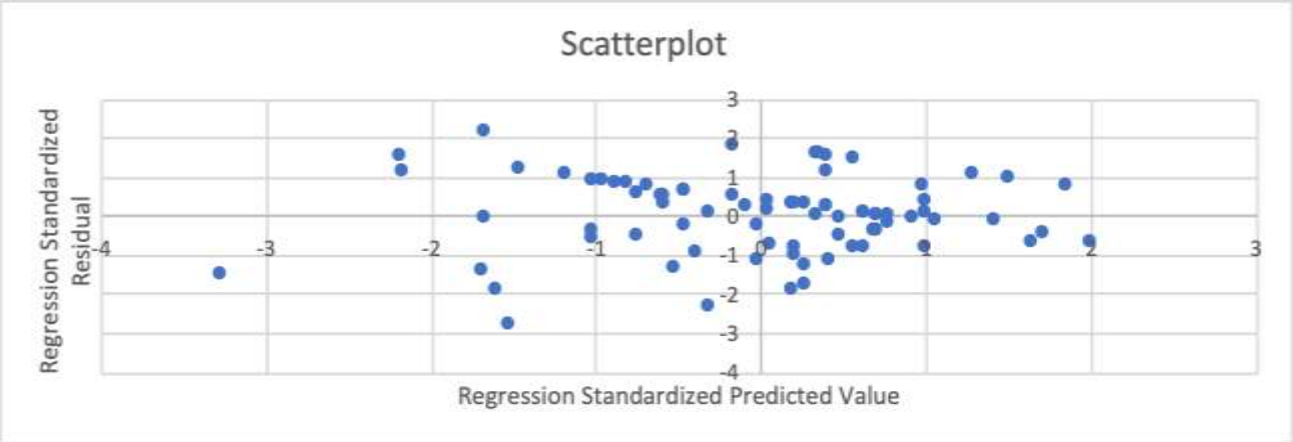

Figure 4.2 Scatterplot

4.3.2 Outliers

The presence of outliners was assessed through computation of Cook's distance. Findings indicated a Cook's distance range of 0 to 0.322 thus indicating, given that the upper limit was below 1.0, that there were no outliers in the data set. The dataset was thus deemed appropriate for analysis through multiple linear regression.

4.3.3 Multicollinearity and correlation

The highest observed correlation between the independent variables was 0.421 (alternative financing and government interventions). The results are presented in table 4.8. Given that none of the correlations was higher than 0.7, the independent variables were deemed suitable for inclusion into the regression model. Moreover, only one of the correlations between independent and dependent variables fell below 0.3 hence indicating that the dataset was generally suitable for analysis through computation of multiple linear regression beta values. The correlation between modern building technologies and affordable housing rounds up to 0.3. An assessment of the interrelation between the dependent and the independent variable indicates that alternative financing approaches were potentially the most impactful of the dependent variable with government interventions being the least impactful on the provision of affordable housing. This assertion is subsequently tested through a regression analysis.

Table 4.8 Test of multicollinearity and correlation

Correlations					
		Affordable Housing	Alternative financing	Modern building Technology	Government Interventions
Pearson Correlation	Affordable Housing	1.00	0.37	0.28	0.14
	Alternative financing	0.37	1.00	-0.01	0.42
	Modern building Technology	0.28	-0.01	1.00	-0.07
	Government Interventions	0.14	0.42	-0.07	1.00
Sig. (1-tailed)	Affordable Housing	.	0.00	0.01	0.11
	Alternative financing	0.00	.	0.48	0.00
	Modern building Technology	0.01	0.48	.	0.26
	Government Interventions	0.11	0.00	0.26	.
N	Affordable Housing	80	80	80	80
	Alternative financing	80	80	80	80

	Modern building Technology	80	80	80	80
	Government Interventions	80	80	80	80

4.3.4 Normality

Normality was assessed through computation of Kalmogorov-Smirnov and Shapiro-Wilk statistics. Both indicated statistical significance hence indicating that the data was generally not suited for analysis through linear regression. However, in evaluation of the histogram indicating the spread of responses, it was apparent that the data was generally normally distributed except for slight skew to the left. The data was thus, on account of passing the aforementioned three tests, deemed admissible for analysis through linear regression.

