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Key Performance Indicators to Predict the Future Performance of Office Nodes

By

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Dissertation in fulfilment of the requirement for the

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Study Leader: Dr Douw Boshoff

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DECLARATION BY STUDENT

I understand that this assignment contributes to the assessment of my competency on work lectured in this course and co-determines my qualification for the receipt of a degree. I accept the rules of assessment of the University of Pretoria and the consequences of transgressing them.

I thus, hereby, confirm that the attached assignment is my own work and any sources consulted are adequately acknowledged in the text and listed in the bibliography.

I further declare that this thesis has been language edited by Janine Dumas, who is an approved academic editor for the University of Pretoria.

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Signature of acceptance and confirmation by Student

ABSTRACT

Treatise Title: Key Performance Indicators to Predict the Future Performance of Office Nodes

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The property sector is globally regarded as one of the best asset classes to invest in. There is substantial data available in respect of the historical performance of the property sectors and geographical locations. The challenge today however, is to be able to predict which office nodes will, in this fast changing environment, be the best performing nodes in the future. This research project endeavours to answer this burning research question. Interviews were conducted with 18 commercial property experts specialising in the different nodes of the main metropolitan regions of South Africa, namely Pretoria, Johannesburg, Cape Town and Durban. Through the interviews, it became evident which key performance indicators (KPIs) are regarded by the property specialist as the most important KPIs to consider when investigating office nodes' performance. In the model formulated, total return was used as the measure of the performance of the different nodes. The most relevant KPIs mentioned by the specialists were used in a multiple regression model as the independent variables and total return as the dependent variable. Twenty years of data from MSCI was examined in the multiple regression model. The regression models were used to further determine which of the KPIs contributed the most towards explaining total return as the measurement of performance. The purpose of the different regression models were to determine a model with the highest adjusted R-square, F-value, as well as the highest significance of all the KPIs used in the model, to enable the researcher to use the Beta values to determine the total return of

the different nodes in the future. The model formulated enables the investor to identify the best performing office nodes in the future.

Keywords: Key Performance Indicators, decision-making models, future performance, office node

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LIST OF ABBREVIATIONS:

ALSI	FTSE/JSE All Share Index
BEE	Black Economic Empowerment
CAPEX	Capital Expenditure
CAPM	Capital Asset Price Model
CBD	Central Business District
CEO	Chief Executive Officer
CG	Capital Growth
CGR	Change in Gross Rental
CREM	Corporate Real Estate Management
CSoN	Change in Size of Node
CV	Change in Vacancy
ExCo	Executive Committee
FDW	Fisher DiPasquale Wheaton
GDP	Gross Domestic Product
GLA	Gross Lettable Area
IPD	Investment Property Databank Index
IPF	Investment Property Forum
IRR	Internal Rate of Return

IT	Information Technology
KPI	Key Performance Indicator
MPT	Modern Portfolio Theory
MRI	Management Report Incorporated
MSCI	Formerly Morgan Stanley Capital International
OLS	Ordinary Least Squares
PwC	Price Waterhouse and Coopers
REEFM	Real Estate Econometric Forecast Model
REIT	Real Estate Investment Trust
SAPOA	South African Property Owners Association
SoN	Size of Node
Sig.	Statistical Significance
SPSS	Statistical Package for Social Sciences
UK	United Kingdom
USA	United States of America
VIF	Variance Inflatory Factor

DEFINITIONS

Grade P:

“Top quality modern space which is generally a pace-setter in establishing rentals and which includes the latest or recent generation of building services, ample parking, a prestige lobby finish and good views, or a good environment” (SAPOA, 2015).

Grade A:

“Generally not older than fifteen years or which has had a major renovation; high quality modern finishes; air conditioning; adequate on-site parking, market rentals near the top of the range in the metropolitan area in which the building is located. (The following should also be taken into account in determining whether the building is A-Grade or not; consider whether the building has a good quality lobby finish, quality access to/from an attractive street environment and other similar factors, such as safety and security)” (SAPOA, 2015).

Grade B:

“Generally older buildings, but accommodation and finishes close to modern standards as a result of refurbishments and renovations from time to time, air-conditioning, on-site parking, unless special circumstances pertain” (SAPOA, 2015).

Grade C:

“Buildings with older style finishes, services and building systems. It may not be air-conditioned or have on-site parking” (SAPOA, 2015).

Gross asking rentals:

"The full rentals being asked including operating costs and municipal cost excluding parking, VAT, electricity/water consumption and internal cleaning" (SAPOA, 2015).

IPD:

Investment Property Databank Index, published by MSC, includes property "indexes and benchmarks that cover both asset and fund-level returns" (MSCI, 2013).

