

**EFFECT OF RESIDENTIAL REAL ESTATE PORTFOLIO DIVERSIFICATION ON  
MANAGEMENT OF RISKS BY REAL ESTATE DEVELOPERS IN NAIROBI COUNTY**

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**A RESEARCH REPORT SUBMITTED TO THE DEPARTMENT OF REAL ESTATE  
AND CONSTRUCTION MANAGEMENT IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE AWARD OF MASTERS OF ARTS IN VALUATION AND  
PROPERTY MANAGEMENT.**

**APRIL-2021**

## DECLARATION

I, **Phoebe Wanjiru Maganjo** registration number (B92/7370/2017), declare that this research project is my original work and has never been presented for examination or award of a degree elsewhere in any other college or university.

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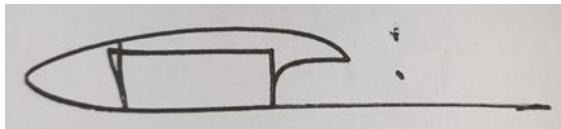
Date; 03<sup>rd</sup> May 2021

I declare that this research project has been submitted for examination with my approval as a supervisor in the Department of Real Estate and Construction Management, School of the Built Environment University of Nairobi

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Date; 03<sup>rd</sup> May 2021

## **DEDICATION**

This research is dedicated to my baby girl, you have made me stronger and focused and to my partner who stood by me throughout the completion of this masterpiece.

## **ACKNOWLEDGEMENT**

My first credit goes to my supervisor Dr Winnie Mwangi, under whose mentorship this project was conceptualized, research conducted and a final report written.

Special thanks to go to all my lecturers for imparting me with relevant knowledge throughout my course of study at the university.

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## ABSTRACT

In real estate, risk is the possibility that an investor will lose some or all of the initial investment. Recent trends in real estate development processes have exposed real estate developers to further and greater risks. The purpose of the study was to investigate the effect of real estate portfolio diversification on the management of risks in real estate developers in Nairobi County, Kenya. The specific objectives of the study were to determine the levels and types of residential real estate diversification, the risks associated with residential real estate investment portfolio and the optimal portfolio of residential properties that can mitigate against risks in real estate investments.

Theories adopted in this study included modern portfolio theory, portfolio management theory and capital asset pricing. The research was carried out in county Nairobi. Nairobi County consists of 17 sub-counties. The study also employed qualitative approach to provide information on risks involved in levels of residential real estate diversification amongst real estate developers. The target population for the study comprised of 69 real estate developers in Nairobi registered with Kenya Property Developers Association (KPDA) in Kenya. The sample size was the same as the target population therefore a census methodology was adopted. This study relied on primary data and secondary data. Secondary data in this study was obtained as reported by the financial controllers. Primary data was collected using interviews conducted online through phone calls. Quantitative information was analyzed using statistical measures of arithmetic mean, variance and standard deviation of returns were used.

The study revealed that the level of residential real estate diversification influence the management of risks. Intra-asset diversification of residential portfolios benefits the firms in risk mitigation. Further, the rise in demand by institutions and accommodation has enhanced optimal portfolio of residential properties. A regression test was conducted to test the relationship between portfolio size and income and revealed that there is a significant relationship between total portfolio size and the income thereof ( $p$  value = 0.000). The relationship between portfolio size and risk was negative. The optimal portfolio size was 2000 units of apartments and mansionettes. A portfolio size which is higher than 2000 didn't not significantly lead to a reduction in risk. Portfolio sizes that were lower than 2000 constituted a high risk and hence were not optimal. ANOVA table had a statistical  $p$ -value of 0.000 which implies that we reject the null hypothesis. Therefore, real estate portfolio diversification have a significant effect on the management of risks among real estate developers in Nairobi County, Kenya. The study revealed that the level of residential real estate diversification influence the management of risks. A broadly diversified portfolio is generated by owners, so that the particular risk involved with one resource is offset by the unique risk involved with yet another asset. By incorporating some fixed-income strategies, you are further hedging portfolio against market uncertainties. Companies adopt optimal portfolio residential properties that can mitigate against the risk in real estate investments which include intra-asset diversification of residential portfolios and meeting locational and structural demands consideration in the market. The study therefore recommends that real estate developer firms should adopt the various risk mitigation strategies that are useful to an organization to minimize the effects of risks on the

investment returns. This will involve variety of diversification strategies of assets' classes and products.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background to this Study

The term risk has been defined as the probability of loss of income, assets or condition of mishap, unfortunate situation or circumstances that result in the decline of revenue or loss of income, property, wealth and other items having economic and financial values. In real estate, risk is the possibility that an investor will lose some or all of the initial investment. Recent trends in real estate development processes have exposed real estate developers to further and greater risks. According to Mwathi (2016), the real estate industry is now characterized by a number of risks such as tenant risk, sector risk, structural risk, legislation risk, taxation risk, planning risk, legal risk, liquidity risk, financial risk and pure (event) risk. Report by Hass Consult reverberated similar details in 2017 as the demand for residential units with functional but stylish spaces rose in Kenya. One of the strategies investors have employed to mitigate the aforementioned risks is diversification. Investors have an option to diversify their real estate portfolios, by investing in different regions, different types of properties, across the regions but same type of properties, or within the regions but different types of properties.

In that regard, one of the major concerns in diversification is affordability and relevance. However, the bigger issue from the investors' side is when they overdo diversification which would result into risk by itself. In Kenya, this is evident from the Housing finance and Suraya properties who have over diversified but the margins of returns are minimal which puts them into risks such as affordability risks and market risks. An investor needs to find balance between diversification and returns. In that regard, the aim of this study is to find the optimal portfolio that maximizes real estate investor's with respect to risk and return trade-off.

Global trends show increasing demand of houses both in developed and developing countries (Perin, 2017). Since the global financial crisis in 2008, there has been a real-estate boom and the rising demand of mortgage houses has fueled the house prices as well as increase in house supplies. Construction companies have reacted to this by constructing more houses to meet demands which has led them to more risks such as increase in debt and in some countries such as Germany, that spiral has inverted to cause over supply resulting to falling house prices which is among the risk the constructors have to contend with after oversupplying (Cohen, 2018).

Rapid urbanization is pushing up demand for housing in Sub-Saharan Africa. African cities become the new home to over 40,000 people every day, many of whom find themselves without a roof over their heads. Recently, IFC and Chinese multinational construction and engineering company, CITIC Construction launched a \$300 million investment platform, CITICC (Africa) Holding Limited, to develop affordable housing in multiple African countries. Kenya and Nigeria are high on the priority list for the new effort. Kenya's housing shortage is estimated at 2 million units, while Nigeria is in want of 17 million units. The soaring demand is being met by scant new supply. Africa's housing market has few local developers with the technical and financial strength to construct large-scale projects (Gibson et al, 2019)

Kenya and particularly Nairobi County is experiencing unprecedented development boom across all its commercial sectors (Kemunto & Nyangena, 2017). The resilience in the property market has been underpinned by strong economic growth, stable inflation and the country's aspiration of becoming a majority middle-income market. Among the latest developments in Kenyan real estate industry is the move to affordable housing. As buyers and developers turn their focus to the low-cost segment of a market that was previously perceived as unprofitable, a low-cost housing boom is gaining traction in Kenya. Among the developers and financiers who have signed contracts with local developers in medium and low-cost building agreements are international investors such as India's Tata and US-based Mi-lost housing development. One of the Tata's projects in Nairobi is the Delta Corp's projects located in Nairobi's Upper Hill. In that regard, as investors venture into affordable housing, they are likely to face risks (Makunda, 2018).

In Kenyan real estate context, there are a number of risks which real estate developers could face. Common risk usually involves tenants known as tenant risk which include not being able to get tenants. Sector risk ascribes to the danger that the real estate properties price will fall at the same time. Structural risk involves the risk associated with the financial structure of the real estate property. Further, the real estate sector can face legislation risk and taxation risks which can appear in several ways including an antitrust suit, new regulations or standards, specific taxes and subsidies. Planning risks involves poor planning for foreseeable problems, and liquidity risks which takes into consideration the depth of the market and how one will exit the investment needs

to be considered before buying (Oundo, 2003). It is in this context that diversification of any investor's portfolio becomes key in mitigating against such risks

Despite the limited availability of land in Nairobi County, there is increase in construction of real estate properties as investors seek to diversify their property portfolios. The increase in supply however has been met by skepticism around the demand of the property. As such, the number of stocks companies possess has been increasing without increase in returns due to low demand. For instance, current reports by Housing Finance suggest that their number of housing projects has increased and currently the supply is higher than the demand. In that regard, investors seeking to diversify their real estate portfolio may be faced by huge risks if they over diversify which paralleled to risk when one has single property or few stocks (Mwaniki, 2015).

In a real estate diversification, a loss (risk) in one product is offset by gains from another product. As such one can expect to get decent returns, though the returns may not be exceptionally high or exceptionally low. The question therefore, is how many individual properties are needed to compose an optimal portfolio. An optimal portfolio is preferred over a maximized portfolio due to the risk return tradeoff. Real estate developers' firms in Kenya have grown in count. In addition, the capital outlays and contributions of their members have increased. However, investment managers of investment firms in Kenya always have an uphill task of deciding the number of stocks to include in a portfolio as well as the composition of a portfolio

## **1.2 Problem Statement**

Diversification in any investment involves spreading investments over multiple, related or unrelated products so as to reduce the risk of a sudden, unexpected outcome (Gupta, 2011). Diversification is a risk management strategy that mixes a wide variety of investments within a portfolio. Diversification of residential real estate is a key store of wealth for households and investors. Various studies have confirmed the importance of portfolio diversification. Studies also have noted that diversifying the portfolio from a collection of assets or securities of different classes and industries is most desirable and adheres to the principles of tradeoff. However, investment managers always contend with the question of how much diversification is enough to reduce risks by enough margins such that more diversification would result to reduced risk minimization or increased risk. In that regard, the concept of optimal diversification is important in addressing this elusive question. The most conventional view argues that an investor can achieve

optimal diversification with only 15 to 20 stocks spread across various industries (Kapusuzogulu and Karacaer, 2010).

Several studies have been conducted to confirm and give solution to this question particularly in security markets however no study has been conducted to investigate the optimal diversification of real estate and in particular residential property which would allow the developers or investors reduce risk while maintain a high return. In that regard, this study seeks to address that by investigating the effect of residential real estate portfolio diversification on management of risks in real estate developers in Nairobi County

Many studies have compared the underlying tradeoff between risk return and investment portfolio to establish the optimal diversification. In the context of the “Modern portfolio theory,” (MPT), Statman (1987) and Wagner & Lau, (1971) compared portfolio risk efficiency in which risk (typically the variance) is reduced for a given amount of expected return. Studies like Ngare's (2008) shows that as portfolio size goes high, both the mean returns and variance have been seen to decrease. Global studies indicate that the question of the optimal portfolio size is an elusive one and that empirical studies have always shown a difference in opinions.

Locally, Nyenze (2010) investigated the effect of assets allocation on retirement benefits fund performance in Kenya but failed to conclude on the number of stocks that make up an optimal portfolio. In addition, the author could not establish whether the size of a portfolio affects returns or risks. Another local study, Kagunda (2010) did a comparison of performance between unit trusts and a market portfolio of shares at NSE but failed to underscore the issue of the optimal portfolio size and its effect on performance. Ngacha (2009) conducted a comparative study on performance between value & growth stocks at the NSE but failed to investigate the effect of portfolio size and composition on the returns and risks of investment schemes in Kenya. Pudha (2010) conducted a survey on the factors that motivate local individual investors to invest in shares of companies quoted at the NSE and concluded that investors were motivated by returns among other factors. However, the study failed to investigate the effect of portfolio diversification and composition on the returns and risks of investment schemes in Kenya.

Therefore, the difference in opinions in global studies and the inadequacies of local studies form the research gap that this study wishes to address. The research question therefore as; what is the



effect of residential real estate portfolio diversification on the management of risks by real estate developers in Nairobi County, Kenya.

### **1.3 Objectives of the study**

The main objective of the research was to investigate the effect of real estate portfolio diversification on the management of risks by real estate developers in Nairobi County, Kenya.

The null hypothesis of the study is as follows:

H<sub>01</sub>: Real estate portfolio diversification does not have a significant effect on the management of risks among real estate developers in Nairobi County, Kenya.

#### **1.3.1 Specific Objectives**

This research work was guided by the following objectives:

- a) To determine the levels and types of residential real estate diversification amongst real estate developers in Nairobi County.
- b) To establish the risks associated with residential real estate investment portfolio in Nairobi County.
- c) To establish the optimal portfolio of residential properties that can mitigate against the risks in real estate investments.

#### **1.4 Research Questions**

- a) What are the levels of residential real estate diversification amongst real estate developers in Nairobi County?
- b) What are the risks associated with residential real estate investment portfolio in Nairobi County?
- c) What is the optimal portfolio residential properties that can mitigate against the risk in real estate investments?

#### **1.5 Justification of the study**

In Kenya, a number of real estate developers have been forced to contend with risk and returns trade off over the last couple of years. According to an Economic Survey published in 2017, the overall number of private buildings completed between the year 2015 and 2016 went high by 10.5 percent; increasing from 9,054 units in 2015 to 10,002 units in 2016. During this period, the

residential houses constituted 86.2% of the private buildings completed. A large and solid industry is represented in this and several other publications have reported and predicted, a "positive outlook." Stakeholders however have lamented that this has not converted into returns, especially to lenders and those who took development loans or mortgages. For instance, some developers like Housing Finance and Suraya Properties have been forced to contend with uncompleted projects worth of Millions of Kenya shillings. Additionally, there have been low returns on completed houses. Therefore, a study on optimal diversification will be very useful in maximizing returns while ensuring the risks do not hurt the industry.

### **1.6 Significance of the Study**

This research study is on the risks associated with residential real estate investment portfolio whose aim is to determine the optimal portfolio that residential property developers can invest in to mitigate against the risks. Therefore, the study is useful to real estate developers by giving them insights and information to make policies and guidelines regarding property investments and diversification. Second, the study may inform practice as investment managers may use the findings of the study to justify diversification as risk management strategy and construct optimal portfolios. Such optimal portfolios may bring sustainability and competitive advantage to investment firms as result of superior financial returns. The study added and built on existing knowledge on optimal portfolio selection. The study results may therefore reduce the elusive controversy surrounding the discussion of the optimal portfolio size of residential real estate investment.

### **1.7 Scope of the study**

This study focus comprised of 69 real estate firms in Nairobi registered with Kenya Property Developers Association (KPPDA). The study investigated the diversification and portfolio returns gained from residential properties in Nairobi County. The study only investigated the portfolio diversification, portfolio returns and portfolio risks to obtain optimal portfolio stock.

### **1.8 Organization of the Study**

The study was organized into five chapters. The first chapter has covered the background to the study, problem statement, general and specific objectives of the study, justification of the study, significance of the study and organization of the study. Chapter two covered the general literature

of the study on principles and motivation behind residential real estate investments, concept of diversification, risks associated with lack of diversification, theoretical review, empirical review and conceptual framework of the study. Chapter three covered the research design, target population, sampling technique and design, data collection methods, data analysis and ethical considerations. Chapter four presented the study findings and interpretation of the results. Chapter five covered the summary of the study findings, discussion and conclusion, recommendations of the study and areas for future studies.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter presents the literature review of the study and concepts relating to real estate residential portfolio diversification. It also covers approaches on the management of risk by real estate developers. The chapter is divided in four sections. Section 2.2 will focus on the general literature relating to the study objectives, section 2.3 will review theories relating to portfolio diversification and management of risks, section 2.4 will focus on the empirical review of the existing studies relating to the study topic and section 2.5 will summarize the chapter.

#### **2.2 Residential Real Estate Investment Portfolios**

Demand for residential real estate rental accommodation has been growing. Nevertheless, Kenya's home ownership is dipping below its long-term average of 70% of the adult population and government's agencies are reducing their spending in the direct supply of rental housing. In Kenya, the population has been growing especially in Nairobi County which is the most populous county increasing the demand for housing (McKee, Muir & Moore, 2017). On the same line, there is rising need for Millennial Housing as revealed in the statistics that the Millennial account for up to 58% of Kenya's present workforce, the number of which is expected to rise by 20 per cent by the year 2025. This implies that millennial housing market constitutes a critical part of the Kenyan middle-income market as these young people seek housing. Recent research shows that investors and developers are taking this generation's paradigm shift to meet the preferences of Millennial hence diversification

Another, trend forcing residential real estate diversification is the rise of institutions and the need of student accommodation which is forcing the investors and developers to react to the new demand. The existing demand for student housing is expected to rise as more colleges open county satellite campuses. However, the investors have to contend with the risk of lower level of resale value in this class of asset as well as increase of wear and tear. (Njenga, 2017).

The ability of conversion of residential apartments into hotel living facilities with the help of air bnb has also encouraged real estate developers to diversify while including modern stylish designs in architecture assimilating buildings in modern towns like Dubai and New York.

In Kenya, residential real estate investments portfolios include investing in REITS. A REIT is a company that is modeled after mutual funds and it finances, acquires, manages and operates income producing real estate such as residential premises, shopping malls, office complexes, hotels, warehouses and timberlands (Kamau, 2016). REITs provide individual and institutional investors with regular income streams, diversification and long terms capital gains from the underlying assets. A REIT is multi-faceted and it not only mobilizes funds for real estate projects, it also generates income from short and long term investments by facilitating trading of property securities in the stock exchange. REITS creates liquidity and diversification of investments portfolio.

A portfolio's objective may be geared towards either capital gains, towards income benefits, or both. A revenue-oriented compilation of investments is chosen for their current revenue, while on the other hand, a growth-oriented investment portfolio primarily comprises of those investments chosen because of their inherent potential for price appreciation. Because most portfolios are diversified to hedge against a particular class of assets or securities, the analysis of the portfolio requires evaluating the whole portfolio rather than focusing solely on asset or security analysis. While an asset or security's risk-return profile largely relies on the property itself, a portfolio's risk-return profile depends on not only on the asset and security component, but a mixture of the two (Mbithi, 2015).

However, unlike other securities and assets like stocks, bonds and shares, where a well-diversified portfolio of such securities is comparatively easy to own, it is commonly the case that most residential properties are difficult to diversify and are primarily impacted by consumer needs and demand. Moreover, with its combination of locational and structural characteristics, each residential property portfolio is distinctive.

### **2.3 Risks Associated with Residential Real Estate Portfolio**

Risk is a dynamic and complex concept that manifests in several ways thereby making it hard to quantify and manage. Risk can be characterized rather simply as the discrepancy between predictions and realizations. In other words, risk as it pertains to real estate investment portfolio denotes the identification of the investment uncertainty surrounding the present and future investments.

An investment in real property is undertaken for its ability to produce returns. The achieved returns may not equal the projected returns due to the existence of risks. To minimize the variations in the returns, the risks must be identified, defined, assessed and managed. The management of risk has in the recent past acquired new significance in property management (McKee, Muir & Moore, 2017). In Kenya, there have been minimal attempts to identify and measure risks and employ the recommended risk management practices.

### **2.3.1 Types of risks**

Among the risk in real estate include is general market risk. This is caused by demographic developments, interest rates, inflation and other factors in the economy. Investors are unlikely to completely eliminate market shocks, but can defend their interests from boom and bust periods using diversification strategies and schedules that rely on general market developments. In addition, inefficient information is the source of market risk. The market for real estate is inefficient. That is not to suggest that there is no data, just that there is no pure data. This is especially true with regard to leases and leasing rolls, where the underlying economic dynamics can be influenced by a variety of factors (e.g. lease terms, contractual adjustments, usage limits, extension rights, kick-out clauses, exclusives).