Table 4.9 Test of Normality

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Affordable Housing	.18	80	.00	.90	80	.00
a. Lilliefors Significance Correction						

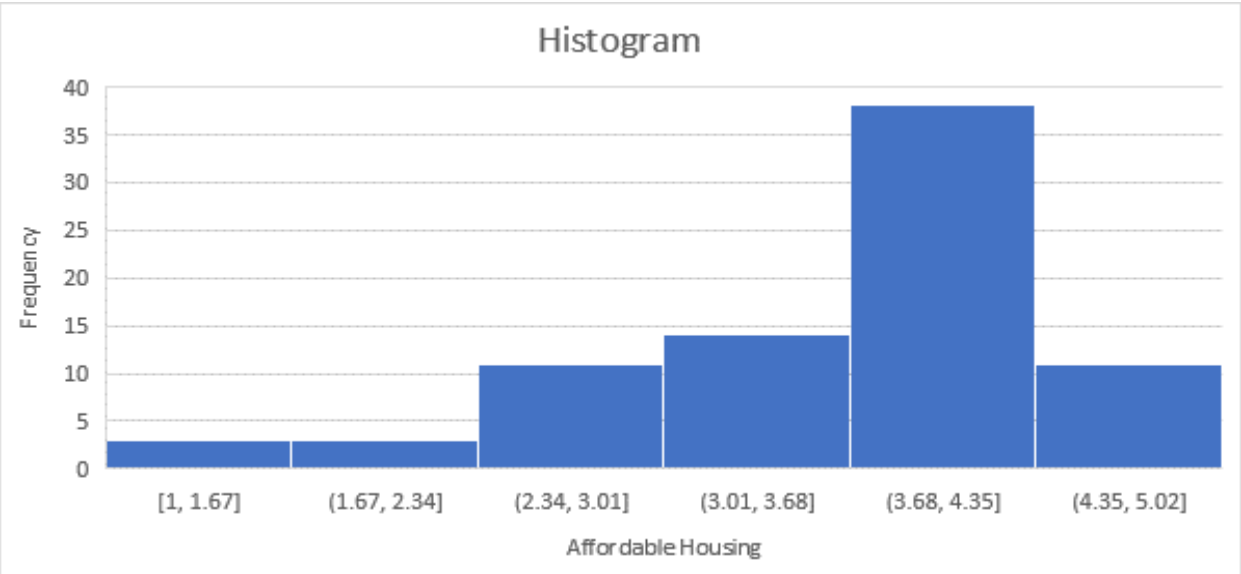

Figure 4.3 Histogram (Affordable housing)

4.4 Regression analysis - Research Objectives

This section addresses all the objectives of the study by presenting finding following analysis of data collected for all the constructs – independent variables (alternative financing, modern building technology and government interventions) and dependent variable (provision of affordable housing). A two-step approach was applied in analysing all the data – assessment of the descriptive statistics and subsequently evaluation of the inferential statistics.

4.4.1 Relationship between alternative financing and provision of affordable housing

This section addresses the first objective of the study by presenting finding following analysis of data collected for the two constructs – alternative financing and provision of affordable housing.

A multiple regression model was run to assess the impact of the various variables on the dependent variable – provision of affordable housing. The model presented an R square value of 0.219 hence indicating that 21.9% of the variance in the dependent variable was accounted for by the generated model. The model was thus deemed suitable for making inference on the impact of the independent variable on the dependent variables.

Table 4.10 Model Summary

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.47[a]	.22	.19	.74
a. Predictors: (Constant), Government Interventions, Modern building Technology, Alternative financing				
b. Dependent Variable: Affordable Housing				

A comparison between the generated model and the null model indicated an F value of 7.114 with a significance value lower than 0.05. The generated model was thus statistically differentiable from the null model hence indicating that the model had predictive value. Table 4.11 provides findings on the ANOVA analysis.