MSCI:

"MSCI Inc. (formerly Morgan Stanley Capital International), is an investment research firm that provides indices, portfolio risk and performance analytics and governance tools to institutional investors and hedge funds" (Investopedia, 2018).

Node:

A suburb or a component thereof that can be clearly identified on maps, that for the purpose of research is identified separate from other nodes.

CHAPTER 1: INTRODUCTION

1.1 Introduction

Investments relate to the action of the investor to commit a capital sum of the investors' money in order to receive a form of capital gains, income flow or the combination of the two, in the future (Adair, Berry & McGreal, 1994). In terms of the economical theoretical definition, investments employ capital for the optimum possible return (Adair et al., 1994).

Property as an expectable class for a multi-asset portfolio is currently more widely accepted by institutional investors and pension funds as a tool for hedging against inflation and for diversification (Hartzell, Eichholtz & Selender, 1993) Currently there is an increased focus and attention on the importance of the performance of the investment in property (Adair et al., 1994). Big investors investing in property realise the priority of "historical performance" data as well as assessing the "future performance" of the "property portfolio" in the formulation of the decision-making strategy (Adair et al.,1994).One of the main reasons for contemplating this research is that the decision-making process that is followed by the investors or decision makers in the real estate environment is based on "insufficient information basis" and is mostly controlled by "investment perspective" (Pfnuer, Schaefer & Armonat, 2004).

The investor will have a trade-off between entrepreneurial flexibility achieved by the real estate holdings in contradiction to the financial opportunity cost of making available the capital for the investment. There are two major benefits of real estate investments. Firstly, it is a transparent investment and secondly (more importantly), the desire of investment in real estate is more appropriate, if the organisation/ investor is in the need of obtaining real estate to better the general value of the organisation/ investor (Pfnuer et al., 2004).

The importance of the study lies in the fact that although some challenges exist in South Africa when investing in property, property remains a very good investment class in the country. The motivation for the study is that the researcher aims to develop a model that consist of KPI's where the data of these KPI's is readably available and that can be used in different countries without taking economic or social specific factors into account. The reason behind this thinking is that the easier the model and the more readably available the data used in the model, the more accurate the forecast.

The office sector is great for modelling in the sense that of the three sectors (Retail, Office and Industrial), this sector is world-wide depended on more or less the same factors. It is not so complex and tenant specific as retail and success in an office investment is not bound to the LSM and neighbourhood Industrial business. Therefor the researcher saw a gab in the market to produce a model that will enable investors world-wide to better their understanding in which node to invest, which nodes are growing and where to dispose some of their investments where the company is overexposed.

The advantage of the model is that, in the current market condition world-wide, investors are spending tremendous time and money on research of where to invest in the future and this study aims to assist the investors.

The main concern for investors is to have the correct and accurate information and knowledge to identify the best performing office nodes currently, but also to identify the nodes that will grow and have a good total return for the investor in future. This thesis aims to develop a model or tool that will enable the investor to determine the top performing office nodes in the future to ensure that investors will have a competitive advantage.

1.2 Background

The background information for this thesis indicates and describes the history and nature of the research problem with reference to the existing literature. The background information indicates the essence of the problem being studied, applicable context of the problem in relation to theory, research and/or practice.

1.2.1 Property Industry view on investments

According to French (2015), Price Waterhouse and Cooper (PwC) Africa Real Estate Leader, there will be extensive growth in the international real estate commerce over the next five years due to the global megatrends such as urbanisation and demographical change. These megatrends will result in opportunities in the industry as well as an increase in investments in the sector (French, 2015).

The impact that the global trends could have on Africa could easily be underestimated and this statement could be proven by the fact that Africa's real estate has conventionally lagged behind both the developing and developed economies. In terms of global standards, Africa's levels of real estate investments are low, and substantial challenges exist in developing possible opportunities.

According to the World Economic Forum, South Africa is the doorway for growth of investments into Africa, due to South Africa's classification as the world's number one in "*auditing and reporting standards*" (PwC, 2015). Therefore, this research study can have a significant impact on investors' decisions.

Real estate investments are globally the third largest asset class for institutional investments as well as the most significant alternative investment class (Andonov, Kok, & Eichholtz, 2013).

It is therefore important to determine the most effective decision-making approaches used by the industry when making decisions about current and future investment opportunities in the office sector.

Horne (2015), the CEO of Broll is of the opinion that Africa is currently considered as a perfect emerging market destination for investments and is drawing the attention of a vast number of investors.

South Africa's listed property remains to be an attractive investment alternative for investors with a long-term investment perspective. The sector offers regional, geographical and environmental variation and durable management teams, as well as being a low cost entry point for investments to some of the greatest quality real estate (Broll, 2014/2015).