Another type of risk is asset-level risk. This is triggered by the inability of players both within the market and those who define the standards to consider the asset class and to make other decisions that have a material effect on the market. Certain risks are shared by any investment in an asset class. However, there still exists a room for putting up real estate apartments in both good and poor markets. Therefore, it is correct to argue that multifamily real estate is low-risk business venture, but with a lesser potential for good returns. More so, apartment blocks are less susceptible to loss than shopping centers following customer demand. On the other hand, hotels pose much more risk than both apartments and offices essentially because of their brief, seasonal occupancy or high dependency on business and tourism travel. By first understanding the industry fundamentals, this risk group can be mitigated. Ideally, real estate is a separate asset class with a range of distinctive attributes that distinguish it from other properties or sectors (Cheong, Olshansky & Zurbruegg, 2011). It is also a complicated asset where the product is in a continual state of development caused by changes in the product's static, environmental and connective elements (ML, 2012). In order to minimize this class of risk, fund managers need to consider how choices are taken by individuals,

corporations and organizations behaving in their own best interests, with differing degrees of social consciousness.

Another risk associated with residential property is tenant risk. Getting tenants is a mandatory requirement for investing in real estate to make money. Obtaining only any occupant, though, won't guarantee profitability. However, not having tenants or renters requires not earning any money from renting. However, for several months in a row, poor renters can fail to pay the rent or even ruin the property too much, ensuring you are at risk of coping with pretty expensive and time-consuming expulsions (Olawale, Lawal & Alabi, 2015). The process of choosing worthy tenants is critical in order to prevent the risk of having bad tenants. Portfolio managers must take the screening process of renters into account, review their credit worthiness score, and ask them for their former landlord's contact details.

Additionally, another class of risk is liquidity risk. Liquidity is the capacity within an investment to access the money you have. One risk of investing in real estate is that investment properties are illiquid, which means you can't convert them into cash easily. Selling a property is neither a quick nor an easy operation, and it is more likely that selling quickly or under pressure would result in losing your investment. This lack of liquidity forces investors in real estate to hold their investments longer than other types of investments, which, if necessary, is risky for those who might need quick access to cash.

In addition, managers and speculators of real estate portfolios are subjected to another class of risk classified as legal risk. This is largely due to unexplained changes in real estate laws. To a considerable degree, after land use and other restrictions have been evaluated based on the equation, the valuation of real estate is bestowed on it by the state. Some of the changes, while others can be immediate and structural, are gradual or cyclical. When a worst-case scenario happens, legal risk can be cushioned by insurance covers and legal protection.

Alternative investments consist of those which fall beyond the categories of typical investments. Investments in real estate take many forms. Investors may have public property investment equity, such as REITs and public real estate loans, for example, mortgage-backed securities, in their portfolio as an alternative to residential real estate portfolios. Investing in REITs and public real estate may reduce some risks such as financial risks and structural risk (Kamau, 2017).

Alternatively, investors can also focus on commercial real estate to include investment premises like office spaces, storerooms, and retail store shops while the industrial real estate to include premises like manufacturing houses, mines, and farms in their portfolios. Investing in different sectors in real estate can in the long run mitigate risks associated with real estate in its entirety rather than just focusing on one sector as in our case for residential property only.

Reducing uncertainty by making more accurate predictions for main factors in decisions is one of the most effective risk management techniques. By combining the power of quantitative analyses with the qualitative observations arising from an understanding of the economic structure and key players likely to impact a given market or submarket, better forecasts can be built. These forecasts are mainly supported from the point of view of the most likely product categories for specific real estate opportunities that will be in the industry, because real estate appeals to different classes of users and investors.

Real estate is one single market, which is somehow ineffective, largely private and determines various variables by behavioral responses. It is important to consider business conditions, how they are segmented into constructive submarkets, value factors in general and through submarkets, the legal / political mechanisms influencing the use of real estate, the obstacles to supply and entry, the workings of demand and shifting expectations, consumer cycles, economic influences and decision-making processes in order to minimize volatility.

In order to avoid overloading and confusion of data that might be caused by noise or excess data, precise care and attention should be accorded to the critical factors that fundamentally affect the real estate market. It is reflectively essential that users stick to the-know your data-related adage because of the private and inefficient dynamics of the real estate industry to avoid being pulled into decision help properly. This is particularly relevant as data cleaning and confirmation requirements are implemented in relation to third-party data, which focuses on mutual disclosures and collaboration rather than unbiased findings of evidence.

### **2.3.2 Causes of Real Estate Risks**

Real estate investment risk exposure is inherently triggered by multiple variables that it can be a daunting task to get a handle on them. Inaccurate information, insufficient information, poor understanding of market models, changes in real estate law, changes in the competitive environment, among others, are some of the causes of real estate risk (Dawidowicz, 2014).



There is no public sector or a clearinghouse that directly monitors and publishes on real estate market conditions and undertakings. Lease rates, prices for transactions, occupancy rates, operating costs and other economic strengths are therefore based on voluntary, self-reporting units. Although providers aim to validate results, there is no way to assess the truthfulness of the information that allows managers to rely on efforts of good conscience to preserve accuracy.

The demand for real property is sluggish. That doesn't imply that no data exists, but no pure data exists. For example, although the price at which a single real estate asset switches hands is known, the conditions underlying the deal are often not known (e.g. seller finance, credit improvement, incentives, and inducements). This is particularly valid for leases and rent transfers, where the underlying economics are influenced by a number of situations ( e.g. contract term, rent changes, use restrictions, extension rights, kick-out provisions, exclusives) (Kamau, 2016).

Real estate is a distinct class of assets with a variety of distinctive attributes distinguishing it from other assets or industries. It is also a complex commodity where, due to changes in the static, environmental and relational elements of the product, the product is constantly evolving. At the very same time, value generators arising from the geographical, capital, and regulatory side of the equation appear to converge over the long term, but due to business limitations, they are in a transitional state of mismatch (Cheong, 2011).

Real estate is behavioral psychology and science, where individuals, groups and organizations with differing degrees of social experience behave in their own best interests to make choices. Given these complexities, the inability to consider the asset class of players operating in the market and those that determine the criteria and make other decisions that have a major influence on the market is a major real estate danger (Olawale, Lawal & Alabi, 2015).

### **2.3.3 Alternatives to counter risks**

Alternative investments are principally those which fall beyond the categories of typical investments. Real estate investments take different forms. For instance, the investors may decide to have public commercial property equity and the public real estate loans in their investment portfolios. A good example of the public commercial properties and public real estate loans include the REITs and the mortgage-backed securities respectively. Accordingly, putting investments in REITs and the public real estate may reduce debt some risks such as financial risks and structural risk (Kamau, 2017).

Alternatively, to include apartment towers, warehouses, and retail store towers, investors may also concentrate on commercial real estate, whereas the industrial real estate encompasses elements manufacturing companies, mining firms, warehouses and farms in their investments portfolios. Investing in different sectors in real estate can in the long run mitigate risks associated with real estate in its entirety rather than just focusing on one sector as in our case for residential property only.

The diversification can be used to mitigate systematic risks once an investor or developer has acquired many assets. In brief, by building on an understanding of the different value drivers across property types, subtypes and locations to dampen the cyclic waves associated with domination of a single property or field, the benefits of diversification for a number can be derived. Since not all risk exposures can be expected, the transition of liabilities from insurers to third parties can accommodate the liability. In exchange for controlling unforeseeable risks from natural accidents, the amount and forms of insurance covers should be determined by considering the tradeoffs associated with a certain insurance premium shortfall.

Even real estate risks can be handled by using contractual agreements and covenants. Lease escalation provisions, guaranteed construction expense arrangements, credit insurance programs, third party assurances, and contingency plans (e.g. standby leases, preapproved capital calls) are examples of these solutions. These categories of liabilities are limited by the use of other modes of ownership (e.g. limited partnerships) or by the use of admissible provisions under which one side agrees not to seek restitution from the other side (e.g. compensation for non-recourse).

A variety of products have been developed to encourage investors to hedge the risk by using corporate finance and structuring strategies to defend against prospective market volatility, exchange rate changes, or other external influences. The trader, in exchange, holds opposing trading positions and then chooses to purchase or sell at a set price depending on what is going on in the trading.

Real estate is principally a single market, one that is dynamic, mostly private and characterized by behavioral reactions to different variables. It is important to consider market conditions, how they are stratified into constructive submarkets, value factors in general and through subsectors, the legal / political mechanism influencing the usage of real estate, the functioning of supply and

regulatory barriers, the functioning of demand and shifting expectations, market stages, external pressures and decision-making prices in order to minimize uncertainty.

The real estate market is a dynamic and diverse industry that relies on a multitude of similar fields and areas of development. It is difficult for an individual company or decision-maker to achieve specific economies of scale across various platforms, economies and types of property, given a rather eclectic character and the capital-intensive nature of real estate. That is one reason why REITs prefer to focus on a certain category of properties. However, despite this trend, widening these markets and bringing in greater economies of scale causes the REITs to be more competitive. That way, other real estate firms have extended their product ranges and service lines.

### **2.3.3 Risk-return Trade off in Real Estate Investment**

The equilibrium between an investor's preference or desire to get the lowest possible risk and the largest possible realizable return is the risk return tradeoff. In the endeavor of generating more sustainable risk-return and investment trade-off, many investors tend to take the risk of pursuing investment portfolios with low risk and with higher-return investments.

The returns on single family homes have been investigated in many surveys. In metropolitan areas, Case & Shiller (1990), utilized single family home prices indexes and excess returns, after which the results indicated that such type of an investment portfolio is ineffective. They find that price increases usually persist for more than one year in the same trend. Construction prices, actual per capita income growth and adult demographic increases are all strongly linked to market adjustments and surplus returns for the following year. Crone & Voith (1999) have analyzed the single-family housing market, finding evidence to support the idea that the correlation between demand and investment negates the trade-off between risk and return. More so, these researchers included the consumption factor in their commercial real estate review.

More so, Naranjo & Ling (1997) discovered a large consumption cost premium, contradicting previous observations of abnormal real estate earning from this market. Another research conducted by researchers Liu, Grissom & Hartzell (1990) investigated the owner-occupied accommodation as well as property-producing income, and finds that systematic mispricing takes place if real estate is implemented to the same price structure model used for pricing other financial assets.

A prevailing myth is that greater risk is proportional to greater return. We are advised by the risk-return trade-off that the greater risk gives us the option of higher returns. No promises exist but just as risk indicate higher potential returns; it implies greater potential losses as well.

## **2.4 Concept of Portfolio Size and Portfolio Risk**

Defining a portfolio as a compilation of assets both managed and held by the same person or company is right. These investments also include investment securities that are investments in individual undertakings; bonds that are interest-bearing debt investments; properties in real estate that are investments in value-added growth; and mutual funds that are, in turn, pools of capital from multiple investors that are invested by practitioners or by indices. Bhat (2019) argues that an investment portfolio is basically a grouping of financial assets such as securities, shares and related cash equivalents as well as their counterparts that are mutual, exchange-traded and closed-fund. In comparison, portfolios are owned and/or managed by financial practitioners or clients directly.

Because it is possible to create an endless amount of portfolios from a set of properties, the challenge is to find the most suitable portfolio. An investor will select his or her ideal portfolio from the portfolio set as per the Efficient Set Theorem (EST) that provides maximum expected overall return for varying degrees of risk and provides minimal risk for varying levels of expected returns (Hatfield et al., 2018). Construction of an investment portfolio is brought about by the need to diversify. According to Steinberg (2018), diversification is the technique that is used to reduce the risks by allocating investments among multitude of assets. Diversification is appropriate when there is a certain level of returns volatility in the market, as such, the value of one asset may be low while the value of other assets is high. Diversification, as already noted, is a risk avoidance approach by the distribution of investment portfolios across various types of financial instruments, sectors and others. By investing in many sectors, each of which will respond differently to the same event, it aims to maximize benefit.

It is undoubtedly better to own five stocks than to own one, but there is a point when adding more stocks to your portfolio ceases to make a difference. However, there still remains a controversy concerning the number of investment stocks that an investor requires to minimize risk exposure while keeping a strong and high return, (Karacaer, & Kapusuzoglu, 2010). A common notion of the optimal diversification is 15 to 20 stocks however; this is subject to debates owing to the different attributes of different industry environments.

On the other hand, the researchers Connor, Goldberg & Korajczyk (2010) describes portfolio risk as the probability that financial targets are not accomplished by the mixture of units or funds under each investment category. Theoretically, portfolio risk is reducible through a successful diversification. Further, Connor, Goldberg & Korajczyk (2010) contends that there are many risks emanating from over-diversifying properties. These risks include: general market risks, the risks at asset level, the idiosyncratic risk, the risk of liquidity, risk of credit, the risk of replacement costs, the risk of leverage and the structural risk.

Portfolio variable is assessed from the distribution of actual returns related to the expected return of that investment portfolio. On the other hand, the standard deviation (SD) is essentially the square root of the variance, computed through weighting each and every possible dispersion by its relative probability, which is, the difference between the actual investment return and the expected investment return (Connor, Goldberg & Korajczyk, 2010). The deviation measure is used to define how far the actual return is from the expected return which defines the direction and decision that the firms need to adopt in order to be focused to get adequate returns.

## **2.5 Theories relating to portfolio diversification and portfolio risk**

The theories discussed include; modern portfolio theory, portfolio management theory and capital asset pricing.

### **2.5.1 Modern Portfolio Theory**

This theory is a speculation set out by the researcher and scholar, Harry Markowitz, in his paper and was circulated in the year 1952 by the Journal of Finance. The MPT hypothesis focused on the likelihood that financial specialists in the sector could create portfolios if risks decreased to expand anticipated equity returns depending on the amount of market risk in an investment. In the field of finance and venture, the MPT theory remain one of the most fundamental and notable financial speculations.

In addition, the MPT hypothesis is referred to as portfolio theory and implies that it is possible for financial experts to create a qualified bleeding edge of ideal portfolios that produces the most severe and imaginable anticipated returns for a specific risk level. It promotes and advises that it is not necessary for speculators to rely exclusively on the usual risks and market return of one individual stock. In the event of growth, a financial expert will win by placing money into multiple

stocks by decreasing the risks in the given portfolio. Consequently, this hypothesis aims to quantify the effects of diversification (Elton & Gruber, 1997).

For most investors, the MPT theory argues that the risk part is any return from an investment, which might be lesser than the foreseen investment returns. Put differently, the risk is any variations from the anticipated stock returns. Each stock has its own divergence from the stock median, as per the MPT theory. This standard deviation from the mean (Markowitz, 1976) is called risk. The MPT, in this regard, gives a plain setting for comprehending and understanding the connections results between the orderly risks and rewards. How property investors oversee the use of dishonorable and aloof speculation techniques in real estate has been extensively developed. In relation to this principle, property owners have a responsibility to examine all venture exercises by figuring the normal returns.

A significant philosophy in finance is the risk reduction benefit of diversification. Diversification reports, however, usually only employ stocks and shares. Several research on the effects of commodities to improve stock diversification have been undertaken in the context of foreign markets (typically using either a commodity index or one group of futures to minimize risks), but then on the other hand, a comprehensive analysis is obviously lacking regarding diversification in the in the context of real estate. Since real estate properties are influenced by different forces they face different risks which Modern Portfolio Theory may fail to take into consideration.

In addition, certain contradictions in logic are revealed by a closer analysis of the MPT principle. For instance, the principle is based on the basic premise that uncertainty determines risk. Investors are really worried with downside uncertainty, so as their portfolio goes up, how many items are there? Volatility is a variable that finds upside motion as similarly terrible as downside movement. What of inflation and the awful toll on non-growth properties that it draws? Finally, speculative stocks that are highly unstable do not conform into this mold because, as a diversified group or otherwise, they obviously do not give superior investment returns. This definition of risk seems impractical right from the start. The entire idea has many questions. There is currently no lasting link between risk (when defined as volatility) and investment return for beginners. Strong volatility does not yield better outcomes, and lower volatility does not yield lower results.

### **2.5.2 Portfolio Management Theory**

Brueggeman and Fisher (2008) refer to investors in portfolio theory as individuals with low risk aversion. The three performance criteria of a traditional portfolio are mean return, standard deviation and the investor who is responsible for the transaction. The first fundamental criterion, the mean return, is to take into account the overall estimated return within the portfolio. The standard deviation is used to determine the risks when it comes to making a distinction of different investments. The investor plays a crucial part regarding the decision making to invest.

Investors usually consider the securities need to assess the degree to which an investment purchase impacts the cost and the investment return of a portfolio asset. In the event that investors already have an existing investment portfolio, his or her key priority will be to determine whether or not the portfolio's performance will improve relative to the amount of risks resolved (Brueggeman, 2008). Investing in real estate properties allows the fund manager to make the right investment decisions and make key investment decisions based on the desired fixed risk-return.

One of the shortcomings in this theory is that it relies on historical performance of a portfolio, to forecast the future performance of a portfolio; this begs the question on how long to forecast. Is it 5 years or 10 years? This creates risk in itself since different properties are influenced by different factors which may be dynamic over that period of time. This makes it difficult for portfolio managers to objectively follow the theory and make objective judgments regarding the portfolio. Furthermore, multiple portfolio investment managers may have varying values, in which case the adjustments may be varying, making it impossible to obtain the ideal stock that mitigates risk and offers reasonable returns.

### **2.5.3 Capital Asset Pricing Model**

Sharpe (1964), Lintner (1965) and Mossin (1966) separately developed the 'Capital asset-pricing concept' (CAPM). This theory is considered the most basic asset-pricing model . The hypothesis essentially poses the question: "What are the equilibrium rates of return if all investors apply the mean-variance criterion to an optimal range of the same mean-variance?"

There is a continuing controversy as to whether the CAPM hypothesis offers an adequate explanation of return balance rates and whether other hypotheses are more suitable. Nevertheless, in fact, CAPM is still commonly used (Sharpe, 1964). It is understood that CAPM has three most

substantial consequences. Second, in equilibrium, both investors hold a stock portfolio of volatile assets, regardless of their risk preferences. Nevertheless, various investors keep various variations of a stock portfolio and a risk-free fund. This concept is called the theory of separation. Secondly, because the stock pool is owned by all, the risk of a particular asset is defined by its covariance in regard to the market; the remaining investment risk is diversified. A standardized calculation of demand covariance is regarded as the beta of the demand. Finally, when non-systemic risk is diversified out, it is appropriate to reward investors for systematic risk (when calculated by market beta) but not for non-systemic risk (Sharpe, 1964). Therefore, it is evident that this theory will be useful in linking the diversification and risks to obtain maximum returns.

## **2.6 Residential Real Estate Diversification Portfolio**

A key issue with residential investment is the question of diversification. As noted, housing is usually a significant part of most households' portfolios. Yet the housing asset holding is invariably a single asset class meaning that residential properties are highly undiversified. This highlights the fact that only a few products are available that allow owners to diversify their assets. The sole difference is that a majority of residential properties may be purchased by developers; however this does not remove the dangers of the asset class. Consequently, Chaudhry, Christie-David & Webb, (2010) address the idea of diversification of intra-assets and how, through diversification within the asset class, an individual can further mitigate real investment risk. This definition applies to numerous ways of broadening and diversifying investment portfolios within residential real estate, resulting from the fact that properties differs by size (square footage and value), type of land, geographical / economic zone, and proximity (edge city versus business district) to a metropolitan area. Since they understand the advantages of intra-asset diversification, many investors own or control multiple types of land.

This awareness has grown over time and this experience indicates that the market is more dynamic than equities (Johansson, Seiler & Tjarnberg, 1999). Within real estate, Viezer (2010) compares thirteen investment portfolio diversification techniques. In the end, the economic diversification strategy was found to be equivalent to regional diversification, based on job groups. The strategies include portfolio diversification, financial portfolios diversification, geographic regions diversification, real estate economics diversification and portfolio management. The article also points out that the most important aspect of real estate investment diversification is the form of



residential house, as it describes almost one-third of the variations in commercial property returns (Viezer, 2010). For instance in Kenya, with the rise of millennial housing demands there are a number of residential properties ranging from single rooms, bedsitters, single rooms to a whole family house. This allows diversification of residential properties within the same asset class but target customers of different economic and financial condition.

Another possibility of diversification is Real Estate Investment Trusts (REITs), which are increasingly available as investment vehicles for investors who may wish to hold a wider portfolio of property. However, there are two problems with REITs in this context. First, REITs often invest in non-residential property such as commercial, retail or industrial real estate. There is less clarity about price movements and returns for these asset classes than for residential (Njenga, 2017).