Table 4.11 ANOVA

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.91	3	3.97	7.11	.00[b]
	Residual	42.44	76	.56		
	Total	54.36	79			
a. Dependent Variable: Affordable Housing						
b. Predictors: (Constant), Government Interventions, Modern building Technology, Alternative financing						

A linear relationship assessment between alternative financing options and provision of affordable housing presented a beta value of 0.446 thus indicting that a one-unit increase in ratings on alternative financing would result in a 0.44 increase in ratings on affordable housing. The relationship was significant at the 95% confidence level. This indicates that alternative financing approaches are a valid factor influencing the provision of affordable housing.

Table 4.12 Coefficients

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.048	.63		1.67	.10
	Alternative financing	.446	.13	.37	3.34	.00
	Modern Building Technology	.339	.12	.28	2.80	.01
	Government Interventions	.001	.11	.00	.01	.99
a. Dependent Variable: Affordable Housing						

4.4.2 Relationship between modern building technologies and provision of affordable housing

This section addresses the second objective of the study. The objective centres on the relationship between modern building technologies and provision of affordable housing.

The relationship between modern building technologies and provision of affordable housing was captured by a beta value of 0.339. This was the second biggest in magnitude after alternative financing. A unit increase in overall rating of modern building technology would result in a 0.339 increase in overall rating on affordable housing. The relationship was valid at a 95% confidence level. Industry stakeholders looking to improve the affordability of housing should thus preferentially consider channelling their efforts towards the uptake of modern building technologies after alternative financing options.

4.4.3 Relationship between government interventions and provision of affordable housing

This section addresses the final objective of the study. The objective assesses the relationship between government interventions and provision of affordable housing.

A beta value of 0.001 captured the magnitude of relationship between government incentives and affordable housing. The impact of the factor on provision of affordable housing was therefore not inferred as it presented a p-value higher than the $\alpha=0.05$. Given the three independent variables, government interventions were the only variable inferred not to have an impact at the 95% confidence level. The inferred lack of relationship between the two factors was particularly notable given that developers, in their summative descriptive responses, seemed to point to the taxation as a seminal factor in determining the pricing of raw materials utilized in the construction process. A possible reason for the finding would be the difference in tax implications by use of materials and the ability of some firms to circumvent taxation policies.

4.5 Summary of findings

Most of the respondents, having served more than five years in their respective companies were knowledgeable of their sub sector. Findings represented the views of a wide range of managers in the industry with the construction, sales and management industries being main industries represented in the study. The impact of alternative financing options on provision of affordable housing was the most apparent with modern building technologies being the second most impactful factor. Both independent variables were valid predictor of affordable housing. Government interventions were the least impactful by magnitude, moreover, the impact of the factor could not be confirmed at the 95% confidence level.

CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter links the findings of the study and those put forward in extant literature. The section shows how the findings address the prior identified gaps and interface with preceding on the topic of study. Each of the study objectives is discussed with a subsequent summation of findings captured in the conclusion section. Recommendations and limitations of the study are also herein put forward.

5.2 Discussion

5.2.1 Impact of Alternative financing Methods on provision of affordable housing

Findings from the study indicate a valid relationship between alternative financing methods and affordable housing; an increase in overall ratings of the applicability of alternative financing methods is inferred to have an impact on the ability of practitioners of the construction industry to provide affordable housing. This finding thus indicates that provision of alternative options to financing would have a notable impact on the housing industry by allowing for construction of houses that generally comprise expenditure of less than 25 percent of renter's income, are secure, decent, conveniently located, allow for low transport expenditure and are not overcrowded. Mwangi (2005) and Magutu (2005) observe that there is explicit evidence of scarcity of housing despite the burgeoning demand for affordable premises.

Assessing the situation and considering the law of supply and demand, one may infer that developers of affordable housing are hindered by challenges in securing the necessary funds for construction of the demanded houses. The costs of construction cannot be recouped through the current financing options. The relationship between the two constructs thus indicates that optimization of alternative financing would serve to impart directly on the availability of affordable housing. In emphasizing the limiting role of financing in the local market, Giddings (2007) posits that the high-capital and high-leverage nature of the construction industry contrasts sternly with the difficulty of securing construction funds thus indicating the need for alternative financing methods.