1.2.2 The current worth of South Africa's property industry

According to a study carried out in 2015 (with the main aim to establish the value of the South African property industry), the "*Property Sector Charter Council*" revealed on the 12th of July 2016, that the value is an astonishing R5.8 trillion. The study publicised that the property sector size is currently worth R5.3 trillion, with another R520 billion worth of land that is already approved and zoned for developments for residential and commercial purposes. This study done by Morgan Stanley Capital International (MSCI) was the first and only study of its kind done in this country (eProperty News, 2016).

The reference for the study was the data gathered by a study done in 2010 that determined the worth of the property sector as R4.9 trillion and through the research done by the MSCI in the last 4 years, the country had a massive increase of approximately R1 trillion (eProperty News, 2016).

The "*Property Sector Charter Council SA Property Sector Economic Impact Report"* stipulated that the estimated property sector input to the gross domestic product (GDP) in 2012 was an astounding R191.4 billion as well as R46.5 billion, to the fiscus (eProperty News, 2016).
Portia Tau-Sekati, the CEO of the Property Sector Charter Council, is of the following opinion: "For a sector this big and this important it is crucial to have a hub of knowledge that consolidates information to support a common and consistent understanding of the sector" (eProperty News, 2016).

According to the study, the following values are attributed to the R1.3 trillion commercial sector: approximately R790 billion owned by the corporates, R300 billion owned by different real estate investment trusts (REITs), R130 billion held by unlisted funds and a further R50 billion by pension- and life funds (eProperty News, 2016).
The different values of each of the divisions in the commercial sector is set out as follows:

- Retail property as being the largest in value at R534 billion in 2016 - in 2012 it was valued at R240 billion;
- second was office properties with a total value of R357 billion in 2016 - was valued in 2012 at R228 billion;
- followed by industrial properties at R281 billion in 2016 - value at R187 billion in 2012; the remainder amounted to R94 billion worth of value in 2016 - R25 billion in 2012 (i.e. other property and hotels) (eProperty News, 2016).

1.2.3 Introduction to commercial property market:

South Africa's commercial property sector makes up a large portion of the overall property market of the country. Therefore, the focus in this thesis is to enable investors that partake in the commercial property sector, specifically the office sector, to have the best return on investment and minimising the risk associated with commercial property. For the purpose of

this study, it is important to discuss the general commercial property market that include the retail, industrial and office sectors.

The following tables indicate the investment transaction per sector, per province as well as the average value per square meter per sector. The purpose of this is for the reader to get a better understanding of how the different sectors perform and how investments are made in each of the different sectors. This will also validate why the specific sector is chosen.

Table 1: Total investment transactions value per sector (Jones Lang LaSalle, March 2018).

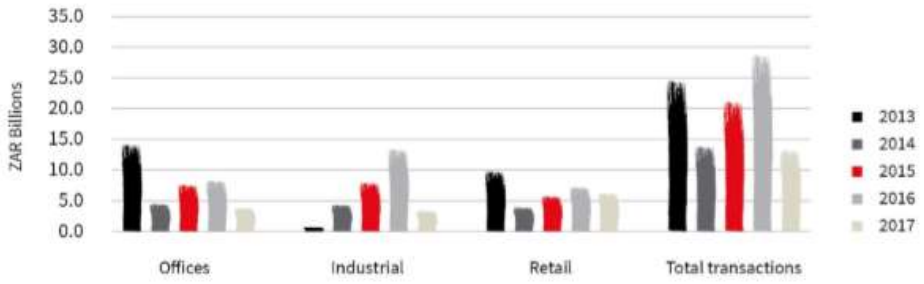


Table 1 indicates that of all of the three sectors in the commercial property industry, that the office sector had the highest total investment value in 2013, 2014 and 2015. It is also evident that all the sectors total investment value decreased significantly from 2016 to 2017 (Jones Lang LaSalle, March 2018).

Table 2: Total investment per province (Jones Lang LaSalle, March 2018).