Internationally, the residential real estate is a primary store of capital for households and owners. However, unlike other securities, such as investment stocks or investment bonds where it is comparatively straightforward to own an excellently-diversified portfolio of such securities it is generally the case that most people invest in a single category of residential land. Moreover, with its combination of locational and structural features, each residential property is distinctive. The question arises: “What are the risk and return profiles of the separate individual residential assets that are actually owned by investors?”

## **2.7 Empirical Review on Diversification of Real Estate Portfolio**

Golob, Bastic & Psunder (2012) study endeavored to determine the elements that impacted the growth and reduction of real estate value on the industry. Researcher used questionnaires to collect data on building quality, sales and access of funds source. The study found that the real estate risks such as price risk and market risks affect the prices of real estate value on the industry. However, this study did not focus on diversification and did not establish the optimal portfolio that would give maximum returns on real estate investments.

In order to escape a rule of thumb strategy to investment decisions, the analysis conducted by Anule & Umeh, (2016) tried to classify the drivers of investment success of commercial property in Lagos region. In order to determine the factors affecting the effectiveness of commercial property portfolio investment in 5 selected locations in Lagos, the survey questionnaire focused on elements determining the performance of commercial property investment were planned and handled by 125 real estate agents in Lagos. Specific sub-markets in this study indicated common

significant variables, namely; the cost of construction materials, location and quality of road facilities, rental development and protection. Study results across submarkets indicated three significant variables. State of the premises; a combination of socio-cultural and legal systems is the second subject; a blend of socio-cultural, political and economic influences is also the third one. The research however did not dwell deeper to establish the effects of risk on returns. Additionally, it did not link real estate diversification with management of risks.

In order to calculate the diversification impact of separately weighted investment portfolios, methodological analysis has been carried out by Aleknevičienė, Aleknevičiūtė & Rinkevičienė, (2012). This was achieved on the "Lithuanian Stock Exchange" (LSE) market and between the years 2009-2010, focused on regular stock market rates. Using three asset selection parameters, the authors built both naive portfolios and separately-weighted investment stocks-portfolios by capitalization. The study findings revealed that the diversification impact of building naïve portfolios is marginally greater than building differently weighted investment portfolios through capitalization. However, this study focused on securities and stock market hence there is sectorial gap which the current study seeks to address.

Further, Barak, Arjmand & Ortobelli (2017) examined the optimum number of investment stock that can allow an investor to optimize the value of diversifying in their investment. Using a condensed method by Elton & Gruber (1977) a set of portfolio variation was derived to define the actual diversification. Eighty stock samples were randomly picked from Bursa Malaysia between the year 1999 and 2002. The study results were that 13 stocks were adequate to build a portfolio that was well diversified.

Fiess et al. (2010) performed an analysis on investment risk diversification of real estate transactions, where the real estate can then become more attractive if its yields are inversely related of sequence, and they found that diversification of real estate improves both the Sharpe ratio, a Sharpe-developed indicator of portfolio efficiency, and the asset equal certainty.

Harelimana (2017) performed a research on the impact of diversification on investment portfolio risk management at the "Rwanda Social Security Board." The research was undertaken by the "Rwanda Social Security Board" (RSSB) to examine the impact of diversification on investment portfolio risk management. This analysis gathered both primary and secondary data in order to capture the overall variance of the two variables. A representative sample of 84 participants out of

124 was chosen using Solvins formula to respond the structured questionnaire and structured interviews. The researcher observed that there was a clear association of importance between investment portfolio diversification in RSSB portfolio risk management where Pearson correlation coefficient of was observed to be 0.964. However, in order to minimize the portfolio risk, to reduce losses by the acquisition of a mutual fund and not to invest directly in shares with maturities greater than the limits set by the investment policy, the recommendations given concentrate on enhancing foreign diversification. The study failed to show the link between diversification and risk management in real estate property investments and management.

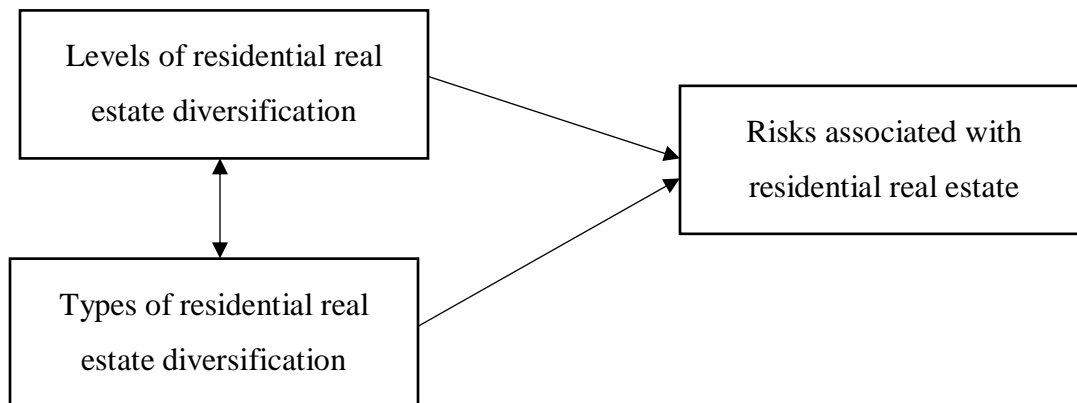
In addition, Rop, Kibet & Bokongo (2016), analyzed the influence of portfolio diversification on the financial performance of commercial banks in Kenya. The thesis used by these researchers was an exploratory research design that gathered secondary data using data collection sheets for secondary data and conducted interviews to obtain primary data from a survey of 40 banks. The study results concluded that a great deal of work was needed to encourage bank portfolio diversification.

Karimi (2013) explored the association between investment portfolio choice and the resultant effectiveness of the investments firms listed with NSE through the use of a descriptive research design. The study sample consisted of 4 firms listed at the Nairobi Stock Exchange in the year 2012 A stratified study sample of 49 managers was chosen and thereafter the questionnaires administration followed. The results of the study suggest that investing is primarily about choosing the best blend of stocks with minimum risks. The research focused on performance while the current study seeks to focus on risk management, portfolio diversification and returns.

## **2.8 Conceptual Framework**

A conceptual framework denotes the overall, logical orientation and connections of all factors that forms the basis of critical thinking, structures, the strategies, practices and implementation of the entire research project (Ravitch & Riggan, 2017). Figure 2.1 is the conceptual framework of the research study.

**Figure 2.1 Conceptual Framework**



**Source: Author (2020)**

According to the literature reviewed, figure 2.1 shows that residential real estate carries some level of risks which can be mitigated by diversification. The diversification strategies include portfolio diversification, financial portfolios diversification, geographic regions diversification, real estate economics diversification and portfolio management. Residential real estate diversification involves diversifying the portfolio within the same asset class but different type of residential premises, different geographical locations in form of apartments and maisonettes in targeting different segments of customers. This therefore leads to diversification which minimizes some risks such as tenant risk. However, over-diversifying lead to increasing risks and also minimizing costs causing low returns. Over-diversifying may increase risks such as legal risks and asset class risks. Therefore, the portfolio managers or investors need to create an optimal portfolio of diversified residential real estate properties that can mitigate risks and at the same time generates good returns.

## **2.9 Summary of the chapter**

There are plenty of reports on portfolio diversification of assets and stocks. The modern philosophy of the market promotes and advises that it is not necessary for speculators to concentrate solely on the usual risks and market return of one individual asset. In the event of growth, a financial expert will win by placing money into multiple stocks by decreasing the risks in the given portfolio. Subsequently, this principle aims to quantify the effects of diversification.

The theory of investment portfolio management allows investors to choose investments and determine the degree to which the purchase of an investment influences the risk and return of a portfolio asset. Investing in real estate properties allows the fund manager to make the right and informed decisions based on the desired fixed risk-return.

The "capital asset pricing model" maintains that all investors keep the stock pool of volatile assets in equilibrium, regardless of their investment decisions. In comparison, diverse market investment portfolio combinations and riskless securities are owned by different owners.

Literature on empirical studies has focused on diversification and risk-return trade-off. Golob et al., (2012) found that the real estate risks such as price risk and market risks affect the prices of real estate value on the industry. Aleknevičienė (2012) showed that forming naïve portfolios, the diversification effect is slightly larger than forming differently weighted portfolios by capitalization. Harelimana (2017) discovered that there was a clear significant association between portfolio diversification in RSSB investment portfolio risk management where the correlation coefficient of Pearson was found to be 0.964. Rop, Kibet & Bokongo (2016) concluded that a great deal of work was needed to encourage bank investment portfolio diversification. Karimi (2013) pointed out that investing is about choosing the best stock mix with minimum risks. These studies failed to link the portfolio diversification and risk management of real estate property developers. Therefore, the current research aims to fill this void by investigating the effect of real estate portfolio diversification on the management of risks by real estate developers in Nairobi County,

## CHAPTER THREE

### RESEARCH LOCATION AND METHODOLOGY

#### 3.1 Introduction

This research chapter discusses and explains the research methodology used in this study. It presents and justifies the research design for this inquiry. The section also discusses the study population, the sampling method and the period covered by the study inquiry. This chapter also discusses the type of data for the study, its measurement and the data collection instrument. Finally, it discusses data analysis, presents conceptual and analytical models and relevant tests of statistical significance.

#### 3.2: Research Location

The researcher conducted the research study in Nairobi County, which came about from the 2010 Kenya Constitution and the successor to the deceased Nairobi City Council. It is the planning and judicial headquarters of Kenya Capital. Nairobi County consists of 17 sub-counties, namely: the Westlands, Ruaraka, Embakasi South, Dagoretti North, Roysambu, Kasarani, Embakasi North, Embakasi Central, Embakasi East, Dagoretti South, Langata, Kibra, Makadara, Kamukunji, Starehe and Mathare. The county has an area of 694.9 sq km.



Figure 3.1 Map of Nairobi County

Investing in real estate and rates are good measures to represent anticipated demand for real estate and act as strong predictors of economic growth (Cytton, 2016). As a city, Nairobi supported a heterogeneous sample, with many local and multinational corporations stationed here. As such, demand for residential real estate is high, as both formally and informally working people are in need of accommodation. Most of Nairobi's estates are experiencing high demand for accommodation, although for most of its residents available units are less so. Taxation, zoning, building codes and standards, land use regulations and county government by-laws provide legal mechanisms relating to immovable property. Controls of land use on housing contains a significant regarding the form of housing construction in Nairobi. Their implementation and compliance by local authorities determines rules and regulations governing the development of urban real estate.

### **3.3 Research Design**

A research design is essentially the detailed blueprint that researchers use to their research study its objectives. There are several interrelated decisions involved in the course of conducting and designing a research report (Bryman, 2016). In this study, mixed methods, together with philosophical or theoretical assumptions and the inquiry methods, was applied in the present study guided by Cresswell et al. (2007). A single analysis contains a mixture of qualitative and quantitative evidence with the assumption that the use of combined quantitative and qualitative methods offers a deeper interpretation of research issues (Curtis, 2011).

The quantitative approach is justified by the epistemology of finance as analytical and based on observed numbers as opposed to opinions and subjective judgments. The quantitative approach aligns well with the positivism because it involves collection of the raw data without altering it making it possible to analyze the study variables objectively. The study also employed qualitative approach to provide information on risks involved in levels of residential real estate diversification amongst real estate developers and risks associated with residential real estate. The qualitative information was derived from the financial managers of the selected developers.

### **3.3 Target Population**

As the definition specifies, the target population must have a clear and concise definition because they determine whether the sampled cases will be eligible or disqualified for the survey or not. The target population for this research consisted of 69 Nairobi real estate developers registered in Kenya with the Kenya Property Developers Association (KPDA) under the corporate members

category that has real estate developers only. The research study selected these developers because they have been in the industry for more than decade. Some of these developers also engage in Engineering, Procurement, Construction and Financing Contract (EPC-F) where they not only act as developers, but double up as lenders and financiers in real estate development. The current developers who are developing new concepts in this field such as purpose built student accommodation were also interviewed.

### 3.4 Sampling and sampling techniques

This study employed simple random sampling to select the study participants. Kothari (2004) describes Simple random sampling (SRS) as a form of sampling in which there is an equal and established probability of being chosen for each member of the population. This technique has been used because it is simple, which guarantees that minimum bias is present. Therefore the finance managers in the real estate developers in operation in Nairobi were included in the study. Fisher’s formula was used in determining the sample size for real estate developers operating in Nairobi to participate in the study.

The formula for the Fisher is as below:

$$n = \frac{z^2 p(1-p)}{d^2} + 1$$

In this formula:

$n$ = denotes the sample size

$z$ = signifies the standard normal deviate value for the level of confidence, for instance 90% level of confidence =1.645.

$d$ = denotes margin of error or level of precision at 0.10 for CI at 90%

$p$ = signifies proportion to be estimated, the assumed  $p=0.5$

Therefore, the research study arrived to the sample size as follows:

$$n = \frac{(1.645^2)(0.5)(1 - 0.5)}{(0.10)^2} + 1$$

$$n = 68.6$$



Fisher's formula gave a sample size of 68.6 which was rounded off to 69. The difference was insignificant therefore the sampling technique will be a census since all the 69 firms were included in the study.

Thus the sample size for respondents will be 69.

The units of analysis comprised 69 real estate financial managers of the real estate developers registered with the KPDA.

### **3.5 Data Types and Data Sources**

Mugenda & Mugenda, (2003) defines data as all the information a researcher gathers for examination in the study. This study relied on both primary and secondary data to complete the inquiry. The evidence that still exists and that has already been recorded is the secondary data (Williams, 2007). The secondary data in this study was obtained as reported by the financial controllers. The financial controllers were trusted to provide the data since they possess specific knowledge and figures regarding the portfolio size and returns.

### **3.6 Data Collection Instruments**

The secondary data was gathered through the help of data collection sheets. Those collection sheets were very significant in ensuring that the researcher did not deviate from the purpose of the study by collecting irrelevant data. The secondary data collection sheet consisted of two columns, one showing the portfolio size and the second one showing returns for the period between 2015 and 2019.

The study targeted one manager from each of the real estate firms. This was useful in getting the best information regarding levels of residential real estate diversification amongst real estate developers and risks associated with residential real estate. The interview guide consisted of three sections. The first section inquired about developer characteristics, the second section inquired about the levels of residential real estate diversification and the third section inquired about risks associated with residential real estate.

### **3.7 Data Analysis**

Qualitative information was recorded and later transcribed. The transcribed information was analyzed thematically. Quantitative information was analyzed using statistical measures of arithmetic mean, variance and standard deviation of returns were used. Quantitative data was

tabulated and entered in Statistical Package for Social Sciences (SPSS) which was used to analysis the data. Quantitative data was analyzed by calculating various percentages as possible. The findings was then presented in form of pie-charts, bar-graphs, and tables. Inferential statistics in form of regression model was used to establish the relationship that exists between Real estate portfolio diversification and the management of risks among real estate developers.

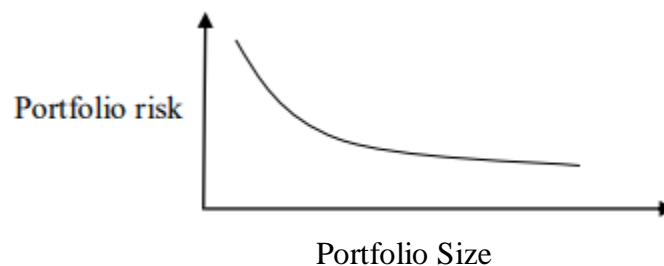
### 3.7.1 Analytical Model

The study did apply the mean variance model by deriving insights from (Dooley & Van de Ven, 1999). Portfolio Variance, in this case the standard deviation, assisted in measuring the investment risk. The number of residential properties combined constitutes portfolio size. Portfolio variance was computed from dispersion of residential property rates of return from their mean. Using equally weighted portfolios, the time series standard deviation was expected to decline to an asymptote as the number of residential property in the investment portfolio increases. Portfolio risk is expected to be negatively related to portfolio size. When the residential properties numbers in the investment portfolio (diversification) increases, portfolio risk decreases. The model below represents that relationship.

$$Y = C + \left( \beta \frac{1}{x} \right) + \varepsilon \quad (3.1)$$

Where Y is portfolio standard deviation (risk), x is portfolio size,  $\beta$ , is the parameter of the model, C is constant and  $\varepsilon$  is the error term of the model.

Portfolio standard deviation (risk) was plotted against investment portfolio number size and the point at which the curve became asymptotic was the optimal portfolio size. This is conceptually shown in figure 3.1 below.



The study also employed the Regression analysis with a 95 percent confidence level to calculate the frequency of the interaction between the two variables. The estimated regression model equation 3.1 was used.

## CHAPTER FOUR

### RESEARCH FINDINGS AND DISCUSSIONS

#### 4.1 Introduction

The results and explanations of the data gathered through questionnaires given to finance managers of real estate developers in Kenya are presented in this section. The chapter is broken down into separate sub-sections depending on the basic goals or specific objectives of the report.

#### 4.2 Response rate

The demographic size consisted of 69 respondents serving as financial managers at various Nairobi real estate developers companies. There were a total of 69 questionnaires issued by the researcher. A total of 50 questionnaires, representing 72 percent of the answer rate, were correctly conducted and returned. Per Mugenda & Mugenda (2008), the study response rate of more than 70 percent is optimal to evaluate. The response rate data is given, as analyzed in table 4.1 below.

**Table 4.1 Response rate**

<b>Questionnaires</b>	<b>Number</b>	<b>Percentage</b>
Duly filled and returned	50	72
Uncollected/ unfilled	19	28
<b>Total</b>	<b>69</b>	<b>100</b>

#### 4.3 Demographic information

The research study purposed to collect the background information of the interviewees who filled the questionnaires to in a bid to determine their appropriateness of fill the questionnaires. The collection of the background information was also critical in getting the necessary feedback in the queries provided by the questionnaire regarding the impact of real estate investment portfolio diversification in the management of risks in the real estate developers in Nairobi County, Kenya.

### 4.3.1 Duration worked in the organizational any position

The research aimed at assessing the duration that the financial managers have worked in the real estate development firm in whichever position. This is crucial in order to assess the knowledge of the managers to give quality and valid responses since the longer the stay in the company the higher the knowledge of the operationalization in the company. Consequently, the illustrations are detailed by the following Table 4.2

**Table 4.2 Working duration**

	Frequency	Percent
Below 2 years	2	2.9
2-6 years	14	20.3
7-10 years	50	72.5
Above 10 years	3	4.3

Notable from the above study findings, majority (73%) of the research participants had worked in the organizations respectively between 7 to 10 years, 20% had served between 2 and 6 years, 4% had served above 10 years whereas 3% had served barely 2 years. Subsequently, this observation indicates that the manager respondents had satisfactory knowledge and expertise on the applied strategies in their respective companies.

### 4.3.2 Duration worked in the current position as financial manager

On assessing the duration that the respondents had served in the respective managerial positions, the findings were presented in Table 4.3.

**Table 4.3 Current position service duration**

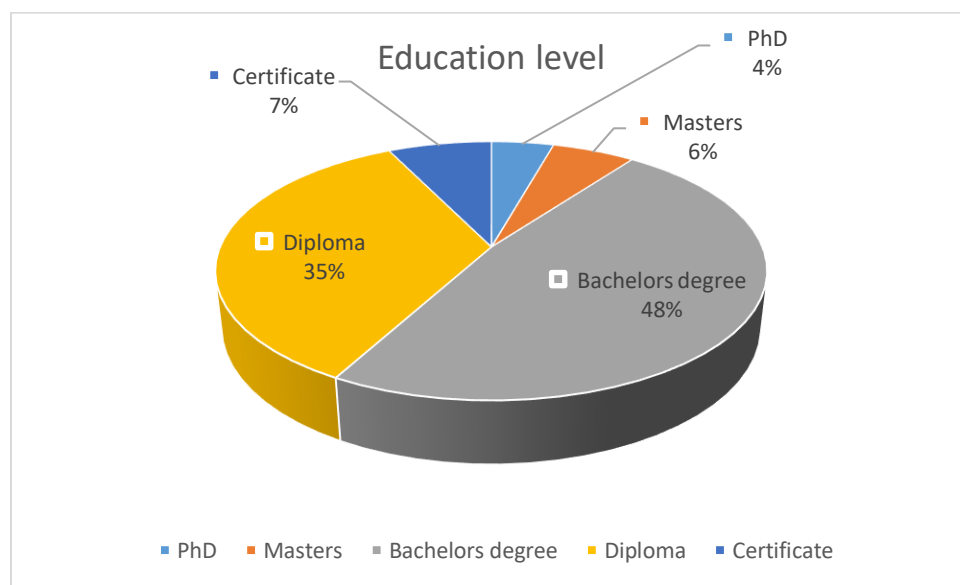
	Frequency	Percent
Below 2 years	2	2.9
2-6 years	11	15.9

7-10 years	58	70.5
Above 10 years	8	9.7

Again, from the above study findings, most of the study respondents (70%) had already worked or served in the current position between 7 and 10 years, 16% had served between 2 and 6 years, 10% had served above 10 years whereas 3% had barely 2 years in the operational positions they were serving. This indicates that the respondents are in a position to give valid responses.