Moko and Olima (2014) highlight development finance institutions as entities that can allow borrowers to circumvent the high-cost loans offered in the local market. Kangethe (2014) further points to joint purchase loans as a viable option in the bid to secure funds for

construction of affordable homes. Also proposed by Kangethe (2014) is the option of incremental funding whereby loans can be supplied in a step-wise manner e.g. to purchase land then to develop the first floor of a rental building later culminating in the construction of a full residential building. Findings from the current study thus point to the optimization of such options as a valid approach to ensuring proliferation of affordable housing in Kenya. The proposed and other similar methods can be advertised to practitioners of the housing development industry and their merits highlighted in comparison to currently available mainstream financing options.

5.2.2 Impact of modern building technology on provision of affordable housing

The impact of modern building technology on provision of affordable housing was secondary to that of alternative financing methods. An increase in ratings of the applicability of modern technologies in the building industry was associated with an increase in the ability of practitioners to avail affordable housing to the populace. Giddings (2007) observes that the challenge of affordable housing is most impactful in cities thus necessitating the development of structures using alternative materials that are lower in cost. This observation is validated by findings from the current study in that the use of alternative materials is shown to impact significantly on the provision of affordable housing.

Cook, Cripps, Irwin and Kolokatroni (2007) however argue that ignorance, perceived risk, and uncertainty on the reliability of the technologies still present as major constricting factors in the push for acceptance of alternative building materials. Findings from the current study thus imply that practitioners in the construction industry would be well informed to engage in concerted efforts to convince clients seeking to set up affordable building projects to use alternative building materials to both save costs and increase the number of constructed units. The need is further emphasized by Indeje (2017) who reports that Kenyans have generally been slow to accept alternative building materials with cement and stone remaining the commonplace materials preferred by most clients.

However, in the formation of such outreach initiatives, it would be necessary to take to account the finding that the choice of switching to alternative materials goes beyond hard costs to issues related to the social and environmental impacts of switching to novel materials. Harrison and Sinha (1995) are of the opinion that a 5 percent cost savings is sufficient in justifying the switch to alternative building materials. Advocacy for the use of alternative materials should thus be championed by the costs savings which may be as high as 67 percent in the case of using soil-

cement blocks in comparison to traditional cement. In contrast, Lu, El Hanandeh, Gilbert and Bailleres (2017) advocate for objective consideration of the cost implications of utilization of alternative building materials. In a comparison the use of concrete, reinforced wood and cement, Lu et al (2017) report that the cost savings are marginal at best. The push for alternative materials is thus to be done with consideration of the actual financial, social, and environmental consequences.

5.2.3 Impact of government interventions on provision of affordable housing

The impact of government incentives was assessed on the basis of direct interventions through building schemes, tax lowering, subsidies for lower-income-based constructions, and facilitation of multi-sector and NGO partnerships (San Ong, 2013; Lim, Olanrewaju, Tan & Lee, 2018; Omwenga, 2013; Magutu, 2005). The aggregate impact of the factors was found to be negligible with a one-unit increase in ratings of government incentives inferred to have an impact of 0.001 on the provision of affordable housing. Furthermore, the impact was not considered valid at the 95% confidence level. The finding is thus contrary to results put forward by San Ong (2013) who states that government intervention through the tax minimization effort would serve to increase the likelihood of construction of affordable houses.

Findings from the current study serve to augment those earlier put forward by Magutu (2005) who points to the varying success of government-initiated affordable housing projects. Magutu (2005) points to a failed housing project that resulted from the lack of consideration of the housing needs of those targeted by proposed initiatives. In the highlighted cause, expenses incurred in the provision of social amenities resulted in over prizing of the constructed houses such that lower-income families could not afford residence in the houses. The building schemes were thus ineffective in meeting the needs of the targeted. The same inference can be made in the current study. This confirmed finding thus points to a need for more rigorous planning on the part of the government in the bid to construct affordable housing.