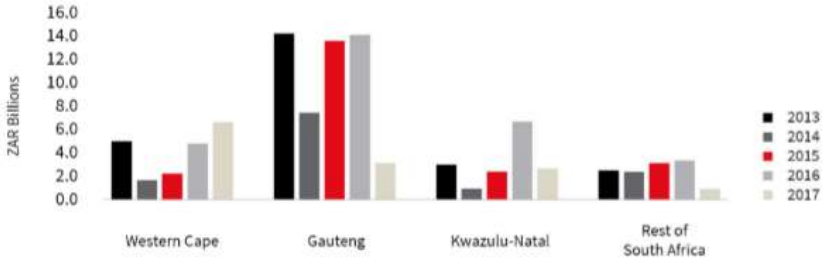
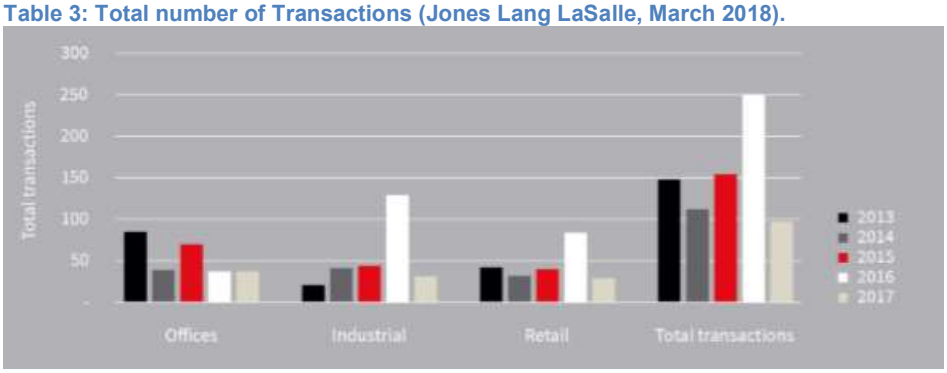


Table 2 clearly indicates that Gauteng had the highest total investment transactions per province for all the years except for 2017. It is evident in the table that Gauteng saw a serious

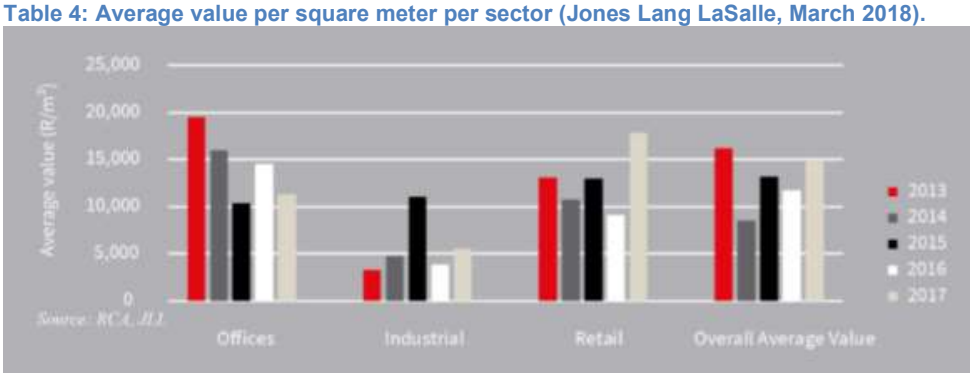
decrease from 2016 in comparison to 2017, in the total amount of investments. In 2017, the Western Cape Province had the highest total investment transaction (Jones Lang LaSalle, March 2018).

Table 3: Total number of Transactions (Jones Lang LaSalle, March 2018).



When considering the total number of transactions, as indicated in table 3, it is evident that the industrial and retail sector saw a significant increase in the number of transactions in 2016 in relation to all the other years. The number of transactions in the office sector stayed more or less static over the last couple of years (Jones Lang LaSalle, March 2018).

Table 4: Average value per square meter per sector (Jones Lang LaSalle, March 2018).



In table 4, it is evident that the office sector, with the exception of 2015 and 2017, had by far the highest average value per square meter in relation to all the other sectors. In 2017, the retail sector had the highest average value per square meter (Jones Lang LaSalle, March 2018).

Table 5: Total transactions by Gross Lettable Area (Jones Lang LaSalle, March 2018).