### 4.3.3 Level of education

The researcher aimed at getting the useful information concerning the educational levels background of the study participants in order to get the level of knowledge in relation to their education from the different real estate developer's managers. Figure 4.1 gives the illustrations.



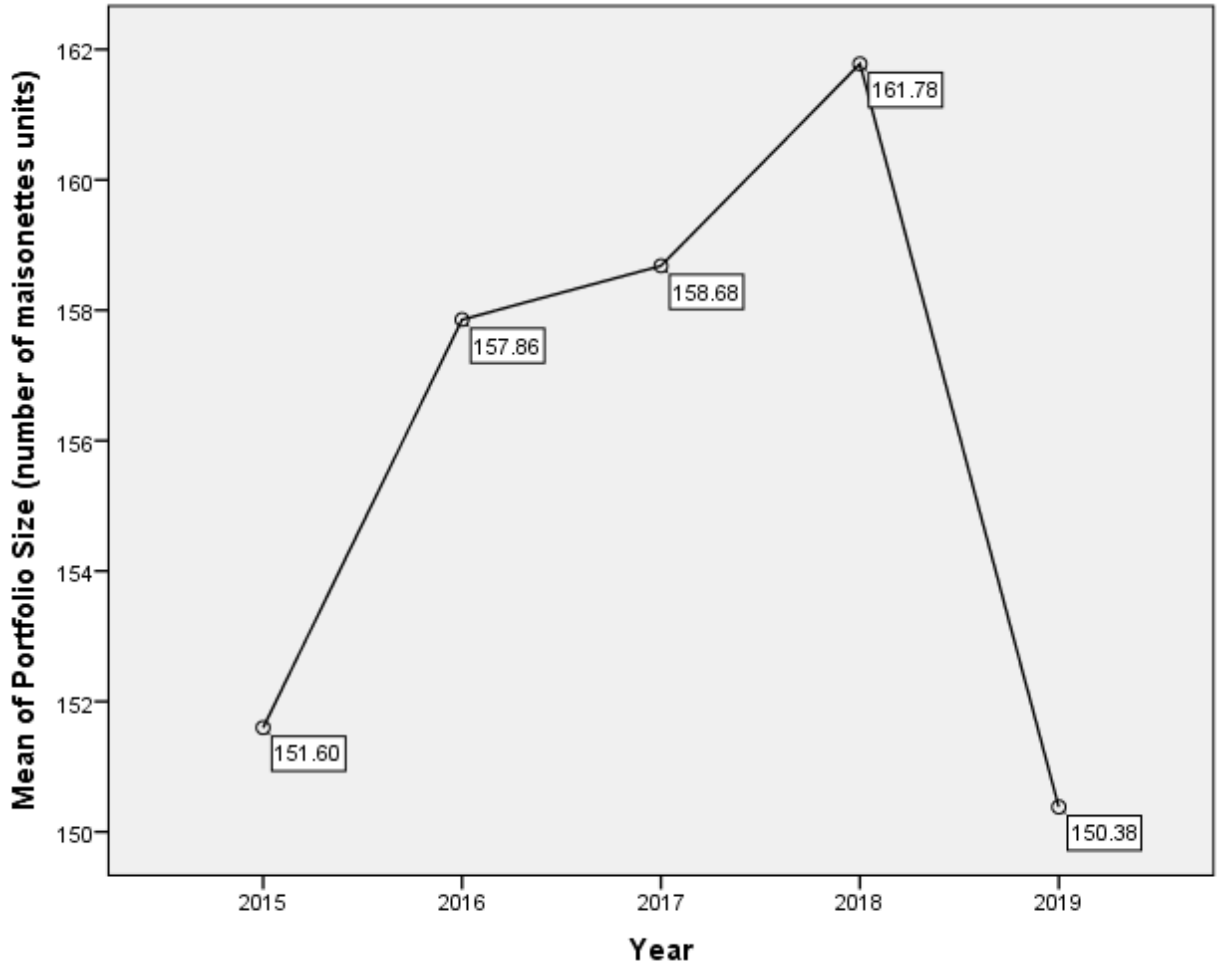
**Figure 4.1 Level of education**

From the results, the majority (48%) of the managers in the real estate developers had a bachelor's degree, 35% had a diploma, 7% had certificate level, 6% had masters level whereas 4% had PhD degree. Education is a key concern to development of strategies in real estate development. The level of education is important as an assessment of the expertise knowledge and skills of the financial managers in the respective firms.

#### **4.4 Levels and types of residential real estate diversification amongst real estate developers in Nairobi County**

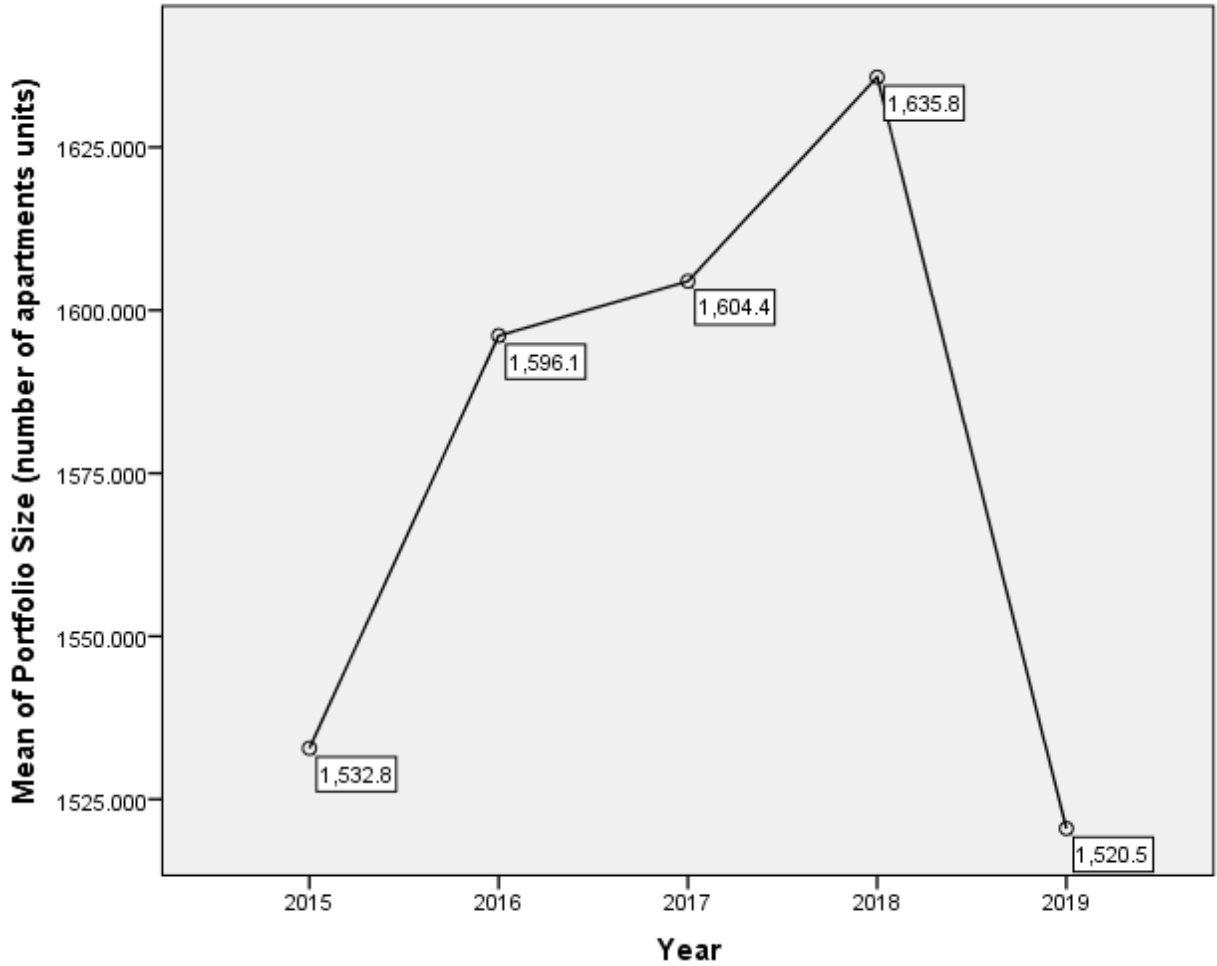
The researcher aimed at investigating the extent and styles of real estate investment portfolio diversification in Nairobi County among real estate developers. To assess the levels of real estate diversification, the annual mean scores of the stock of mansionettes and apartments across the 69 developers was calculated.

Results reveal that the average level of diversification ( number of mansionettes) across the 69 real estate developers in year 2015 was 151.6 mansionettes, 157.86 in year 2016, 158.68 in year 2017 and 161.78 in year 2018. However, the level dropped to 150.38 in year 2019. This implies that the level of diversification consistently rose from year 2015 to 2018 but sharply declined in year 2019. The decline in the level could be explained by social economic factors which include the reduced demand for mansionettes , a market correction in the form of a drop in real estate prices and hence a reduction in supply.



**Figure 4.2 Mean portfolio size of mansionettes**

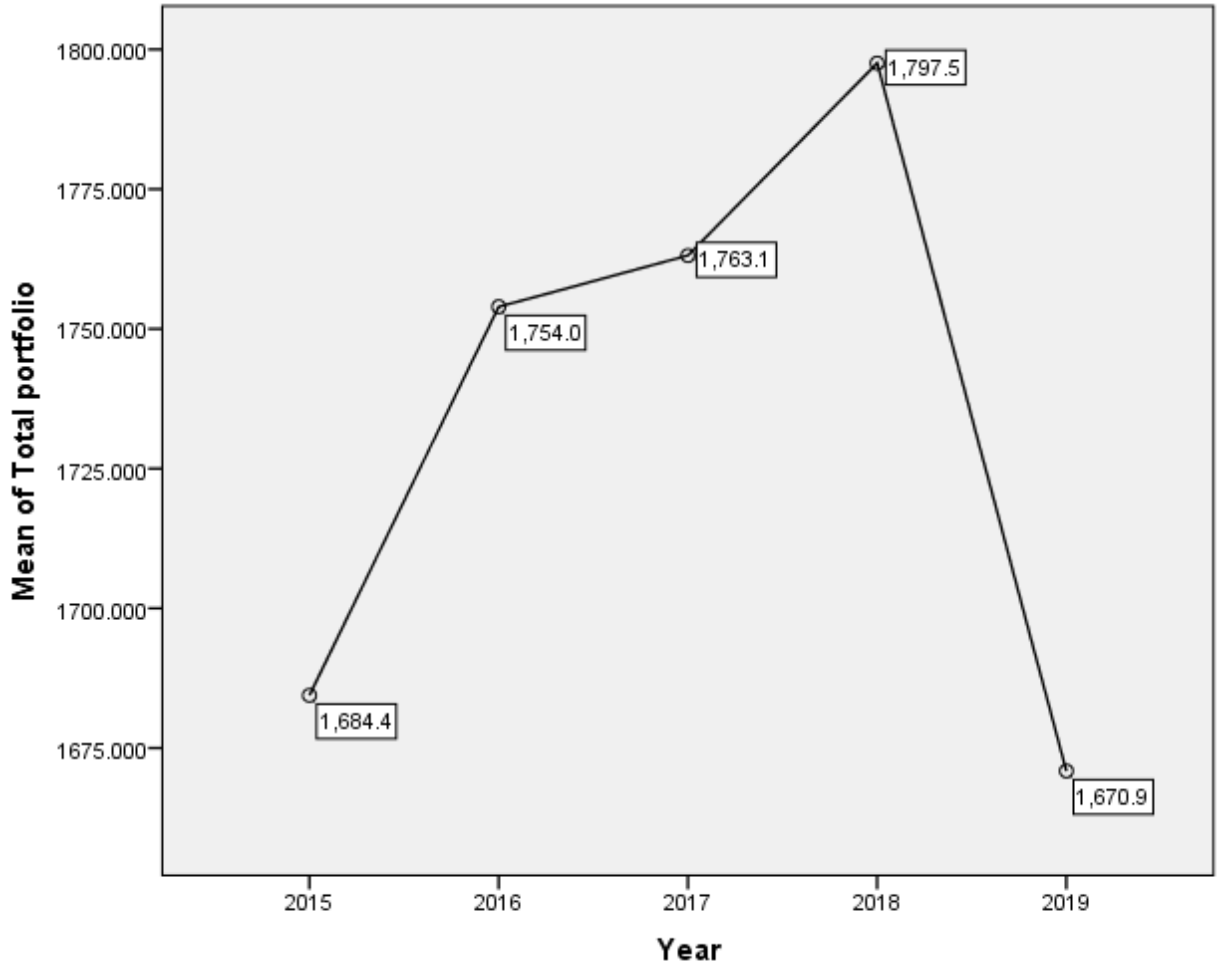
Results reveal that the average level of diversification across the 69 real estate developers in year 2015 was 1532.8 apartments, 1596.1 in year 2016, 1604.4 in year 2017 and 1635.8 in year 2018. However, the level dropped to 1520.5 in year 2019. This implies that the level of diversification (number of apartments) consistently rose from year 2015 to 2018 but sharply declined in year 2019. The decline in the level could be explained by social economic factors which include the reduced demand for apartments, a market correction in the form of a drop in real estate prices and hence a reduction in supply.



**Figure 4.3 Mean portfolio size of apartments**

A combination of the two types of real-estate developments (mansionettes and apartments) reveals that there was a consistent increase in the levels of investments in these portfolios. However, there was a notable drop in the total investments portfolio was observed in year 2019.

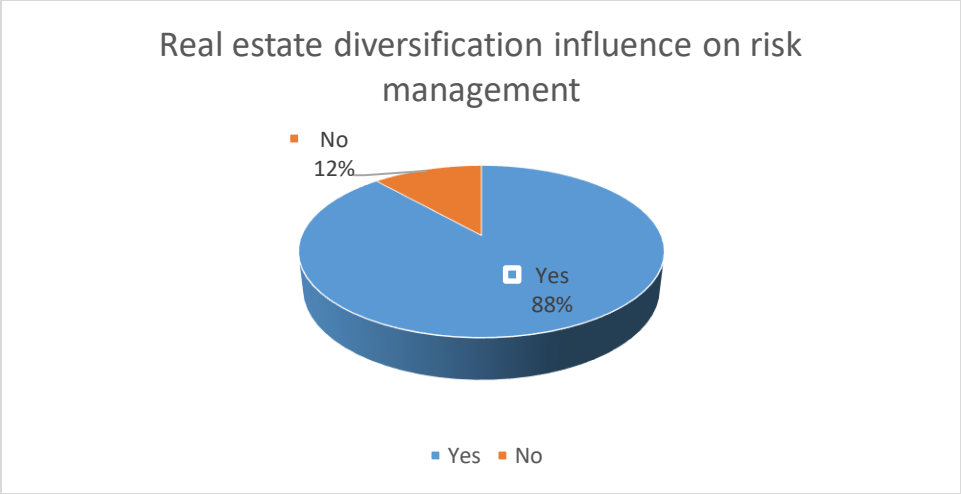




**Figure 4.4 Mean total portfolio size**

Qualitative responses were also sought using a questionnaire to establish additional information about level and types of real estate diversification. Respondents who responded via the questionnaire revealed that there are different diversification levels and types that are involved in real estate development. In particular the two type of portfolio diversification that were highly used were investing in apartments and mansionettes. Further, the levels of diversification differ across different companies with some developers having increased levels/number of apartments and mansionettes.

The research assessed whether the level of residential real estate diversification influenced the management of risks in real estate developers. Figure 4.2 indicates that majority (88%) indicated that from their point of view, the level of residential real estate diversification influence the management of risks, which was a contrary opinion among 12% of the respondents.



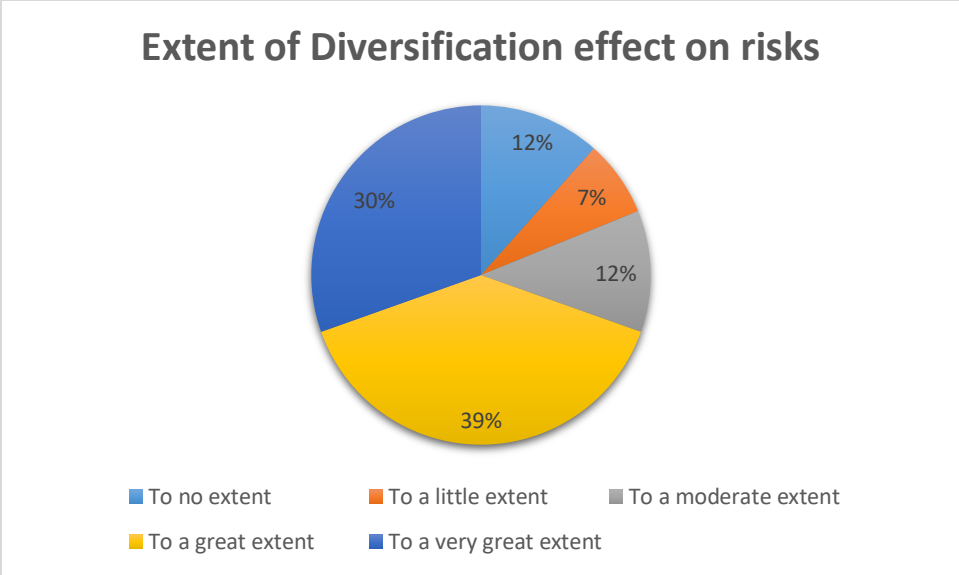
**Figure 4.5 Real estate diversification influence on risk management**

On explaining the situation further, the extent of diversification effects was assessed on a five point Likert scale. Table 4.4 gives the illustrations

**Table 4.4 Diversification effects on risk management**

Statement	Mean	Std. Deviation
To what extent does level of residential real estate diversification influence on the management of risks in real estate developers	3.7	1.298

The mean of the responses was 3.7 which were greater than 2.50 and the standard deviation was 1.298. This implies that the diversification level have an influence on the risk management since the mean score bordered more on agreement with the statement as opposed to disagreement. Figure 4.6 gives more illustration. Most of the respondents (69%) indicated that level of residential real estate diversification influence the management of risks in real estate developers to a great extent



**Figure 4.6 Diversification effects on risk management**

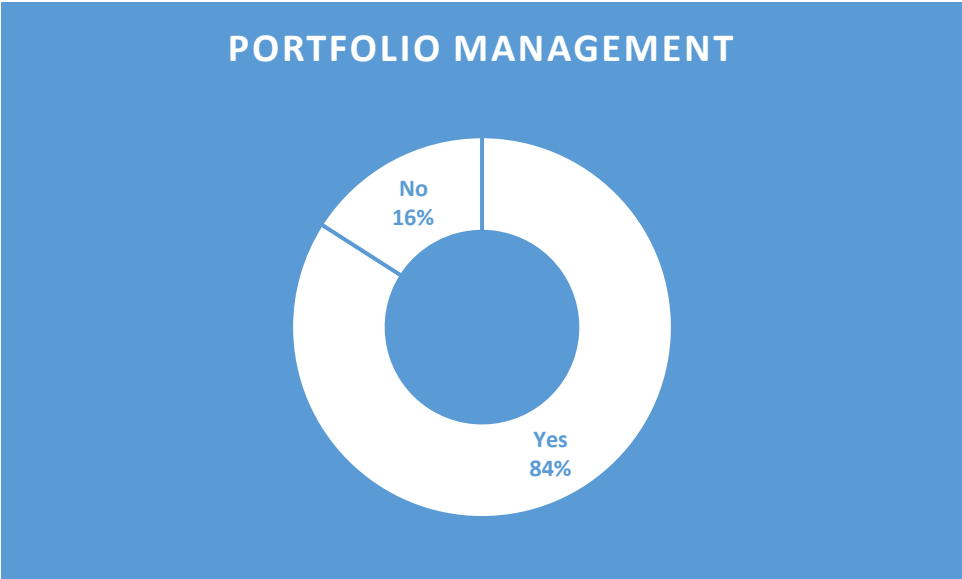
The research aimed at assessing whether financial, portfolios diversification and geographic regions diversification affect the management of risks in the firm. Majority of respondents noted that diversifying the financing sources was an important type of real estate diversification since having only one source of finance could lead to failure of real estate firms and hence increased risk. Portfolio type diversification was also recommended by respondents since balancing the portfolio between mansionettes and apartments may safeguard against falling or shifting demand risk. Respondents indicated that another type of diversification was geographical diversification. Investing in different geographical areas reduces the risk of shifting demands and also geographic specific risks such as the government appropriation risks.