Sengupta (2006) proposes PPP-developed houses as an effective approach to construction of affordable housing. The finding is however not confirmed in the current study as partnerships, as a part of the construct government incentives, did not appear in general to impact positively or significantly on the likelihood of construction of affordable houses. The inference, therefore, is that the mode of partnership effected in Kenya is not favored by practitioners in the industry hence the government may need to find innovative ways to incentivize the practitioners thus

resulting in the construction of affordable houses that meet the financial interests of those involved in the construction efforts.

5.3 Conclusion

This study sought to address three main objectives - To establish how accessibility to alternative financing affects the provision of affordable housing in Nairobi County; to determine how modern building technologies affect the provision of affordable housing in Nairobi County; and finally to assess the impact of government interventions on the provision of affordable housing in Nairobi County. Of the three considered factors, alternative financing had the highest impact on the provision of affordable housing with modern building technologies presenting as the second most influential factor. Contrary to the researcher's expectations and extant literature, government interventions were deemed to be of marginal and unverified impact on the provision of affordable housing in Nairobi county.

5.4 Recommendations

The main recommendations from the study is that entities involved in the construction of affordable housing should focus on provision of alternative financing methods as the primary factor to be addressed in the bid to ensure construction of affordable housing in Nairobi. Modern building technologies should similarly be advocated for with the focus being on the cost savings that would result from the use of materials such as pre-cast concrete and interlocking bricks. Efforts to ensure increased uptake of alternative building materials should be concerted to ensure that final purchasers and renters of the constructed homes view the houses as socially acceptable, environmentally safe and generally less expensive. Finally, government agencies involved in the construction of affordable houses ought to rethink their approach to ensure that efforts are of benefit to industry practitioners as the current approaches are generally deemed to have no impact on the bid to construct affordable houses.

5.5 Limitations of the study

The main limitation of this study presents in its restriction to KPDA-affiliated members. The study thus does not include the views of practitioners in the industry that do not have affiliation with the organization. Further studies should thus be conducted to address the views of other entities involved in the construction of affordable houses in the county.

The second limitation presents in the lack of involvement of government entities in the study. Subsequent studies should contrast the views of the government and those of other stakeholders

in the industry to identify gaps in the structuring of partnerships between the government and private entities looking to develop affordable housing in the county.

A third limitation presents in the limitation of factors considered as influencers of the ability of developers to construct affordable houses. Subsequent studies should focus on other factors deemed influential to the quest.

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APPENDICES

APPENDIX I: SAMPLE INTRODUCTION LETTER

(Letter Head of Strathmore Business School)

(Date)

Dear [name],

RE: INTRODUCTION LETTER

This is to confirm that Sophia Machuki is a student at Strathmore Business School and is conducting a research project towards attaining her Master's degree.

The researcher aims to study factors affecting affordable housing development in Nairobi County. Your participation in the study is requested in way of filling out a questionnaire with questions of the various aspects of the study. The process should take about 10 minutes of your time.

Do feel free to contact the Administrator at Strathmore Business School on +254 703034414 in the event of questions or concerns.

Yours faithfully,

FOR: STRATHMORE BUSINESS SCHOOL

DEAN, SCHOOL OF GRADUATE STUDIES

APPENDIX II: PARTICIPANT INFORMATION AND CONSENT FORM

Determining factors that affect provision of affordable housing in Nairobi County

SECTION 1: INFORMATION SHEET

Investigator: Sophia Kamau-Machuki

Institutional affiliation: Strathmore University Business School (SBS)

2.0 About the study

2.1 Purpose of the study

1. To explore how accessibility to alternative financing affects the provision of affordable housing in Nairobi County
2. To assess how innovative building technologies, affect the provision of affordable housing in Nairobi County
3. To evaluate how government interventions, affect the provision of affordable housing in Nairobi County

2.2 Participation

You do not have to take part in this study; your participation will however highly be appreciated. If your first response does not meet the objectives, you may be contacted subsequently with a request for additional information.

2.3 Eligibility

The study targets persons with managerial positions in development firms in Nairobi county.

2.4 Ineligibility

Persons not involved in managerial decision making are excluded from the study.

2.5 Implications of the study to the participant, risks and benefits

You are kindly requested to participate through the filling of the questionnaire as directed by the study research assistant. The information collected from you will be treated as confidential. You may request feedback from the study by including your email address at the end of the study.