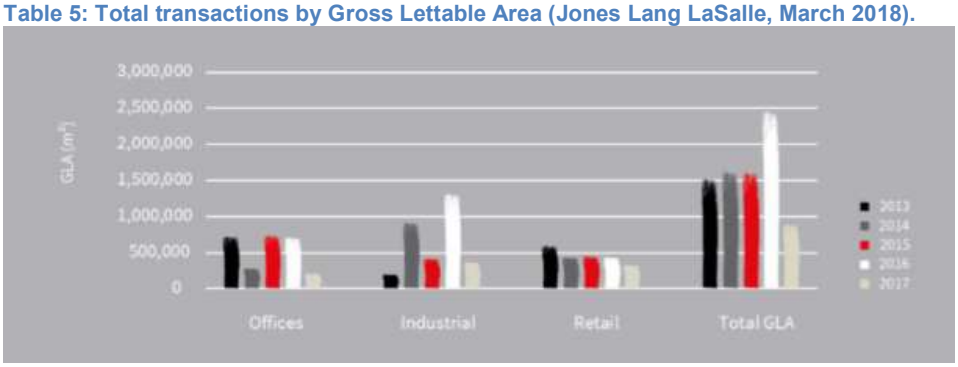
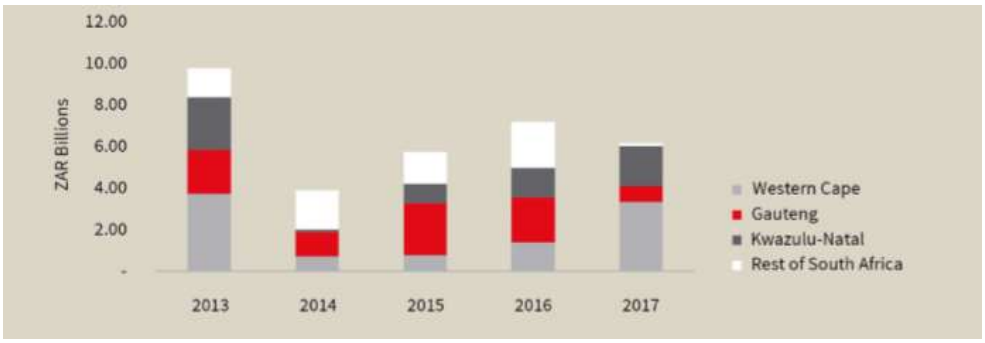


Table 5 clearly indicate that the sector with the highest amounts of transaction per GLA was the office sector with the exception of 2014. In 2014, the industrial sector had the highest amount of transactions per GLA (Jones Lang LaSalle, March 2018).

1.2.3.1 Retail Transactions

Table 6 indicate that 2017 was a very challenging year with retail transactions amounting to just over R 6.1 billion, indicating a decrease year to year of 14% (Jones Lang LaSalle, March 2018).

Table 6: Retail transaction value per province (Jones Lang LaSalle, March 2018).



It is interesting to note that although the value decreased by 14% the transaction volume decreased by 65% compared to 2016, as indicated in table 7 (Jones Lang LaSalle, March 2018).

Table 7: Retail transaction volume (Jones Lang LaSalle, March 2018).

The sales that took place in the retail sector were of high value in spite of less properties exchanging hands, indicating that property investors and owners on the sell-side were focused on higher transaction value rather than concentrating on the amount of investments. This statement is based on the growth in value per square meter from R9,054/m2 in 2016 in comparison to R17,811/m2 in 2017, as indicated in figure 1 (Jones Lang LaSalle, March 2018).

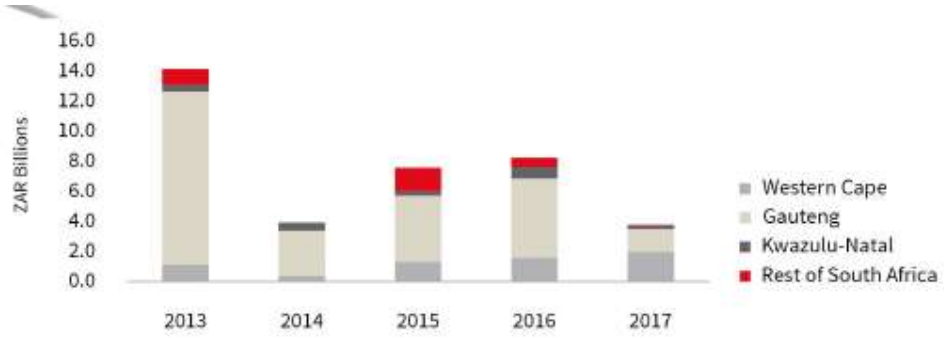
Figure 1: Growth in value per square meter (Jones Lang LaSalle, March 2018).

KwaZulu- Natal and the Western Cape reported growth in both value and volume. The total retail amount of properties that were transacted in 2017 were 29. This is the lowest amount of transaction since 2012 (Jones Lang LaSalle, March 2018). In comparison to 2016, the province that saw the highest growth was the Western Cape with a year-to-year increase of 8%. Gauteng had the highest value per square meter in comparison to all the other provinces, although none of the transactions in this province made the top five transaction by value (Jones Lang LaSalle, March 2018).

1.2.3.2 Office Transaction

The office sector saw a 53.8% decrease in value of the transaction year on year. While the poor economic climate could be somewhat of an explanation, another explanation could be that according to Statistics South Africa, newly constructed office space in South Africa summed up to the total value of up to R5.8 billion (Jones Lang LaSalle, March 2018). This growth in new developments stipulate the demand that investors and tenants have for better quality office space that is efficient and environmentally friendly and has a state of the art design (Jones Lang LaSalle, March 2018).