The research revealed that the key objective of diversification is to balance out the non - systematic investment risk occurrences in an investment portfolio such that certain assets 'strong performance will annihilate others' poor performance. Consequently, only when the stocks in the portfolio are not completely correlated will the advantages of diversification be preserved. The respondents indicated that the financial portfolios diversification and geographic regions diversification enhance the management of risks in the firm. Further, the firms are expanding the residential properties in form of apartments and maisonettes to increase their income and diversify their products. Some respondents indicated that the apartments already built are expanded to diversify the incomes.

Diversification is a risk reduction strategy through the distribution of assets between different types of financial instruments, sectors, and others. It seeks to maximize profitability by investing in different regions, each of which would respond differently to the same situation. Most financial analysts believe that the most critical part of meeting long-range financial targets and mitigating risk is diversifying financial resilience, although it does not shield against losses. Here, we glance at why this is so and how diversification of your portfolio can be accomplished.

By investing in assets spanning numerous financial instruments, sectors, and other sectors, diversifying lowers the risk. Risks may be both systemic or un-diversifiable, and diversifiable or un-systemic. Investors will find it difficult and costly to balance a diversified portfolio, and since the risk is alleviated, it can come with smaller returns.

The research assessed whether the different firms practice portfolio management. The findings presented by the below Figure 4.7, indicates that the majority of the respondents (84%) of the respective real estate firms practice portfolio management whereas 16% indicated that the practice is not common in the firms.

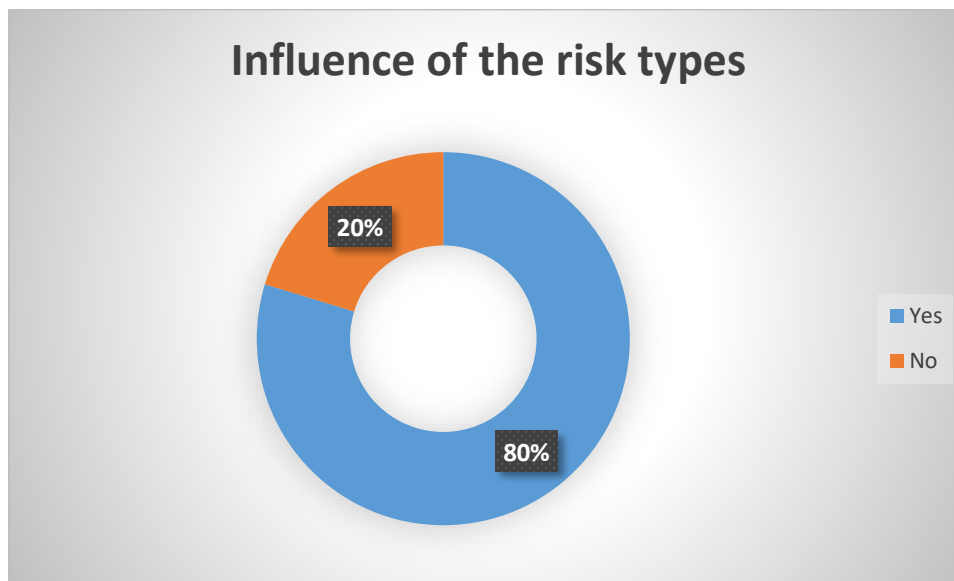


**Figure 4.7 Portfolio management**

**4.5 Real estate portfolio risks associated with Real Estate Developers.**

The research aimed at assessing the different portfolio risks that face the real estate developers. Therefore, the research evaluated whether the types of risks in residential real estate diversification

significantly impacted on the management and prevention of risks in real estate developers. The findings were presented in Figure 4.8.



**Figure 4.8 Risk types effect and risk management**

The findings in Figure 4.6 revealed that majority (80%) indicated that types of risks in residential real estate diversification influence on the management of risks while 20% informed that there exists no significant relationship between risk types in real estate investment portfolios and the effectual risk management.

The research assessed the types of risks that the firms experience in real estate diversification. The respondents indicated the various risks involved. General market risk involves the peaks and troughs in all sectors linked to the market economy, market interest rates, market inflation or other business movements. Risk at Asset-Level is incorporated in every portfolio of an asset class which has a share of some risks. Idiosyncratic risk is peculiar to a specific property where the higher the risk, the greater the reward. Credit risk is also found in what determines valuation is the longevity and consistency of the revenue stream of the land. Risk of replacement costs is found where the capacity for market segment induces elevated lease rates for older properties, and remains just a question of time before such lease rates support new construction and raise the risk of supply. Tenant Risk was also found to be common where tenants are screened to gauge their capability of paying rent to avoid the risk of rent defaults, structural wear and tear and generally having bad tenants. Risk of Leverage is common where the more debt an investment owes the higher risk it is

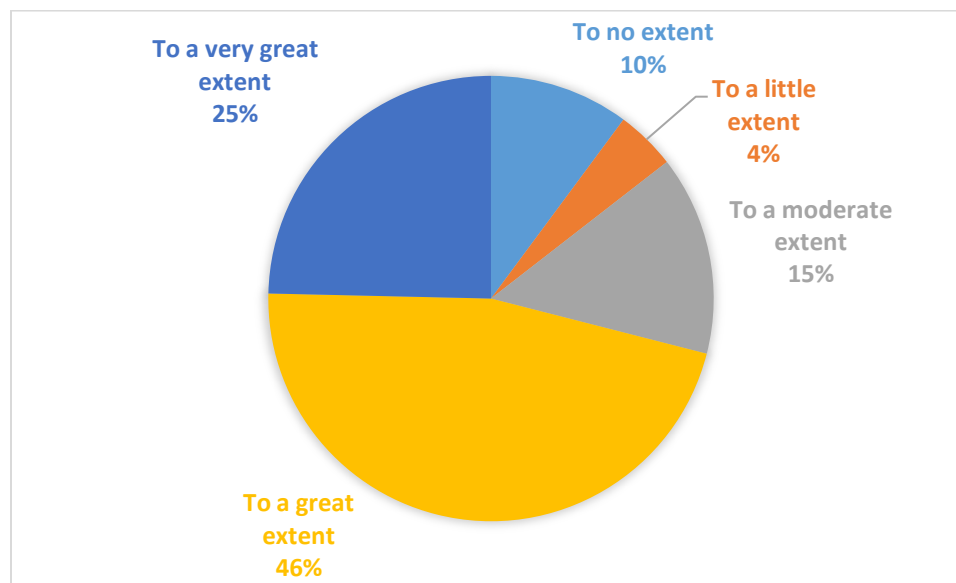
and, in exchange, the more investors can expect. Structural risk is common where it refers to the financial framework of the investment and the privileges it gives to specific individuals.

The research further assessed the extent types of risks in residential real estate diversification influence the management of risks in real estate developers.

**Table 4.5 Risk types extent and risk management**

	Mean	Std. Dev
To what extent does types of risks in residential real estate influence on the management of risks in real estate developers	3.71	1.189

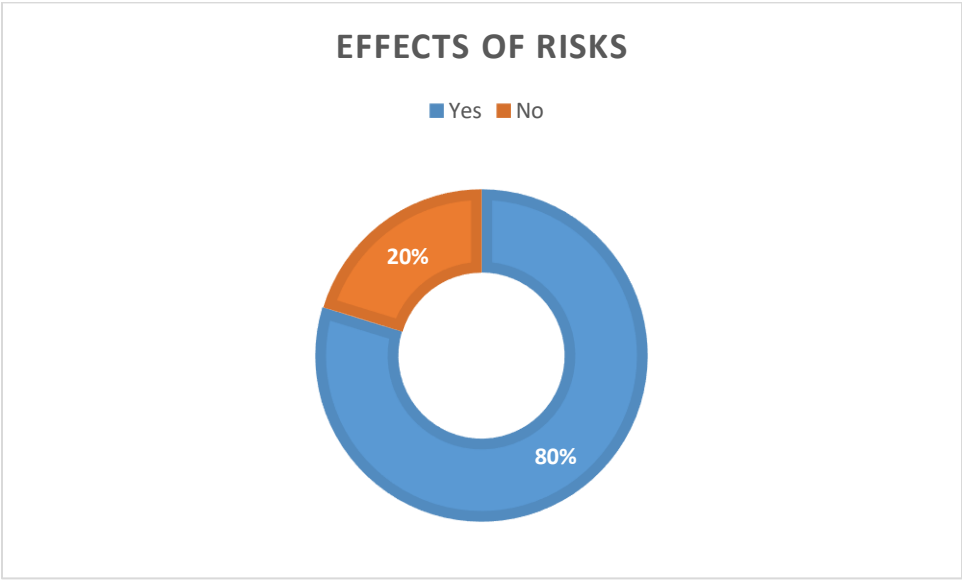
The results findings in Table 4.4 reveal that the mean and the standard deviation of the responses was 3.71 and 1.189 respectively. This implies that the extent of types of risks influencing the management of risks is high. Further illustrations of the responses are as in Figure 4.9. Majority (46%) indicated that types of risks in residential real estate influence the management of risks in real estate developers to a great extent



**Figure 4.9 Risk types extent and risk management**

The research evaluated whether businesses are at risk from demographic developments, interest rates, competition or other industry trends. Majority (80%) of the respondents indicated that the firms experience risks in general market changes whereas 20% indicated that the general market

changes are not a big effect on the management of the risks that the real estate developers firms face in the course of their operations.

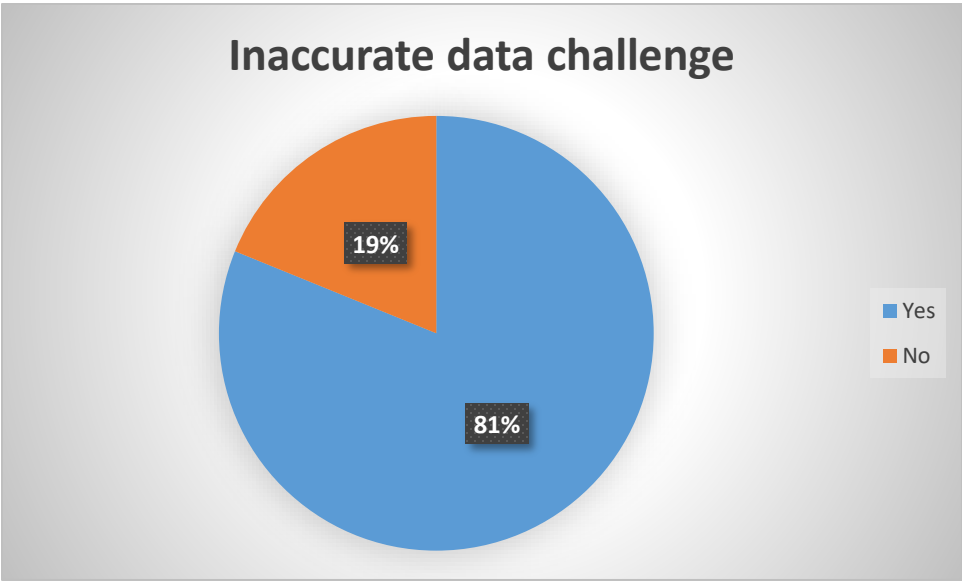


**Figure 4.10 Effects of risks**

The research further assessed the how external risks of the firm that cannot be controlled by the firms including changes in the economy; interest rates, inflation or other market trends affect the firms. Notable from the study results, investors cannot remove market volatility, but they can invest their capital against booms and busts with a conservative portfolio and strategy based on general economic conditions. Business risk impacts the efficiency of the whole sector at the same time. It is challenging to mitigate since it affects the entire sector of the market, as diversification would not benefit. Changes to interest rates, exchange rates, geopolitical tensions, or recessions entail market risk.

The research assessed the cases of residential property experiencing legal risk happening. The respondents indicated that this type of risk is rare and doesn't happen regularly. Moreover, it was noted that much of the legal risk is induced by unknown shifts in real estate rules. To a large degree, the standard of real estate is levied on it by the state after land use and other constraints have been placed to bear on the system. Some of the adjustments, while others may be instantaneous and systemic, are incremental or cyclical. Insurance and legal security will minimize legal liability if a worst-case scenario happens.

The research evaluated whether inaccurate data on the market and product expose a firm to the potential market risks. The bulk of the study respondents (81%) confirmed or indicated that the cases of inaccurate data and its effects expose the firm to risks whereas 19% indicated that inaccurate data is not a major concern on the risks a business is exposed in the market. Figure 4.11 illustrates the findings.



**Figure 4.11 Challenge of inaccurate data**

The study assessed the how firm’s accuracy of data and adequate information concerning the market minimize risks. The respondents indicated that data during its lifetime can be passed to other systems, changed and updated several times. If unforeseen changes to data arise, the issue arises.

Further, it was noted that unintentional modifications or the removal of sections of the data can make the information useless. As it is distinct from its original type, it is no longer accurate and consistent. The integrity of data is important for the analysis of accurate and trustworthy data. Trying to make data-driven business choices based on corrupt data can have significant implications for the future of your business. This can lead to mistakes, missed benefits and even the loss of income.

The study evaluated the possibility of adoption of risk returns tradeoff. The majority (87%) of the respondents indicated that firms set a balanced risk return tradeoff assessed in risk mitigation strategies whereas 13% indicated that the practice is not common. Figure 4.12 gives the



illustration. This implies that the firms in large numbers adopt advanced strategies to combat risks in the market.



**Figure 4.12 Risk return tradeoff strategy implementation**

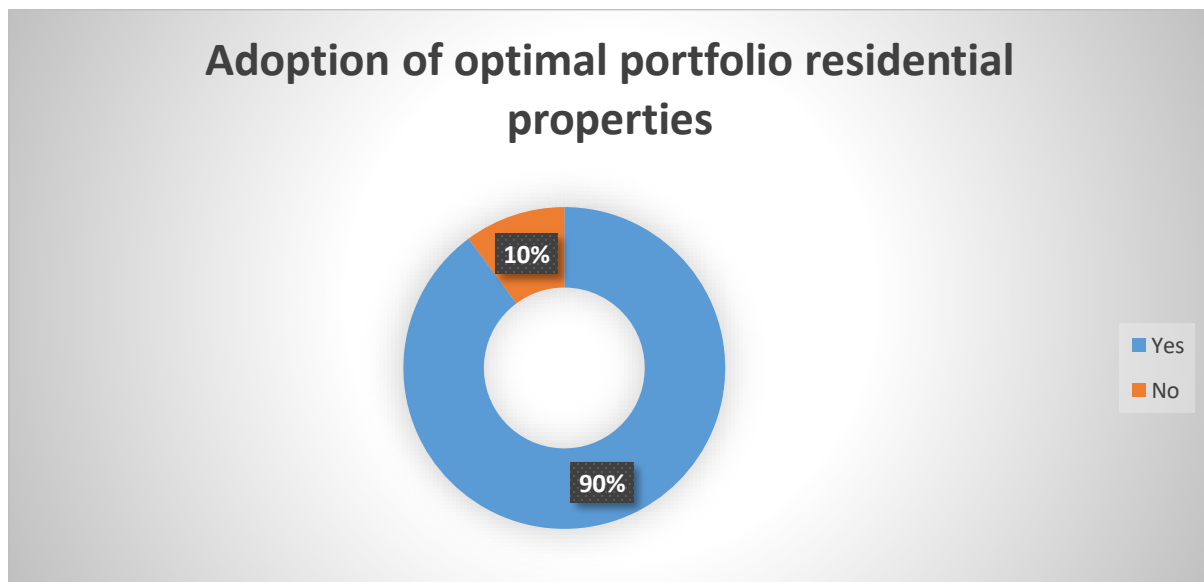
Further, the research assessed other risk mitigation strategies the firms have incorporated. Various respondents gave different views on the strategies used in the firms. There is no question that appropriately planned and implemented strategies for exploiting real estate would increase in investor gains. The key is to make sure that all the right habits are yours, and the analysis is sound.

It was found that the real estate developer would be helped by these risk reducing techniques to decrease the likelihood of losing an investment. If the property is not over-priced, operating on an assumption or other novel funding approach that decreases the interest rate is a successful strategy. By reducing the interest rate, decreasing the payments would raise cash flow and decrease the risk of real estate leveraging.

Lowering yield on cash investment is also a better approach sometimes. High debt, especially in a time of greater vacancy or lack of credit, may backfire. It will cost more cash upfront to increase the down payment, but the amount supported and lower payments will be reduced. Moreover, growing the value of the property by changes raises equity and, upon liquidation of the asset, results in higher income.

#### 4.6 Optimal portfolio residential properties

The research assessed the different portfolio assets that optimize mitigation of risks that face real estate developers. The evaluation of whether companies have adopted optimal portfolio of residential properties that can mitigate against the risk in real estate investments was done where majority of the respondents (90%) indicated that adoption of optimal portfolio of residential properties have been done whereas 10% indicated on the contrary that it's yet to be done. Figure 4.13 illustrates the findings.



**Figure 4.13 Residential properties optimal diversification**

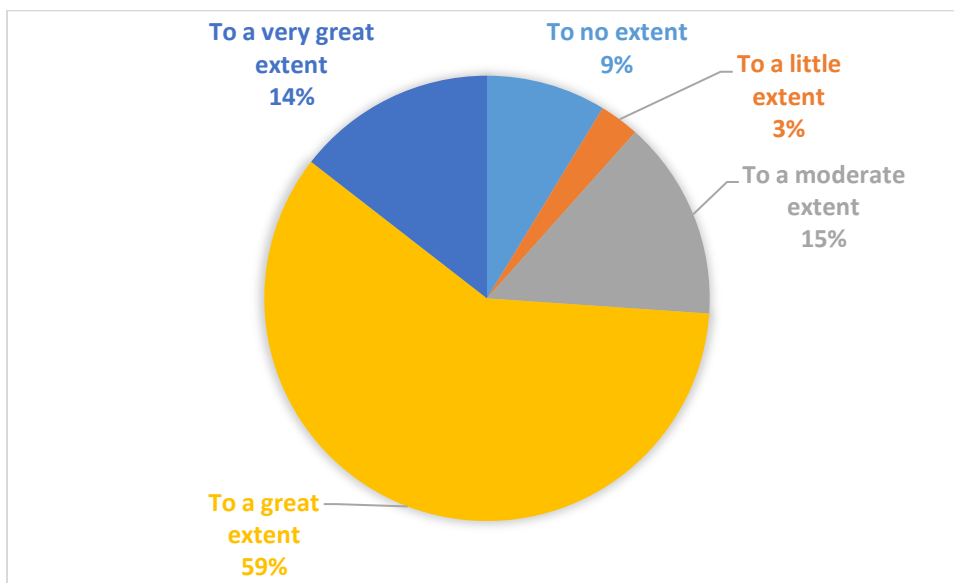
The optimization of the portfolios was done by balancing investments between apartments and mansionettes. Majority of real-estate developers laid emphasis on apartments as opposed to mansionettes. This is because apartments were easier to sell or rent out and had reduced risks of income deviations compared to mansionettes. An optimal portfolio was therefore when more apartments were invested in as opposed to mansionettes.