2.10 Who can I contact in case I have further questions?

In the event of questions or concerns, kindly get in contact with the researcher, Sophia Kamau-Machuki, at Strathmore University Business School. You ca also reach the researcher via sophia.machuki@gmail.com , or by phone +254 722 960 810. Feel free to also contact the study supervisor, Dr. Simon Wangura via sndiritu@strathmore.edu or by phone +254 722 590 559

An independent person within the institution can also be reached via:

The Secretary–Strathmore University Institutional Ethics Review Board, P. O. BOX 59857, 00200, Nairobi, email ethicsreview@strathmore.edu Tel number: +254 703 034 375.

I, _____, understand the entails of the study and that I am free to desist from participating in this study at this time. I agree to the storage of data for the purpose of the study.

☐ I will take part in the study

☐ I will NOT take part in this study

Participant's Signature:

_____ **Date:_____/_____/_____**

DD /MM /YEAR

Participant's Name:

_____ **Time:_____/_____**

(Please print name) **HR/MN**

I, **Sophia Kamau-Machuki, affirm that I have explain the study entails to the participant ant that he/she has opted to participate in the study.**

Investigator's Signature:

_____ **Date:_____/_____/_____**

DD/MM /YEAR

Investigator's Name:

_____ **Time:_____/_____**

(Please print name) **HR/MN**

APPENDIX III: RESEARCH QUESTIONNAIRE

Thank you for taking part in this study.

PART A: DEFINITIONS

Affordable housing definition

This study affordable housing entails housing that – does not claim a higher than 25% expenditure of income, offers sufficient decency as perceived by the resident, does not present issues of overcrowding, has favorable tenure conditions, offers adequate security, and is conveniently located.

Alternative financing methods definition

Alternative financing methods are defined as non-traditional approaches to advancement of finances. These entail – community-based funding, subsidized targeted loans by banks, Development Finance Institution funding, and cashflow-based funding.

Modern building technologies definition

These factors involve assessment of – Cost savings associated with alternative materials (e.g. filler slabs, wood, and soil cement blocks), comparative long-term cost effectiveness, training costs, and socio-cultural shifting costs

Government interventions definition

The factors considered under government interventions include –

Direct interventions through building scheme, tax lowering, subsidies for lower-income-based constructions, and facilitation of multisector and NGO partnerships

PART B: COMPANY INFORMATION AND RESPONDENTS' PROFILE

1. Within which sub-sector of the construction industry do you fall?

Architecture [ ] Surveying [ ]

Construction [ ] Sales & Management [ ] Other [ ]

2. How long has the company been in operation?
3. What is your role in the organization?
4. What is your managerial level in the company?

Operational Level [ ] Middle level [ ] Senior level [ ]

PART C: IMPACT OF ALTERNATIVE FINANCING METHODS ON PROVISION OF AFFORDABLE HOUSING

	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
	1	**2**	**3**	**4**	**5**
Community-based funding has been central in allowing for construction of affordable housing					
Subsidized government loans by banks have been central in allowing for construction of affordable housing					
Development Finance Institution funding has been important in allowing for construction of affordable housing					
Cashflow-based funding has been pivotal in allowing for construction of affordable housing					

PART D: IMPACT OF MODERN BUILDING TECHNOLOGIES ON PROVISION OF AFFORDABLE HOUSING

	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
	1	**2**	**3**	**4**	**5**
Cost savings associated with alternative building materials (filler slabs, wood and soil cement blocks)					
Comparative long-term cost effectiveness of alternative materials and technologies allow for building of affordable houses					
Training costs associated with the use of alternative materials and technologies do not hinder the construction of affordable houses					
The socio-cultural shifting costs (e.g. negative perception of cement blocks) do not present as a hinderance to construction of affordable housing					