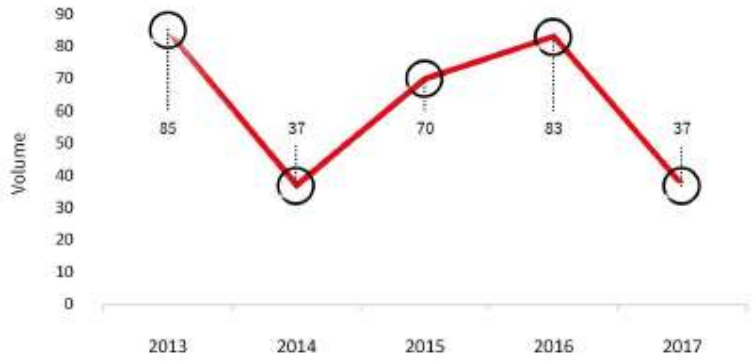
Table 8: Office transaction value by province (Jones Lang LaSalle, March 2018).



When considering the transaction volume, as per table 8, there has been a significant decrease of 62% in the office sector. In 2016, 82 properties were transacted in comparison to only 37 properties transfer to new owners in 2017 (Jones Lang LaSalle, March 2018). On a provincial level, the Western Cape was the only province that indicated an increase in the number of transactions that took place on a year-to-year basis, indicating an increase from four properties in 2016 to 13 properties in 2017 (Jones Lang LaSalle, March 2018). It is interesting to note that Gauteng was responsible for 54% of all the transactions recorded for 2017. Mainly the office transaction activity was focussed in and around Gauteng, with the

province accounting for more than half of the whole countries ongoing office developments (Jones Lang LaSalle, March 2018).

Table 9: Office transactions volume (Jones Lang LaSalle, March 2018).



It is evident in table 9, that although Gauteng accounted for most of the office transactions in volume that this was not the case in terms of the value of the transactions that took place (Jones Lang LaSalle, March 2018). In relation to transaction value, 40% of the value was accounted for in the Western Cape indicating that this was the best performing market despite the weak economic conditions (Jones Lang LaSalle, March 2018).

There has been a significant decrease in the estimated value per square meter that was mainly motivated by the significant drop in the estimated value per square meter in the Western Cape resulting in an overall decrease of 22% on the value from 2016 to 2017 (Jones Lang LaSalle, March 2018).

It is important to note in figure 2, that the average value per square metre recorded for most of the office transaction per province (R9000/m2) was not far from the value per square metre for newly constructed buildings at R 9200/m2 (Jones Lang LaSalle, March 2018).

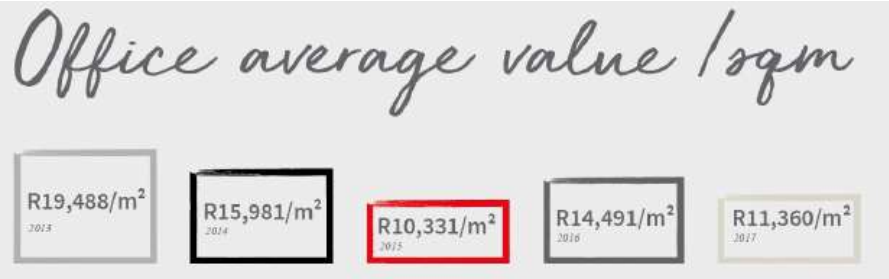
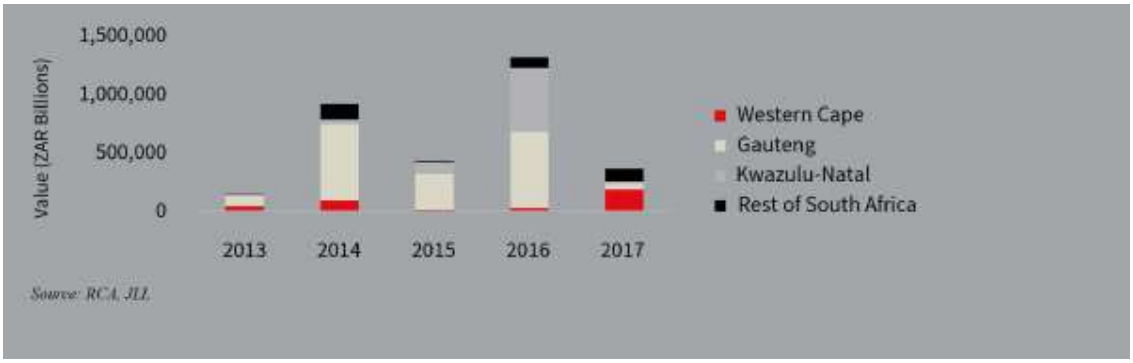


Figure 2: Office average value /square meter (Jones Lang LaSalle, March 2018).