The research assessed whether adoption of optimal portfolio of residential properties influence mitigation of risks in the firms. The results indicated that companies have adopted optimal portfolios of residential properties that can mitigate against the risk in real estate investments to a high rate. This was evidenced from the high mean value of 3.68 in the 5-point Likert scale. The standard deviation was 1.05. The illustrations are as per Table 4.6

**Table 4.6 Types of risks influence on risk management**

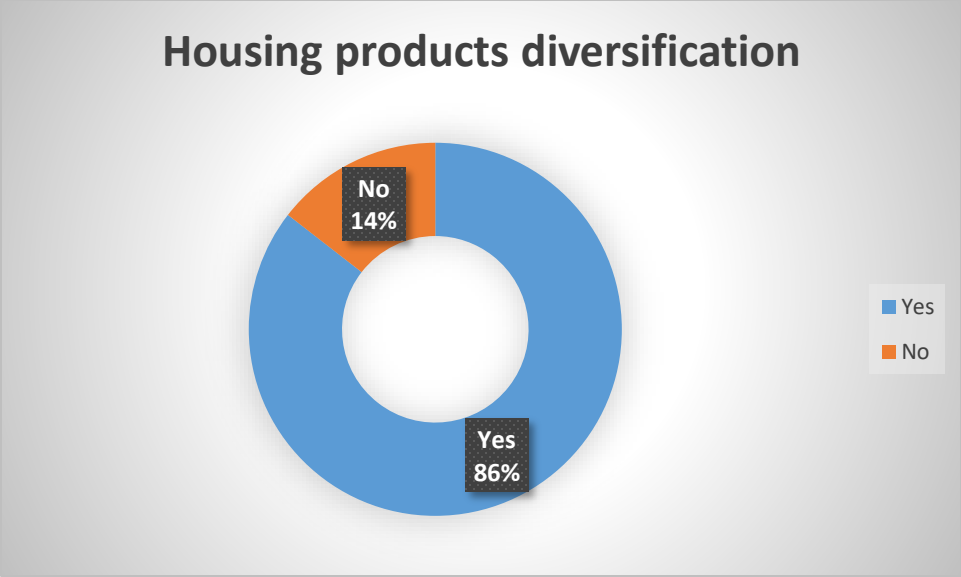
	Mean	Std. Dev.
To what extent does types of risks in residential real estate diversification influence on the management of risks in real estate developers	3.68	1.05

Further illustrations are as per Figure 4.14 where majority (59%) indicated that types of risks in residential real estate diversification significantly influence the management of risks in real estate developers.



**Figure 4.14 Types of risks influence on risk management**

The study evaluated the relationship of housing products and portfolios diversification. Majority (86%) indicated that housing products are used as a diversification strategy whereas 14% had a contrary opinion as shown in Figure 4.15. This implies the housing products are a form of diversification.



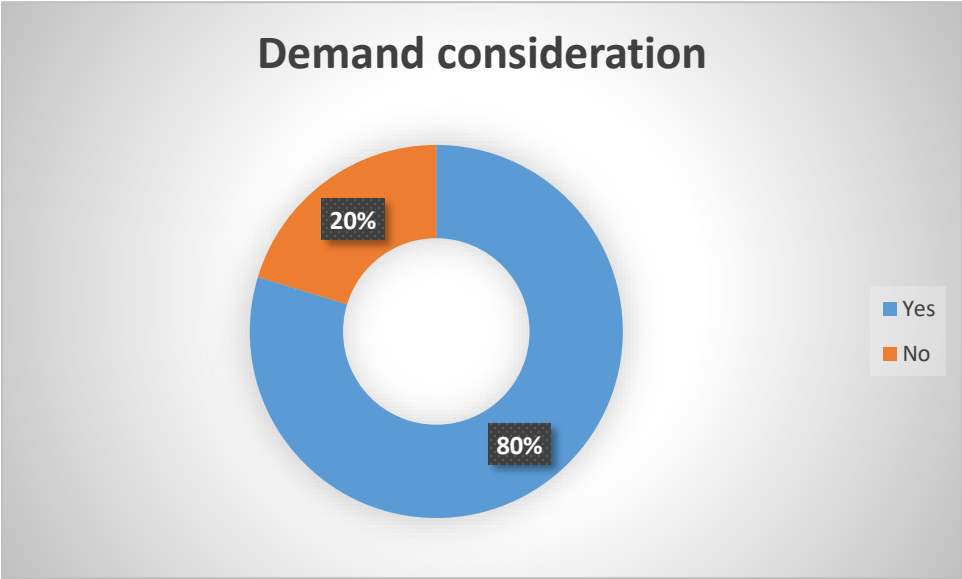
**Figure 4.15 Diversification of housing products**

The respondents indicated the reasons of diversification in housing products are that any housing property portfolios ought to be in property development, as a protection against all other asset groups. There are some differences about how much of the threat should be dedicated to real estate. Returns on assets of housing products have comparatively low risk comparisons with several other asset groups, contributing to the portfolio's sustainability. Returns enhancement from the housing products real estate helps the firm to obtain higher yields for a given amount of portfolio risk as part of a portfolio. Having a diversified portfolio of properties over a single home has advantages.

The respondents were asked to issue their opinion on whether intra-asset diversification of residential portfolios benefits the firm in risk mitigation. The results revealed that most of the firms have adopted expansion of products within the classes especially in the low risk investment to ensure the overall product diversification is enhanced and therefore the risk of classes in leveraged within the classes.

The study further evaluated whether the rise in demand by institutions and accommodation has enhanced optimal portfolio residential properties. The respondents indicated that the growth in the tertiary education institutions in different areas of the nation have created a growing demand for housing which in turn created ventures of real estate developers. The respondents further indicated that the rise in the number of ventures that the firms are willing to venture into have assisted in the diversification of their portfolios which in turn minimize the risk over portfolio rise.

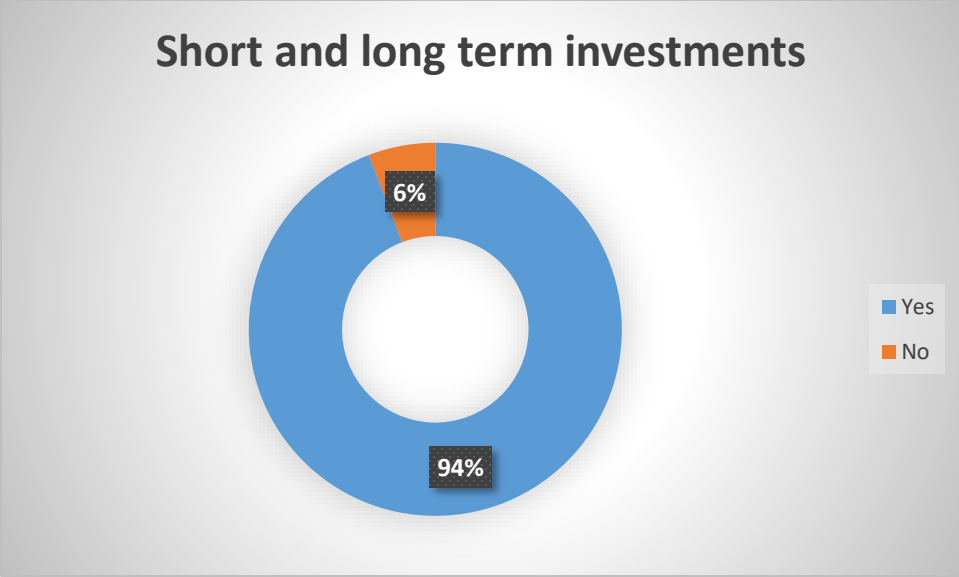
The research assessed the practice of the strategy of locational and structural demands consideration in the market. Majority of the respondents (80%) indicated that the firms put into consideration locational and structural demands in the market before making an investment whereas 20% indicated that the location and structure demand is not a major consideration. Figure 4.16 gives the illustration.



**Figure 4.16 Location and structure demand consideration**

The importance of considering the demands in location and structure was insisted by the respondents whereby they indicated that favourable areas and safe environment for the products on sale are key. The accessibility of sustenance in the location and the reputation in the structure of the products influence the real estate developers association with the business partners and customers. Therefore, the location and structure variation have a contribution on the demand of the product and thus considered as important factors.

The research assessed the involvement of firms following short term and long term investments. Most of the respondents (94%) indicated that the respective firms have engaged in short and long term investments to mitigate uncertain risks whereas 6% indicated the contrary as evidenced by the below Figure 4.17.



**Figure 4.17 Short and long term investments**

The respondents further indicated that the firms practice both short and long terms investment due to the varying benefits. Short-term investment provides the investor with versatility as they do not have to struggle for the security to maturity in return to get cash. On the other hand, by trading in the open market, long-term investments may be liquidated, but the investor receives lower income. Investments held over extended durations usually show lower yield than funds managed over shorter periods of time. Tax benefits on capital gains are also given by putting the money into long-term rather than short-term investments. Sometimes, at rates below the income tax bracket, long-term gains are taxed. The respondents further indicated that the investments in both short and long terms are a benefit in ensuring the firm has sustainable growth of income.

**Quantitative analysis of ascertaining the optimal portfolio size of real estate assets**

To test for the optimal portfolio size, two regressions were performed to assess the underlying association between income and portfolio size and between portfolio size and risk.

**Relationship between portfolio size and income**

The illustration of the first regression (relationship between portfolio size and income) is as shown in Table 4.7 and Figure 4.18.

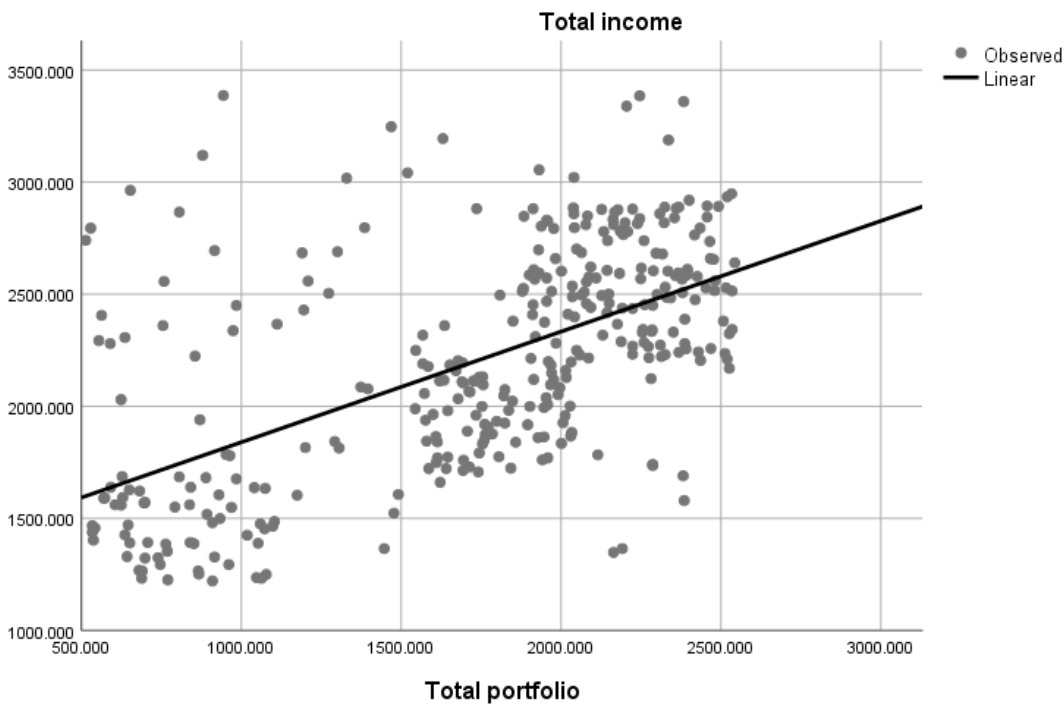
**Table 4.7 Model summary of optimal portfolio**

*Dependent Variable: Total income*

Equation	Model					Parameter Estimates	
	R Square	F	df1	df2	Sig.	Constant	b1
Linear	0.334	172.267	1	343	0.000	1346.019	0.494

*The independent variable is Total portfolio.*

Evident from the findings in the below Table 4.7, it is correct to say that there exists a significant relationship between total portfolio size and the income thereof (p value = 0.000). As the portfolio size increase, the total income increases proportionately. The line of best fits illustrates this positive relationship.



### Figure 4.18 Linear regression (Income vs portfolio)

Figure 4.18 reveals that there is a linear relationship between total portfolio size and the income. The higher the portfolio size, the higher the income. However, this regression by itself does not factor in risk.

### 4.7 Relationship between portfolio size (combined apartments and mansionettes) and risk (standard deviation of income)

In an effort to determine the extent of association further between real estate portfolio diversification and the management of risks in real estate developers, the researcher conducted a linear regression analysis. The real estate portfolio diversification was measured in form of portfolio size (level of residential real estate diversification and the type of diversification). Management of risks was assessed in measures of portfolio risk (standard deviation of monthly real estate income). The hypothesis of the study was tested:

H<sub>01</sub>: Real estate portfolio diversification does not have a significant effect on the management of risks among real estate developers in Nairobi County, Kenya.

#### 4.7.1 Model summary

In this research, portfolio risk, the model description is one of the regressions with details about the capacity of the regression lines to account for the overall variance in the experiment component. In Table 4.8, the results are shown.

**Table 4.8 Model summary of portfolio size and risk**

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<b>R</b>	<b>R Square</b>	<b>Adjusted R Square</b>	<b>Std. Error of the Estimate</b>
0.707	0.501	0.499	148.203

---

The independent variable is Total portfolio.

---

Table 4.8 is indicated that the value of adjusted R squared was 0.499 implying that 49.9% of the management of risks in real estate developers could be explained by portfolio size. The remaining 50.1% variation in portfolio risks could be explained by some other factors not employed in the model.



## 4.7.2 ANOVA

To examine the statistical significance of the model, the test of ANOVA was conducted. The recorded outcomes are as shown in the Table 4.9.

**Table 4.9 Regression Anova**

	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
Regression	7549491	1	7549491	343.721	0.000
Residual	7533649	343	21963.99		
Total	15083141	344			

The independent variable is Total portfolio.

### **Source: Research data (2020)**

A p-value which is greater than 0.05 means that the used independent variables have no influence on the independent variables and this implies that they cannot be used as predictor variables. In statistics, a p-value of less than 0.05 means that the independent variable is significant and can be used to predict the dependent variable. According to Table 4.9, the model is significant statistically with p-value=0.000 implying that portfolio size (level of residential real estate diversification and the type of diversification) is usable in explaining the independent variable (portfolio risk). The model was significant. The significant value was 0.000 which implies that we reject the null hypothesis. Therefore;

*Real estate portfolio diversification have a significant effect on the management of risks among real estate developers in Nairobi County, Kenya.*

The following Table 4.10 shows the coefficients of regression.

**Table 4.10 Coefficients of regression**

	<b>Unstandardized Coefficients</b>	<b>Standardized Coefficients</b>	<b>t</b>	<b>Sig.</b>
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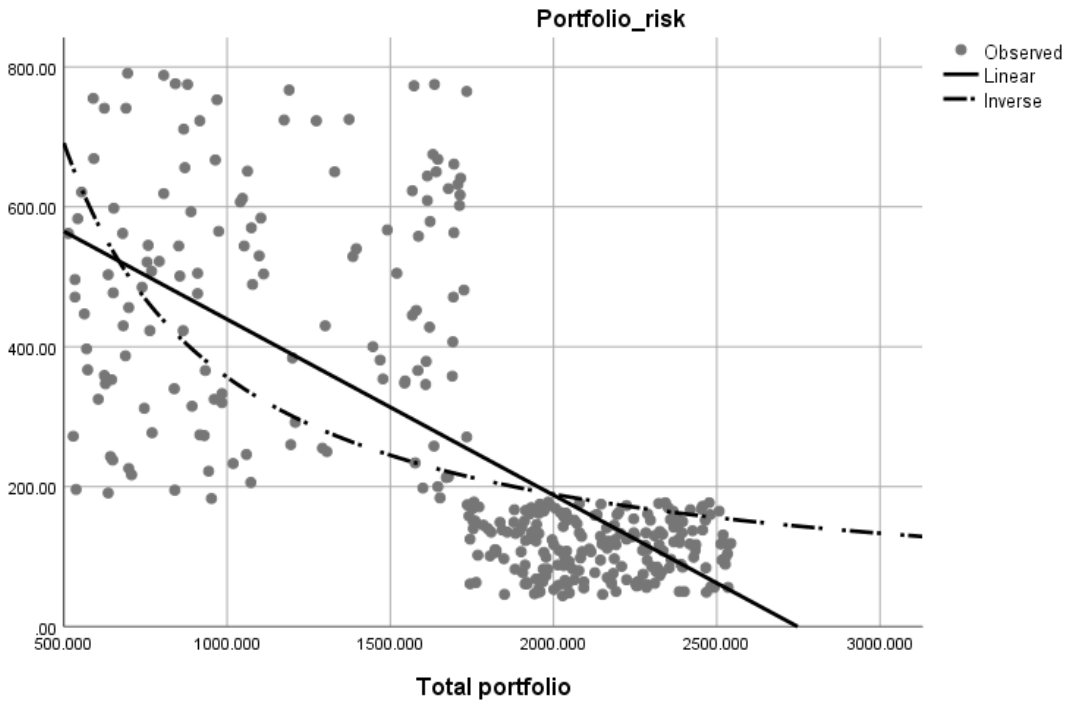
	<b>B</b>	<b>Std. Error</b>	<b>Beta</b>		
Total portfolio	-0.251	0.014	-0.707	-18.54	0.000
(Constant)	690.524	24.824		27.817	0.000

Figure 4.14 illustrate the underlying connection between investment portfolio size and investment portfolio risk. The summary of the model is shown in the equation.

$$Y = 690.52 + \left(-0.251 \frac{1}{x}\right) + \varepsilon \quad (3.1)$$

Where Y is portfolio standard deviation (risk), x is portfolio size (level of residential real estate diversification and the type of diversification),  $\beta$ , is the parameter of the model, C is constant and  $\varepsilon$  is the error term of the model.

According to the coefficients of regression in Table 4.10, portfolio size (level of residential real estate diversification and the type of diversification) with a coefficient of -0.251 (p-value = 0.000) was found to be significant and relating negatively on portfolio risk. This implies that an increase in portfolio size by 1 (one) units reduce the portfolio risk (standard deviation of income) by 0.251 units. However, this rate is not constant as it reduces with time as is shown by the curve. This implies that too low portfolio sizes (under diversification) or too high portfolio sizes (over-diversification) are not optimal for risk management. An optimal portfolio size therefore exists between the low level of diversification and the high level of diversification.



**Figure 4.19 Portfolio risk and size relationship**

Optimal portfolio size is a situation where the additional increase in portfolio does not reduce the risk significantly. The graph between the relationship between portfolio size and risk shows the optimal portfolio size. Therefore, from Figure 4.16 the optimal portfolio size is 2000. This is the second intersection point at which the curved line meets the straight line (the point at which 2000 units of apartments and mansionettes yielded a risk of 200).

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter provides a summary of the findings from the analysis, the conclusions and recommendations. It discusses the findings of independent variables based on study objectives and in relation to the dependent variable. The summary, conclusions and recommendations given are in line with the objectives and various hypotheses of the study. In addition there are suggestions for further studies.

#### 5.2 Summary

The main purpose of this study was to establish the influence of real estate portfolio diversification on the management of risks by real estate developers in Nairobi County. The main areas of focus was in pursuit of levels and types of residential real estate diversification, risks associated with residential real estate investment portfolio and optimal portfolio of residential properties that can mitigate against risks in real estate investments and management of risks.