PART E: IMPACT OF GOVERNMENT INTERVENTIONS ON PROVISION OF AFFORDABLE HOUSING

	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
	1	**2**	**3**	**4**	**5**
Government interventions by way of initiating construction of housing schemes are pivotal in addressing the challenge of lack of affordable housing					
Lowering taxes associated with land ownership allows for development of affordable housing					
Subsidies for lower-income-based constructions allow for creation of affordable housing settlements					
Facilitation of multisector and NGO partnerships in construction of houses allows for affordable housing					

PART F: PROVISION OF AFFORDABLE HOUSING

	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
	1	**2**	**3**	**4**	**5**
My company is currently able to construct houses that account for less than 25% of middle-class and lower-class populations					
We currently can build houses that are decent as perceived by middle-class and lower-class populations					
The houses we build or intend to build for the middle-class and lower-class populations do not present challenges in overcrowding					
The current houses we build have favorable tenure/occupancy conditions for lower- and middle-class populations					
The houses we currently build for lower- and middle-class populations do not present security challenges					
The houses we currently build for lower- and middle-class populations					

are conveniently located regarding transportation					

Thank you for taking time to participate in this study.

APPENDIX IV: KPDA MEMBERS 2020

1	Acorn Management Services Ltd
2	AHCOF Investments (Kenya) Ltd
3	Amazon Projects Ltd
4	Amboseli Court Ltd
5	AMS Properties Ltd
6	Bahati Ridge Development Ltd
7	Blueline Properties Ltd
8	Camelot Consultants Ltd
9	Century City Property Ltd
10	Cheriez Properties Ltd
11	Chigwell Holdings Ltd
12	Cytonn Real Estate
13	Coral Property International Ltd
14	Daykio Plantations Ltd
15	Dewbury Ltd
16	Dunhill Consulting Ltd
17	Elegant Properties Ltd
18	Elm Ridge Ltd
19	Endless Africa Ltd
20	Enkavilla Properties Ltd
21	Fairdeal Development & Infrastructure Ltd
22	Fedha (Management) Ltd
23	Golden Compass Ltd

24	Heri Homes Properties Ltd
25	HF Development and Investments Ltd
26	Home Afrika Ltd
27	House and Homes Ltd
28	Homescope Properties Ltd
29	iJenga Ventures Ltd
30	Immensity Holdings Ltd
31	INFPAC Ltd
32	Jabez Properties
33	Kamhomes Investments Ltd
34	Karibu Homes
35	Karume Holdings Ltd
36	Kings Developers Ltd
37	Kzanaka Ltd
38	Laser Property Services Ltd
39	Leo Capital Holdings Ltd
40	Lordship Africa
41	Manrik Holdings Ltd
42	Meera Construction Ltd
43	Mlima Construction Company Ltd
44	MML Turner & Townsend
45	Mugumo Developments Ltd
46	Natureville Homes

47	Norcent Projects Ltd
48	Optiven Ltd
49	PDM (Kenya) Ltd
50	Pioneer Holdings (Africa) Ltd
51	Prissy Apartments Ltd
52	Prism Residential Ltd
53	Realux Holdings Ltd
54	Rozana Properties Ltd
55	Sayani Investments Ltd
56	Sherry Blue Properties Ltd
57	Shreeji Development Ltd
58	Sigimo Entreprises Ltd
59	SJR Properties Ltd
60	SLOK Construction Ltd
61	Sohail Developments Ltd
62	Soma Properties
63	Superior Homes Kenya Ltd
64	14Trees Kenya Ltd
65	Tatu City Ltd
66	Tecnofin Kenya Ltd
67	The Combined Warehouses Ltd
68	The Epic Properties Ltd
69	The GoDown Arts Centre

70	Tilisi Developments Ltd
71	Trident Estates Ltd
72	TSG Realty Ltd
73	Two Rivers Development Ltd
74	Unity Homes Ltd
75	Username Investments Ltd
76	VAAL Real Estate
77	Tilisi Developments Ltd
78	Trident Estates Ltd
79	Acres Investments
80	Adlife
81	Advent Valuers
82	Africa Logistics Properties
83	Amber Properties Ltd
84	Andrew Kamau Ndara/ Dinara Developers
85	Ark Properties And Investments Ltd
86	Athena Properties Ltd
87	AVIC International
88	Beautiful Mabati Houses/Halifax Houses
89	Belasi Developers
90	Bluebells Properties/Safaricom Investment Cooperative
91	Bonito Properties Ltd
92	Buffalo Mall Development Ltd