1.2.3.3 Industrial Transactions

It is evident in table 10 that the industrial market recorded a notable decline of 75% from R13.3 billion in 2016 to just R3.3 billion in 2017 in the total investment value (Jones Lang LaSalle, March 2018). For sales of existing assets 2017 was a poor performance year and indicated the lowest value since 2013 (Jones Lang LaSalle, March 2018).

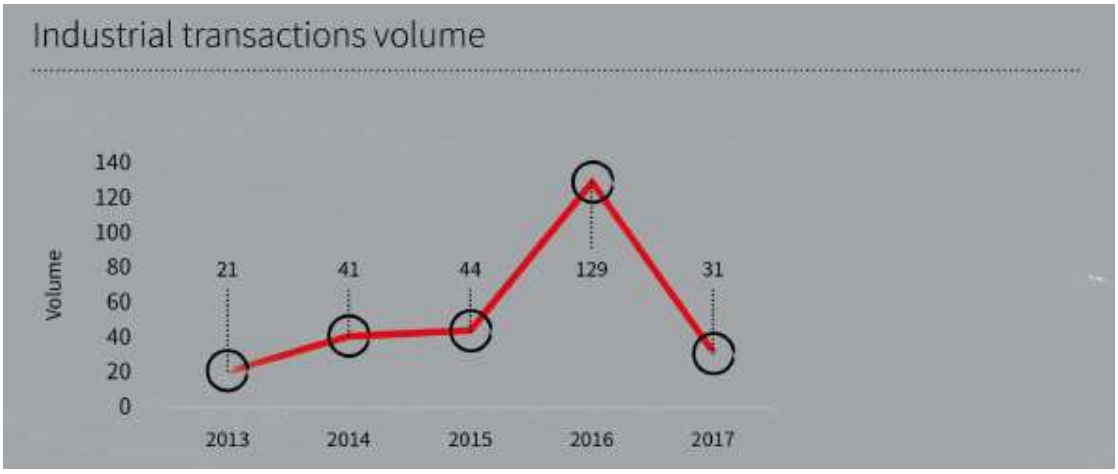
Table 10: Total industrial transaction value (Jones Lang LaSalle, March 2018).



Notwithstanding the relative high confidence that the investors still have in the industrial sector in comparison to all the other sectors (Jones Lang LaSalle, March 2018). It is evident through the market research that investors are looking to initiate large-scale greenfield developments and it is therefore incorrect to see the decline in investment as a lack of confidence on the side of investors. Statistics South Africa stated that over 1 million square meters of industrial space was constructed in the in industrial, warehouse and logistics sector in 2017 (Jones Lang LaSalle, March 2018).

Further to this, the sector has 1.8 million square meters of plans processed by large municipalities (Jones Lang LaSalle, March 2018). It is evident in table 11 that, when one compare the investment sales of completed buildings against the secondary sale of buildings in 2017 the completed buildings had double the estimated values of the secondary sales (Jones Lang LaSalle, March 2018).

Table 11: Indtsrial transaction Volume



On a positive note, as indicated in figure 3, when one compares the value of the sales based on rands per square meter, there was a significant improvement in 2017, from R3818 per square meter in 2016 to R5506 per square meter in 2017 (Jones Lang LaSalle, March 2018). If the market keeps on improving, the completion of new speculative properties will present high-quality assets which shouldn't struggle to let or sell (Jones Lang LaSalle, March 2018).

Figure 3: Average value / square meter (Jones Lang LaSalle, March 2018).

This discussion about commercial property made it evident that the office sector has the highest total investments transaction value per sector, also the highest average value per square meter as well as the highest total amount of transactions per GLA (Jones Lang LaSalle, March 2018). The researcher therefore focused this thesis study on the office sector, specifically how investors can determine in which nodes to invest in in the future with readily available key performance indicators (Jones Lang LaSalle, March 2018).

1.2.4 Foreign direct investments in South Africa

1.2.4.1 Weak points of investing in South Africa…

South Africa has of a number of constraints that could cause the limitation of foreign investments. The number of labour strikes in the country have increased over the last couple of years and this could ultimately have a huge effect on South Africa's credit rating. The continual increase of corruption and violence in the country also takes its toll on the confidence that the foreign investors have in investing in South Africa (Export Enterprises SA, 2016).

The current restriction on the electricity supply also contributes to the low investors' confidence. South Africa also has a huge problem with a high level of unemployment, high-skilled labour is in short supply, and strict immigration processes and laws apply. The process of import-export is also burdensome. One of the main factors that is important for investors is the course that the general policy-making processes undergoes, specifically structural reform and economic issues (Export Enterprises SA, 2016).