The study revealed that the level of residential real estate diversification influence the management of risks. The research revealed that diversification aims to balance out non - systematic risk occurrences in a portfolio so that certain assets 'strong performance will annihilate others' poor performance. Consequently, only when the stocks in the portfolio are not completely correlated will the advantages of diversification be preserved. Diversification is a risk reduction strategy through the distribution of assets between different types of financial instruments, sectors, and others.

A broadly diversified portfolio is generated by owners, so that the particular risk involved with one resource is offset by the unique risk involved with yet another asset. By incorporating some fixed-income strategies, you are further hedging portfolio against market uncertainties. The study further revealed that real estate economics diversification influence the management of risks. Diversification between different types of assets is critical. Different assets would not respond to adverse events in the same way.

The study revealed that types of risks in residential real estate diversification influence on the management of risks. The research assessed the types of risks that the firms experience in real

estate diversification. The respondents indicated the various risks involved in real estate development which include general market risk, risk at asset-level, idiosyncratic risk, credit risk, tenant risk, risk of replacement costs, risk of leverage and structural risk.

Companies have identified optimal portfolio for residential properties that can mitigate against the risk in real estate investments. Further, adoption of residential properties influence mitigation of risks in the firms. Intra-asset diversification of residential portfolios benefits the firms in risk mitigation. Further, the rise in demand by institutions and accommodation has enhanced optimal portfolio residential properties. This is facilitated by the strategy of locational and structural demands consideration in the market. The respective firms have engaged in short and long term investments to mitigate uncertain risks.

A regression test was conducted to test the relationship between income and portfolio size and revealed that there is a significant relationship between total portfolio size and the income thereof (p value = 0.000). As the portfolio size increase, the total income increases proportionately. On regressing portfolio risk against portfolio income to test the theory of risk-return trade-off, there was a linear relationship between portfolio risk and returns in form of income. Moreover, the relationship between portfolio risk and returns is inverse, that is, an increase in portfolio risk leads to a decrease in returns and vice versa. On conducting a regression analysis on the relationship between portfolio size and portfolio risk, the relationship was significant statistically with p-value=0.000 implying that portfolio size is usable in explaining portfolio risk with a coefficient of -0.251 was found to be significant and relating negatively on portfolio risk. The graph between the relationship between portfolio size and risk shows the optimal portfolio size is 2000.

### **5.3 Conclusion**

From the findings revealed in this study, it can be concluded that the influence of real estate portfolio diversification on the management of risks in real estate developers is significant. Portfolio diversification has a major role it contributes to the management of risks. Diversification aims to balance out non - systematic risk occurrences in a portfolio so that certain assets 'strong performance will annihilate others' poor performance. Few firms in Kenya engage in Real Estate Investment Trusts (REITs) to reduce the risk of portfolio because certain assets are likely to gain despite the fluctuating economic times.

Fixed-income strategies are some of the initiatives towards hedging portfolio against market uncertainties. The various risks involved in real estate development include general market risk, risk at asset-level, idiosyncratic risk, credit risk, risk of replacement costs, tenant risks, risk of leverage and structural risk. Investors can't eradicate market and economic fluctuations, but with a balanced portfolio and plan focused on overall economic conditions, they can invest their money against the economic shifts adverse conditions. Companies adopt optimal portfolio residential properties that can mitigate against the risk in real estate investments which include intra-asset diversification of residential portfolios and meeting locational and structural demands consideration in the market.

#### **5.4 Recommendations**

The study found out that the influence of real estate portfolio diversification on the management of risks in real estate developers is significant. Real estate developers should invest more in apartments as opposed to mansionettes since this may reduce the risk of deviation of incomes. Real estate developers could also consider diversifying risk by having as many units as 2000 units. They may also consider geographical diversification where units are located in different regions say rural versus urban, highlands versus coastlands.

Real estate developers should consider financial diversification by investing in REITS, stocks and also securing lines of credit from different financial institutions

The real estate development firms should adopt the various risk mitigation strategies that are useful to an organization to minimize the effects of risks on the investment returns. This will involve the variety of diversification strategies of assets including commercial, industrial retail, vacant land and real estate products.

Kenya Property Development Association should use the study findings to craft risk management policies on how their members can reduce risks by adopting several diversification practice and create awareness on diversification strategies.

Banks and insurance firms can also hold seminars for property developers on how they can support them in reducing risks through financial diversification and insurance contracts in cases of revenue loss.

The study also suggests that real estate developers could apply Portfolio Theory when selecting their portfolios which emphasizes maximizing returns while considering risks involved in the short and long term investments that real estate developers engage in.

### **5.5 Recommendation for further research**

This study focused on portfolio diversification influence on management of risks in real estate developers. This study focused only on residential real estate exclusively and therefore other studies should be done on other real estate components including commercial, residential, industrial and vacant properties.

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## APPENDICES

### Appendix I: Data collection sheet

Company Name		Income from mansionettes	Income from apartments	Portfolio Size (number of mansionettes units)	Portfolio Size (number of apartments units)
	2015				
	2016				
	2017				
	2018				
	2019				

## Appendix II: Questionnaire

My name is Phoebe Maganjo, pursuing a Master's Degree in Real Estate in the faculty of Built Environment at the University of Nairobi. I am undertaking an academic research project titled **“EFFECT OF RESIDENTIAL REAL ESTATE PORTFOLIO DIVERSIFICATION ON MANAGEMENT OF RISKS BY REAL ESTATE DEVELOPERS IN NAIROBI COUNTY”**. This research project will be used purely for purposes academics and for the partial fulfillment of a postgraduate degree course. Please take note that your confidentiality is guaranteed and you responses will be strictly used only for the purposes of the study)

### Section A: General information

1. How long have you worked in the organization?

Below 2 years [ ]      2-6 years [ ]      7-10 years [ ]      above 10 years [ ]

2. How long have you worked in the current position?

Below 2 years [ ]      2-6 years [ ]      7-10 years [ ]      above 10 years [ ]

3. Please indicate your highest level of education:

PhD [ ]      Masters [ ]      Bachelors [ ]      Diploma [ ]      Certificate [ ]

### Section B: Diversification Levels

Indicate your opinion on the following statements relating to application of residential real estate diversification strategies on the management of risks.

4. Does the level of residential real estate diversification influence on the management of risks in real estate developers?

Yes [ ]      No [ ]

5. To what extent does level of residential real estate diversification influence on the management of risks in real estate developers?

To a very great extent [ ]

To a great extent [ ]



To a moderate extent      [ ]

To a little extent      [ ]

To no extent      [ ]

6. How does financial portfolios diversification and geographic regions diversification enhance the management of risks in the firm?

.....  
.....  
.....

7. Does the firm practice portfolio management?

Yes      [ ]                      No      [ ]

If yes, how does portfolio diversification affect the management of risks in the firm?

.....  
.....  
.....

8. In your opinion, explain how real estate economics diversification influence the management of risks

.....  
.....  
.....

**Section C: Real estate portfolio risks**

9. Does the types of risks in residential real estate diversification influence on the management of risks in real estate developers?

Yes      [ ]                      No      [ ]

10. What types of risks do you experience in real estate diversification?

.....  
.....  
.....  
11. To what extent does types of risks in residential real estate diversification influence on the management of risks in real estate developers?

To a very great extent     

To a great extent             

To a moderate extent        

To a little extent            

To no extent                   

12. Does the firm experience risks in changes in the economy, interest rates, inflation or other market trends?

Yes                                        No                   

If yes, how?

.....  
.....  
.....

13. How frequent does the residential property experiencing legal risk happens?

.....  
.....  
.....

14. Does inaccurate data on the market and product expose a firm to the potential market risks?

Yes                                        No                   

15. How does firm's accuracy of data and adequate information concerning the market minimize risks?

.....  
.....  
.....

16. Have the firm set a balanced risk return tradeoff assessed in risk mitigation strategies?

Yes [ ] No [ ]

17. Which other risk mitigation strategies have the firm incorporated?

.....  
.....  
.....

**Section C: Optimal portfolio residential properties**

18. Have the company adopted optimal portfolio residential properties that can mitigate against the risk in real estate investments?

Yes [ ] No [ ]

If yes which ones

.....  
.....  
.....

19. To what extent have the company adopted optimal portfolio residential properties that can mitigate against the risk in real estate investments?

- To a very great extent [ ]
- To a great extent [ ]
- To a moderate extent [ ]
- To a little extent [ ]
- To no extent [ ]

20. Does the housing products for owners to diversify their holdings affect portfolios diversification?

Yes [ ] No [ ]

If yes, how does it affect?

.....  
.....  
.....

21. Intra-asset diversification of residential portfolios benefits the firm in risk mitigation. In your own opinion, explain how.

.....  
.....  
.....

22. Does the rise in demand by institutions and accommodation is enhance optimal portfolio residential properties? In your opinion, explain how.

.....  
.....  
.....

23. Does the firm takes into consideration locational and structural demands in the market?

Yes [ ] No [ ]

If yes, what is the importance considering the demands?

.....  
.....  
.....

24. Have the firm have engaged in short and long term investments to mitigate uncertain risks?

Yes [ ] No [ ]

If yes, how does the investments mitigate risks?

.....  
.....  
.....

**Appendix III: Lists of Real Estate Developers**

1. Active Homes
2. Afriland Agencies
3. Ark Consultants Ltd
4. Barloworld Logistics (Kenya) Ltd
5. Betterdayz Estates
6. British American Asset Managers
7. Canaan Properties
8. Capital City Limited
9. CENTUM
10. Colburns Holdings Ltd
11. Coral PropertyConsultants Ltd
12. Country Homes and Properties
13. Cytonn
14. Crystal Valuers Limited
15. Daykio Plantations Limited
16. Double K Information Agents
17. Dream Properties
18. Dunhill Consulting Ltd
19. East Gate Apartments Limited

20. Ebony Estates Limited
21. Economic Housing Group
22. Elgeyo Gardens Limited
23. Fairway Realtors and Precision Valuers
24. FriYads Real Estate
25. Greenspan Housing
26. Hajar Services Limited
27. Halifax Estate Agency Ltd.
28. Hass Consult
29. Hewton Limited
30. Homes and lifestyles
31. Housing Finance
32. Jimly Properties Ltd
33. Josekinyaga Enterprises Ltd
34. Karengata Property Managers
35. Kenya Prime Properties Ltd
36. Kenya Property Point
37. Kings Developers
38. Kiragu & Mwangi Limited
39. Kitengela Properties Limited
40. Knight Frank Limited
41. KusyombunguoLukenya
42. Land & Homes
43. Langata Link Estate Agents

44. Langata Link Ltd
45. Lantana Homes
46. Legend Management Ltd
47. Lloyd Masika Limited
48. MamukaValuers(M) Ltd
49. Mark Properties Ltd.
50. MarketPower Limited
51. Mentor Group Ltd
52. Merlik Agencies
53. Metrocosmo Ltd
54. Mombasa Beach Apartments
55. Monako Investment Ltd
56. Muigai Commercial Agencies Ltd.
57. Myspace Properties (K) Ltd.
58. N W Realite Ltd
59. Nairobi Real Estates
60. Neptune Shelters Ltd
61. Oldman Properties Ltd
62. Oloip Properties
63. Ounga Commercial Agencies
64. Raju Estate Agency Limited (REAL)
65. Suraya Properties
66. Tysons Limited
67. VAAL

68. Wathiomo K Co Ltd

69. Willmary Development

**Source: Kenya Property Developers Association**



**Data Set (Secondary)**

1	2015	198.44	2006.398	219	2216.851	2204.833	2436.100	117.00
1	2016	196.45	1986.303	177	1791.426	2182.750	1968.600	82.00
1	2017	195.23	1974.018	227	2298.842	2169.250	2526.200	98.00
1	2018	194.39	1965.448	181	1833.195	2159.833	2014.500	59.00
1	2019	201.19	2034.229	226	2286.466	2235.417	2512.600	118.00
2	2015	167.38	1692.418	174	1754.298	1859.800	1927.800	161.00
2	2016	219.71	2221.492	188	1904.357	2441.200	2092.700	55.00
2	2017	156.21	1579.487	206	2080.715	1735.700	2286.500	95.00
2	2018	156.67	1584.128	206	2080.715	1740.800	2286.500	60.00
2	2019	304.78	3081.624	85	858.585	3386.400	943.500	222.00
3	2015	151.32	1529.983	80	809.081	1681.300	889.100	593.00
3	2016	163.40	1652.196	108	1092.182	1815.600	1200.200	384.00
3	2017	160.50	1622.803	190	1924.468	1783.300	2114.800	107.00
3	2018	259.34	2622.165	156	1579.487	2881.500	1735.700	174.00
3	2019	252.91	2557.191	195	1969.331	2810.100	2164.100	70.00
4	2015	147.49	1491.308	76	765.765	1638.800	841.500	776.00
4	2016	132.35	1338.155	58	587.860	1470.500	646.000	353.00
4	2017	132.80	1342.796	95	963.781	1475.600	1059.100	246.00
4	2018	110.31	1115.387	69	700.791	1225.700	770.100	277.00
4	2019	112.46	1137.045	97	980.798	1249.500	1077.800	489.00
5	2015	226.44	2289.560	223	2257.073	2516.000	2480.300	160.00

5	2016	227.51	2300.389	226	2289.560	2527.900	2516.000	95.00
5	2017	254.29	2571.114	176	1782.144	2825.400	1958.400	50.00
5	2018	227.51	2300.389	221	2232.321	2527.900	2453.100	168.00
5	2019	243.12	2458.183	184	1864.135	2701.300	2048.500	48.00
6	2015	199.97	2021.929	208	2105.467	2221.900	2313.700	79.00
6	2016	234.55	2371.551	193	1950.767	2606.100	2143.700	129.00
6	2017	251.38	2541.721	178	1799.161	2793.100	1977.100	99.00
6	2018	220.78	2232.321	203	2057.510	2453.100	2261.000	65.00
6	2019	231.03	2335.970	173	1745.016	2567.000	1917.600	63.00
7	2015	154.22	1559.376	152	1540.812	1713.600	1693.200	471.00
7	2016	251.53	2543.268	219	2215.304	2794.800	2434.400	109.00
7	2017	260.25	2631.447	224	2267.902	2891.700	2492.200	56.00
7	2018	200.12	2023.476	77	778.141	2223.600	855.100	501.00
7	2019	264.08	2670.122	227	2292.654	2934.200	2519.400	120.00
8	2015	131.89	1333.514	99	999.362	1465.400	1098.200	530.00
8	2016	147.03	1486.667	97	977.704	1633.700	1074.400	570.00
8	2017	131.12	1325.779	49	493.493	1456.900	542.300	583.00
8	2018	140.45	1420.146	75	762.671	1560.600	838.100	340.00
8	2019	141.37	1429.428	63	635.817	1570.800	698.700	226.00
9	2015	168.61	1704.794	159	1604.239	1873.400	1762.900	63.00
9	2016	154.99	1567.111	143	1443.351	1722.100	1586.100	558.00
9	2017	191.86	1939.938	158	1596.504	2131.800	1754.400	140.00

9	2018	179.93	1819.272	158	1594.957	1999.200	1752.700	169.00
9	2019	196.61	1987.895	149	1503.684	2184.500	1652.400	184.00
10	2015	202.42	2046.681	139	1406.223	2249.100	1545.300	351.00
10	2016	152.08	1537.718	214	2167.347	1689.800	2381.700	143.00
10	2017	209.61	2119.390	203	2051.322	2329.000	2254.200	58.00
10	2018	121.33	1226.771	195	1969.331	1348.100	2164.100	112.00
10	2019	218.64	2210.663	108	1087.541	2429.300	1195.100	260.00
11	2015	110.93	1121.575	62	626.535	1232.500	688.500	387.00
11	2016	124.70	1260.805	69	694.603	1385.500	763.300	423.00
11	2017	144.43	1460.368	84	846.209	1604.800	929.900	273.00
11	2018	124.85	1262.352	77	775.047	1387.200	851.700	544.00
11	2019	119.49	1208.207	82	833.833	1327.700	916.300	274.00
12	2015	208.54	2108.561	192	1938.391	2317.100	2130.100	159.00
12	2016	250.31	2530.892	197	1989.442	2781.200	2186.200	145.00
12	2017	255.66	2585.037	212	2142.595	2840.700	2354.500	84.00
12	2018	257.96	2608.242	195	1972.425	2866.200	2167.500	122.00
12	2019	256.43	2592.772	187	1895.075	2849.200	2082.500	98.00
13	2015	153.61	1553.188	157	1584.128	1706.800	1740.800	158.00
13	2016	182.07	1840.930	166	1681.589	2023.000	1847.900	97.00
13	2017	190.49	1926.015	147	1486.667	2116.500	1633.700	258.00
13	2018	179.93	1819.272	171	1731.093	1999.200	1902.300	142.00
13	2019	197.06	1992.536	141	1426.334	2189.600	1567.400	623.00

14	2015	255.36	2581.943	202	2043.587	2837.300	2245.700	154.00
14	2016	254.75	2575.755	176	1779.050	2830.500	1955.000	133.00
14	2017	248.78	2515.422	218	2199.834	2764.200	2417.400	118.00
14	2018	253.67	2564.926	209	2113.202	2818.600	2322.200	176.00
14	2019	246.18	2489.123	222	2243.150	2735.300	2465.000	152.00
15	2015	113.83	1150.968	78	787.423	1264.800	865.300	423.00
15	2016	113.83	1150.968	62	628.082	1264.800	690.200	741.00
15	2017	145.96	1475.838	61	620.347	1621.800	681.700	430.00
15	2018	128.37	1297.933	57	578.578	1426.300	635.800	503.00
15	2019	126.23	1276.275	48	488.852	1402.500	537.200	196.00
16	2015	235.47	2380.833	203	2048.228	2616.300	2250.800	62.00
16	2016	259.95	2628.353	213	2154.971	2888.300	2368.100	142.00
16	2017	214.97	2173.535	215	2171.988	2388.500	2386.800	149.00
16	2018	226.13	2286.466	177	1792.973	2512.600	1970.300	165.00
16	2019	205.17	2074.527	215	2171.988	2279.700	2386.800	120.00
17	2015	212.36	2147.236	68	686.868	2359.600	754.800	521.00
17	2016	121.79	1231.412	69	699.244	1353.200	768.400	508.00
17	2017	149.48	1511.419	146	1475.838	1660.900	1621.800	579.00
17	2018	169.52	1714.076	183	1850.212	1883.600	2033.200	102.00
17	2019	302.33	3056.872	215	2168.894	3359.200	2383.400	125.00
18	2015	182.68	1847.118	56	567.749	2029.800	623.900	741.00
18	2016	187.73	1898.169	124	1249.976	2085.900	1373.600	725.00

18	2017	194.31	1964.690	150	1520.701	2159.000	1671.100	213.00
18	2018	214.20	2165.800	166	1683.136	2380.000	1849.600	46.00
18	2019	241.59	2442.713	107	1082.900	2684.300	1190.000	767.00
19	2015	206.40	2086.903	50	504.322	2293.300	554.200	621.00
19	2016	174.57	1765.127	78	792.064	1939.700	870.400	656.00
19	2017	160.65	1624.350	86	866.320	1785.000	952.000	183.00
19	2018	286.88	2900.625	210	2125.578	3187.500	2335.800	108.00
19	2019	212.98	2153.424	100	1011.738	2366.400	1111.800	504.00
20	2015	209.15	2114.749	227	2298.842	2323.900	2526.200	89.00
20	2016	241.43	2441.166	207	2089.997	2682.600	2296.700	152.00
20	2017	210.83	2131.766	203	2052.869	2342.600	2255.900	60.00
20	2018	200.74	2029.664	209	2116.296	2230.400	2325.600	73.00
20	2019	200.58	2028.117	185	1873.417	2228.700	2058.700	82.00
21	2015	122.86	1242.241	130	1316.497	1365.100	1446.700	400.00
21	2016	224.60	2270.996	163	1646.008	2495.600	1808.800	135.00
21	2017	251.69	2544.815	125	1260.805	2796.500	1385.500	529.00
21	2018	217.57	2199.834	193	1950.767	2417.400	2143.700	95.00
21	2019	176.72	1786.785	144	1455.727	1963.500	1599.700	198.00
22	2015	176.26	1782.144	181	1831.648	1958.400	2012.800	88.00
22	2016	180.69	1827.007	176	1782.144	2007.700	1958.400	63.00
22	2017	178.25	1802.255	148	1497.496	1980.500	1645.600	200.00
22	2018	159.58	1613.521	148	1497.496	1773.100	1645.600	668.00