APPENDIX V: NACOSTI CERTIFICATE

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone:+254-20-2213471,
2241349,3310571,2219420
Fax:+254-20-318245,318249
Email: dg@nacosti.go.ke
Website : www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref No. **NACOSTI/P/19/53943/30240**

Date: **7th June, 2019.**

Sophia Njeri Kamau-Machuki
Strathmore University
P.O. Box 59857 00200
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Actors that affect sustainable provision of affordable housing in Nairobi County."*** I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for the period ending **7th June, 2020.**

You are advised to report to **the County Commissioner, and the County Director of Education, Nairobi County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

BONFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nairobi County.

The County Director of Education
Nairobi County.

THIS IS TO CERTIFY THAT:
MS. SOPHIA NJERI KAMAU-MACHUKI
of STRATHMORE UNIVERSITY ,
10333-100 Nairobi ,has been permitted
to conduct research in *Nairobi County*

on the topic: *FACTORS THAT AFFECT SUSTAINABLE PROVISION OF AFFORDABLE HOUSING IN NAIROBI COUNTY*

for the period ending:
7th June,2020

.....
Applicant's Signature

Permit No : NACOSTI/P/19/53943/30240
Date Of Issue : 7th June,2019
Fee Recieved :Ksh 1000

.....
Director General
National Commission for Science, Technology & Innovation

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014.

CONDITIONS

1. The License is valid for the proposed research, location and specified period.
2. The License and any rights thereunder are non-transferable.
3. The Licensee shall inform the County Governor before commencement of the research.
4. Excavation, filming and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
5. The License does not give authority to transfer research materials.
6. NACOSTI may monitor and evaluate the licensed research project.
7. The Licensee shall submit one hard copy and upload a soft copy of their final report within one year of completion of the research.
8. NACOSTI reserves the right to modify the conditions of the License including cancellation without prior notice.

National Commission for Science, Technology and Innovation
P.O. Box 30623 - 00100, Nairobi, Kenya
TEL: 020 400 7000, 0713 788787, 0735 404245
Email: dg@nacosti.go.ke, registry@nacosti.go.ke
Website: www.nacosti.go.ke

REPUBLIC OF KENYA

National Commission for Science, Technology and Innovation

RESEARCH LICENSE

Serial No.A 25221

CONDITIONS: see back page

APPENDIX VI: ETHICAL APPROVAL DOCUMENT

Strathmore UNIVERSITY

3rd May 2019

Mrs. Kamau Machuki Sophia
kamau.sophia@gmail.com

Dear Sophia,

REF Protocol ID: SU-IERC0420/19 **Student No:** 93250

FACTORS THAT AFFECT SUSTAINABLE PROVISION OF AFFORDABLE HOUSING IN NAIROBI COUNTY

We acknowledge receipt of your application documents to the Strathmore University Institutional Ethics Review Committee (SU-IERC) which includes:

1. Study Protocol submitted on 17th April 2019
2. Cover letter listing all submitted documents 17th April 2019
3. Proposal declaration page signed by supervisors 17th April 2019

The committee has reviewed your application, and your study "*Factors that affect sustainable provision of affordable housing in Nairobi County*" has been granted **approval**.

This approval is valid for one year beginning **3rd May 2019** until **3rd May 2020**

In case the study extends beyond one year, you are required to seek an extension of the Ethics approval prior to its expiry. You are required to submit any proposed changes to this proposal to SU-IERC for review and approval prior to implementation of any change.

SU-IERC should be notified when your study is complete.

Thank you

Sincerely,

STRATHMORE UNIVERSITY INSTITUTIONAL ETHICS REVIEW COMMITTEE (SU-IERC) 03 MAY 2019 TEL: +254 (0)703 034 000 P. O. Box 59857 - 00200 NAIROBI - KENYA

Prof Florence Oloo
Secretary
Strathmore University Institution Ethics Review Committee

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email admissions@strathmore.edu www.strathmore.edu