22	2019	185.13	1871.870	142	1430.975	2057.000	1572.500	773.00
23	2015	221.39	2238.509	194	1956.955	2459.900	2150.500	46.00
23	2016	225.68	2281.825	214	2165.800	2507.500	2380.000	154.00
23	2017	234.24	2368.457	180	1820.819	2602.700	2000.900	117.00
23	2018	246.48	2492.217	193	1952.314	2738.700	2145.400	175.00
23	2019	231.49	2340.611	176	1779.050	2572.100	1955.000	162.00
24	2015	241.13	2438.072	209	2108.561	2679.200	2317.100	85.00
24	2016	212.36	2147.236	147	1488.214	2359.600	1635.400	775.00
24	2017	287.49	2906.813	147	1483.573	3194.300	1630.300	675.00
24	2018	205.63	2079.168	203	2055.963	2284.800	2259.300	59.00
24	2019	266.68	2696.421	59	594.048	2963.100	652.800	598.00
25	2015	257.96	2608.242	73	733.278	2866.200	805.800	619.00
25	2016	233.48	2360.722	174	1757.392	2594.200	1931.200	134.00
25	2017	227.82	2303.483	209	2116.296	2531.300	2325.600	136.00
25	2018	231.49	2340.611	190	1919.827	2572.100	2109.700	111.00
25	2019	274.94	2779.959	174	1757.392	3054.900	1931.200	170.00
26	2015	226.13	2286.466	169	1709.435	2512.600	1878.500	149.00
26	2016	232.71	2352.987	171	1729.546	2585.700	1900.600	107.00
26	2017	213.74	2161.159	175	1772.862	2374.900	1948.200	146.00
26	2018	259.95	2628.353	209	2114.749	2888.300	2323.900	117.00
26	2019	259.34	2622.165	172	1740.375	2881.500	1912.500	88.00
27	2015	224.91	2274.090	207	2093.091	2499.000	2300.100	86.00

27	2016	201.81	2040.493	219	2210.663	2242.300	2429.300	99.00
27	2017	216.80	2192.099	172	1738.828	2408.900	1910.800	151.00
27	2018	225.83	2283.372	187	1885.793	2509.200	2072.300	147.00
27	2019	222.16	2246.244	176	1779.050	2468.400	1955.000	49.00
28	2015	178.40	1803.802	165	1670.760	1982.200	1836.000	149.00
28	2016	186.66	1887.340	164	1659.931	2074.000	1824.100	109.00
28	2017	169.98	1718.717	154	1553.188	1888.700	1706.800	632.00
28	2018	184.21	1862.588	164	1656.837	2046.800	1820.700	110.00
28	2019	197.98	2001.818	176	1783.691	2199.800	1960.100	68.00
29	2015	159.27	1610.427	176	1782.144	1769.700	1958.400	175.00
29	2016	166.31	1681.589	158	1601.145	1847.900	1759.500	151.00
29	2017	173.20	1751.204	164	1659.931	1924.400	1824.100	106.00
29	2018	189.87	1919.827	152	1537.718	2109.700	1689.800	358.00
29	2019	165.70	1675.401	145	1468.103	1841.100	1613.300	609.00
30	2015	220.78	2232.321	172	1740.375	2453.100	1912.500	61.00
30	2016	199.21	2014.194	172	1734.187	2213.400	1905.700	77.00
30	2017	209.76	2120.937	212	2139.501	2330.700	2351.100	170.00
30	2018	253.67	2564.926	198	2001.818	2818.600	2199.800	163.00
30	2019	231.18	2337.517	202	2046.681	2568.700	2249.100	131.00
31	2015	219.40	2218.398	197	1994.083	2437.800	2191.300	117.00
31	2016	250.31	2530.892	197	1989.442	2781.200	2186.200	97.00
31	2017	257.35	2602.054	184	1856.400	2859.400	2040.000	108.00

31	2018	222.77	2252.432	218	2201.381	2475.200	2419.100	167.00
31	2019	259.49	2623.712	212	2147.236	2883.200	2359.600	96.00
32	2015	202.42	2046.681	184	1864.135	2249.100	2048.500	93.00
32	2016	227.36	2298.842	169	1712.529	2526.200	1881.900	82.00
32	2017	259.03	2619.071	191	1935.297	2878.100	2126.700	159.00
32	2018	237.61	2402.491	229	2314.312	2640.100	2543.200	119.00
32	2019	219.25	2216.851	200	2023.476	2436.100	2223.600	173.00
33	2015	210.83	2131.766	228	2306.577	2342.600	2534.700	116.00
33	2016	248.93	2516.969	198	1997.177	2765.900	2194.700	160.00
33	2017	231.03	2335.970	214	2164.253	2567.000	2378.300	146.00
33	2018	200.89	2031.211	200	2023.476	2232.100	2223.600	125.00
33	2019	231.95	2345.252	188	1899.716	2577.200	2087.600	107.00
34	2015	119.65	1209.754	58	584.766	1329.400	642.600	243.00
34	2016	114.14	1154.062	61	618.800	1268.200	680.000	562.00
34	2017	132.04	1335.061	48	485.758	1467.100	533.800	471.00
34	2018	112.61	1138.592	78	788.970	1251.200	867.000	711.00
34	2019	143.36	1449.539	57	572.390	1592.900	629.000	355.00
35	2015	110.93	1121.575	96	966.875	1232.500	1062.500	651.00
35	2016	111.23	1124.669	94	952.952	1235.900	1047.200	612.00
35	2017	151.78	1534.624	56	570.843	1686.400	627.300	347.00
35	2018	139.38	1409.317	87	881.790	1548.700	969.000	753.00
35	2019	119.03	1203.566	63	635.817	1322.600	698.700	456.00



36	2015	161.26	1630.538	157	1587.222	1791.800	1744.200	61.00
36	2016	165.55	1673.854	167	1690.871	1839.400	1858.100	135.00
36	2017	185.90	1879.605	154	1557.829	2065.500	1711.900	602.00
36	2018	158.51	1602.692	175	1766.674	1761.200	1941.400	47.00
36	2019	197.83	2000.271	183	1848.665	2198.100	2031.500	157.00
37	2015	233.48	2360.722	213	2153.424	2594.200	2366.400	165.00
37	2016	205.33	2076.074	179	1805.349	2281.400	1983.900	178.00
37	2017	201.65	2038.946	213	2154.971	2240.600	2368.100	121.00
37	2018	203.03	2052.869	215	2175.082	2255.900	2390.200	89.00
37	2019	256.28	2591.225	170	1714.076	2847.500	1883.600	133.00
38	2015	223.99	2264.808	183	1851.759	2488.800	2034.900	66.00
38	2016	212.98	2153.424	196	1980.160	2366.400	2176.000	65.00
38	2017	198.90	2011.100	227	2292.654	2210.000	2519.400	131.00
38	2018	226.29	2288.013	228	2306.577	2514.300	2534.700	56.00
38	2019	253.37	2561.832	202	2037.399	2815.200	2238.900	128.00
39	2015	151.62	1533.077	73	733.278	1684.700	805.800	788.00
39	2016	225.37	2278.731	115	1158.703	2504.100	1273.300	723.00
39	2017	262.70	2656.199	216	2184.364	2918.900	2400.400	50.00
39	2018	186.97	1890.434	126	1270.087	2077.400	1395.700	540.00
39	2019	234.40	2370.004	206	2082.262	2604.400	2288.200	161.00
40	2015	166.01	1678.495	142	1437.163	1844.500	1579.300	452.00
40	2016	197.52	1997.177	152	1539.265	2194.700	1691.500	407.00

40	2017	168.45	1703.247	159	1608.880	1871.700	1768.000	102.00
40	2018	191.56	1936.844	181	1834.742	2128.400	2016.200	109.00
40	2019	189.26	1913.639	153	1542.359	2102.900	1694.900	661.00
41	2015	199.36	2015.741	188	1898.169	2215.100	2085.900	129.00
41	2016	234.24	2368.457	210	2124.031	2602.700	2334.100	132.00
41	2017	238.99	2416.414	223	2253.979	2655.400	2476.900	177.00
41	2018	225.06	2275.637	193	1955.408	2500.700	2148.800	118.00
41	2019	252.30	2551.003	174	1763.580	2803.300	1938.000	136.00
42	2015	167.84	1697.059	145	1463.462	1864.900	1608.200	346.00
42	2016	158.36	1601.145	153	1542.359	1759.500	1694.900	563.00
42	2017	157.44	1591.863	145	1465.009	1749.300	1609.900	379.00
42	2018	184.67	1867.229	179	1811.537	2051.900	1990.700	173.00
42	2019	187.43	1895.075	180	1816.178	2082.500	1995.800	124.00
43	2015	141.22	1427.881	63	632.723	1569.100	695.300	791.00
43	2016	116.43	1177.267	67	679.133	1293.700	746.300	312.00
43	2017	109.85	1110.746	82	827.645	1220.600	909.500	505.00
43	2018	136.63	1381.471	80	812.175	1518.100	892.500	315.00
43	2019	139.54	1410.864	71	720.902	1550.400	792.200	522.00
44	2015	246.48	2492.217	203	2055.963	2738.700	2259.300	63.00
44	2016	280.76	2838.745	79	799.799	3119.500	878.900	775.00
44	2017	207.62	2099.279	57	578.578	2306.900	635.800	191.00
44	2018	165.85	1676.948	116	1175.720	1842.800	1292.000	255.00

44	2019	258.88	2617.524	196	1981.707	2876.400	2177.700	61.00
45	2015	190.79	1929.109	172	1741.922	2119.900	1914.200	123.00
45	2016	165.09	1669.213	180	1820.819	1834.300	2000.900	53.00
45	2017	173.35	1752.751	181	1825.460	1926.100	2006.000	169.00
45	2018	168.76	1706.341	183	1848.665	1875.100	2031.500	87.00
45	2019	167.69	1695.512	175	1771.315	1863.200	1946.500	68.00
46	2015	216.95	2193.646	182	1839.383	2410.600	2021.300	163.00
46	2016	234.86	2374.645	172	1741.922	2609.500	1914.200	166.00
46	2017	224.60	2270.996	186	1878.058	2495.600	2063.800	152.00
46	2018	235.93	2385.474	188	1904.357	2621.400	2092.700	64.00
46	2019	255.05	2578.849	195	1967.784	2833.900	2162.400	141.00
47	2015	203.95	2062.151	205	2068.339	2266.100	2272.900	109.00
47	2016	239.29	2419.508	222	2244.697	2658.800	2466.700	84.00
47	2017	210.68	2130.219	206	2079.168	2340.900	2284.800	56.00
47	2018	252.91	2557.191	187	1890.434	2810.100	2077.400	80.00
47	2019	205.94	2082.262	197	1990.989	2288.200	2187.900	124.00
48	2015	125.00	1263.899	95	957.593	1388.900	1052.300	544.00
48	2016	143.06	1446.445	51	518.245	1589.500	569.500	397.00
48	2017	134.95	1364.454	84	849.303	1499.400	933.300	366.00
48	2018	125.31	1266.993	76	764.218	1392.300	839.800	195.00
48	2019	140.45	1420.146	54	550.732	1560.600	605.200	325.00
49	2015	204.56	2068.339	208	2102.373	2272.900	2310.300	62.00

49	2016	250.16	2529.345	199	2009.553	2779.500	2208.300	86.00
49	2017	229.96	2325.141	187	1891.981	2555.100	2079.100	134.00
49	2018	255.97	2588.131	221	2235.415	2844.100	2456.500	172.00
49	2019	251.69	2544.815	184	1857.947	2796.500	2041.700	59.00
50	2015	224.45	2269.449	191	1935.297	2493.900	2126.700	77.00
50	2016	203.18	2054.416	222	2246.244	2257.600	2468.400	49.00
50	2017	259.64	2625.259	183	1854.853	2884.900	2038.300	162.00
50	2018	250.16	2529.345	192	1941.485	2779.500	2133.500	160.00
50	2019	220.47	2229.227	206	2080.715	2449.700	2286.500	110.00
51	2015	159.73	1615.068	162	1642.914	1774.800	1805.400	101.00
51	2016	164.93	1667.666	158	1596.504	1832.600	1754.400	150.00
51	2017	173.96	1758.939	162	1636.726	1932.900	1798.600	140.00
51	2018	155.14	1568.658	166	1676.948	1723.800	1842.800	138.00
51	2019	188.65	1907.451	158	1598.051	2096.100	1756.100	178.00
52	2015	242.81	2455.089	174	1755.845	2697.900	1929.500	126.00
52	2016	223.53	2260.167	211	2131.766	2483.700	2342.600	177.00
52	2017	215.88	2182.817	184	1857.947	2398.700	2041.700	157.00
52	2018	210.07	2124.031	205	2077.621	2334.100	2283.100	134.00
52	2019	257.35	2602.054	208	2100.826	2859.400	2308.600	130.00
53	2015	179.47	1814.631	175	1771.315	1994.100	1946.500	122.00
53	2016	155.60	1573.299	154	1559.376	1728.900	1713.600	617.00
53	2017	176.41	1783.691	156	1577.940	1960.100	1734.000	271.00

53	2018	174.42	1763.580	142	1434.069	1938.000	1575.900	234.00
53	2019	188.65	1907.451	177	1789.879	2096.100	1966.900	64.00
54	2015	223.69	2261.714	210	2120.937	2485.400	2330.700	78.00
54	2016	234.09	2366.910	216	2179.723	2601.000	2395.300	150.00
54	2017	214.20	2165.800	226	2281.825	2380.000	2507.500	165.00
54	2018	259.18	2620.618	200	2023.476	2879.800	2223.600	67.00
54	2019	235.01	2376.192	216	2179.723	2611.200	2395.300	85.00
55	2015	226.59	2291.107	169	1710.982	2517.700	1880.200	167.00
55	2016	199.51	2017.288	205	2069.886	2216.800	2274.600	75.00
55	2017	228.28	2308.124	183	1851.759	2536.400	2034.900	99.00
55	2018	221.24	2236.962	187	1891.981	2458.200	2079.100	176.00
55	2019	232.71	2352.987	215	2178.176	2585.700	2393.600	134.00
56	2015	163.25	1650.649	118	1188.096	1813.900	1305.600	250.00
56	2016	260.41	2632.994	221	2235.415	2893.400	2456.500	138.00
56	2017	251.53	2543.268	48	481.117	2794.800	528.700	272.00
56	2018	242.05	2447.354	117	1183.455	2689.400	1300.500	430.00
56	2019	230.27	2328.235	109	1099.917	2558.500	1208.700	292.00
57	2015	204.10	2063.698	200	2023.476	2267.800	2223.600	126.00
57	2016	233.33	2359.175	196	1986.348	2592.500	2182.800	76.00
57	2017	239.29	2419.508	178	1803.802	2658.800	1982.200	82.00
57	2018	232.41	2349.893	212	2145.689	2582.300	2357.900	153.00
57	2019	241.74	2444.260	186	1878.058	2686.000	2063.800	67.00

58	2015	171.67	1735.734	159	1611.974	1907.400	1771.400	171.00
58	2016	193.39	1955.408	177	1792.973	2148.800	1970.300	106.00
58	2017	179.01	1809.990	139	1404.676	1989.000	1543.600	348.00
58	2018	190.18	1922.921	155	1570.205	2113.100	1725.500	481.00
58	2019	190.03	1921.374	156	1577.940	2111.400	1734.000	765.00
59	2015	154.99	1567.111	148	1492.855	1722.100	1640.500	650.00
59	2016	198.29	2004.912	151	1526.889	2203.200	1677.900	214.00
59	2017	167.99	1698.606	183	1847.118	1866.600	2029.800	143.00
59	2018	182.99	1850.212	151	1526.889	2033.200	1677.900	626.00
59	2019	190.64	1927.562	178	1799.161	2118.200	1977.100	73.00
60	2015	232.10	2346.799	218	2207.569	2578.900	2425.900	137.00
60	2016	220.47	2229.227	89	895.713	2449.700	984.300	333.00
60	2017	300.49	3038.308	198	2006.459	3338.800	2204.900	133.00
60	2018	160.19	1619.709	87	877.149	1779.900	963.900	667.00
60	2019	246.64	2493.764	46	467.194	2740.400	513.400	562.00
61	2015	172.74	1746.563	159	1602.692	1919.300	1761.200	148.00
61	2016	191.71	1938.391	157	1587.222	2130.100	1744.200	125.00
61	2017	159.27	1610.427	145	1468.103	1769.700	1613.300	644.00
61	2018	180.08	1820.819	183	1845.571	2000.900	2028.100	44.00
61	2019	183.45	1854.853	176	1777.503	2038.300	1953.300	53.00
62	2015	144.59	1461.915	134	1356.719	1606.500	1490.900	567.00
62	2016	137.09	1386.112	133	1344.343	1523.200	1477.300	354.00

62	2017	191.10	1932.203	205	2076.074	2123.300	2281.400	116.00
62	2018	271.88	2749.019	184	1856.400	3020.900	2040.000	152.00
62	2019	292.23	2954.770	132	1336.608	3247.000	1468.800	381.00
63	2015	144.28	1458.821	106	1068.977	1603.100	1174.700	724.00
63	2016	304.62	3080.077	202	2043.587	3384.700	2245.700	134.00
63	2017	273.72	2767.583	137	1383.018	3041.300	1519.800	505.00
63	2018	271.58	2745.925	120	1209.754	3017.500	1329.400	650.00
63	2019	205.17	2074.527	53	536.809	2279.700	589.900	755.00
64	2015	216.50	2189.005	51	512.057	2405.500	562.700	447.00
64	2016	265.30	2682.498	228	2305.030	2947.800	2533.000	104.00
64	2017	230.42	2329.782	223	2258.620	2560.200	2482.000	57.00
64	2018	208.54	2108.561	141	1426.334	2317.100	1567.400	445.00
64	2019	242.51	2451.995	82	833.833	2694.500	916.300	723.00
65	2015	133.26	1347.437	82	827.645	1480.700	909.500	476.00
65	2016	128.21	1296.386	92	926.653	1424.600	1018.300	233.00
65	2017	130.82	1322.685	97	976.157	1453.500	1072.700	206.00
65	2018	133.72	1352.078	99	1004.003	1485.800	1103.300	584.00
65	2019	140.30	1418.599	56	567.749	1558.900	623.900	359.00
66	2015	168.91	1707.888	161	1624.350	1876.800	1785.000	145.00
66	2016	195.99	1981.707	143	1441.804	2177.700	1584.400	366.00
66	2017	172.58	1745.016	171	1724.905	1917.600	1895.500	136.00
66	2018	185.74	1878.058	154	1560.923	2063.800	1715.300	641.00

66	2019	190.18	1922.921	146	1474.291	2113.100	1620.100	428.00
67	2015	122.86	1242.241	197	1994.083	1365.100	2191.300	50.00
67	2016	142.14	1437.163	215	2170.441	1579.300	2385.100	50.00
67	2017	210.38	2127.125	88	886.431	2337.500	974.100	565.00
67	2018	207.93	2102.373	173	1746.563	2310.300	1919.300	61.00
67	2019	230.11	2326.688	68	689.962	2556.800	758.200	545.00
68	2015	147.34	1489.761	94	946.764	1637.100	1040.400	607.00
68	2016	119.19	1205.113	67	672.945	1324.300	739.500	485.00
68	2017	146.42	1480.479	58	590.954	1626.900	649.400	238.00
68	2018	129.44	1308.762	48	485.758	1438.200	533.800	496.00
68	2019	150.86	1525.342	89	895.713	1676.200	984.300	320.00
69	2015	125.31	1266.993	64	643.552	1392.300	707.200	217.00
69	2016	147.49	1491.308	53	538.356	1638.800	591.600	669.00
69	2017	125.15	1265.446	59	592.501	1390.600	651.100	477.00
69	2018	143.21	1447.992	52	521.339	1591.200	572.900	367.00
69	2019	116.43	1177.267	86	874.055	1293.700	960.500	325.00





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