1.4.2.2 Government measures to motivate or restrict Foreign Direct Investment.

Almost all of South Arica's industries are open to foreign investors. The government lays out only a few limitations concerning the industry of investment and the amount that could be

invested. Furthermore, numerous measures have been put into place by the government to promote foreign investments namely easy understandable tax rules, a regulatory policy on competition that is improved from the previous one, the incentives of the investment, as well as the protection that is guaranteed for intellectual rights (Export Enterprises SA, 2016).

Due to the recent recession, economic recovery has been very slow for South Africa. The unemployment rate in South Africa is currently one of the highest in the world (in 2014 the rate was 25.1%) and the country has difficulty in creating new working opportunities in the public as well as private sector. In order to improve the current unemployment situation, President Zuma stated that the government of South Africa will make up to USD 303 million available in order to provide help and to support employees and business leaders that experienced financial difficulties during the recession (Export Enterprises SA, 2016).

Table 12: Country comparison for the protection of investors (Export Enterprises SA, 2016)

	South Africa	Sub-Saharan Africa	United States	Germany
Index of Transaction Transparency*	8.0	5.0	7.0	5.0
Index of Managers Responsibility**	8.0	4.0	9.0	5.0
Index of Shareholders Power***	8.0	5.0	9.0	5.0
Index of Investor Protection****	8.0	4.5	8.3	5.0

*"Note: *The greater the index, the more transparent the conditions of transactions. **The greater the index, the more the manager is personally responsible. *** The greater the index, the easier it will be for shareholders to take legal action. **** The greater the index, the higher the level of investor protection"* (Export Enterprises SA, 2016).

1.2.5 South African commercial property market cycles

The real estate market is a large market not only in terms of number of properties, but also in square metre coverage. It is a very competitive market and the ownership of real estate has a fragmental meaning, that no developer or owner controls a specific share of the real estate market in big cities.

When local owners of real estate or investors realise that the vacancy rates in buildings are decreasing, resulting in the rentals that are increasing, one can normally conclude that the amount of leasable space is also declining. This results in developers doing feasibility studies and searching for possible sites, analysing the market to determine that if additional space will be developed, and whether it will be profitable or not. There is no precise way to determine how much space should be developed because it is extremely difficult to determine the extent of the demand. The fact that it is so difficult to determine the exact demand, leads to overdevelopment. For the purpose of this study, it is very important that investors understand where the different sub sectors are in terms of the property cycles.

1.2.5.1 Viruly clock

The property cycle for the industrial, retail and office sectors are tracked by the property economist Prof. Francois Viruly through the Booming market, Recession phase and then Recovery phase as well as the contributing factors behind these. It is interesting to note that the three sectors are not always in the same phase of the property cycle. Retail could for example experience pressure due to the rising of interest and inflation rates while industrial is producing high returns as a result of the scarcity of zoned land with infrastructure as well as the extended lead times due to lengthy periods of approval from local authority to have the environmental impact assessment approved (Moneyweb, 2008).

The importance of this study is to be able to determine, if the correct KPI's and weightings thereto have been elected, if the future performance of office nodes could be scientific predicted. It is however important to realise that these KPI's do no necessarily put the performance of the node into perspective in terms of its property cycle. Taking the property cycle into consideration could assist the decision maker to interpret the data more scientifically and distinguish between a mere temporary improvement in one or more of the KPI's in contrast with an actual recovery of a sector.

Pyhrr, Roulac & Born (1999) is of the opinion that almost all the phenomenon in real estate, politics, business and economy is cyclical although most of the analysts and investors are viewing it incorrectly, it is mostly seen as trends and not as cycles. This results in many investors that follow the "herd instinct" and following the crowed by selling investments in the recession phase and buying during a booming phase.

According to various studies, one of the most important key variable that is tied to building cycles and rentals is the vacancy rate according to Pyhrr, et al (1999). It is interesting to note that there is more or less one year lag that exist between when the vacancy rate cycle's peak and rental rate. More however, the mismatch that exists between demand and supply which causes periods of unusual high vacancy rates which is then followed by periods of unusual low vacancies could be explained by the distrinctive aspects of construction lag, adjustment cost related to property and demand uncertainty.

Pthrr et al (1999) is of the opinion that another interpretation on the cyclical patterns is the psychological aspects of human behaviour. The author states that when people go through periods of prosperity the psychology of affluence and its by-product, economic optimism, is adopted. People then rationalize that what has happened will continue to happen and they become risk-takers and notice less risk than what is actually evident. More and more people become risk takers which then causes the oversupply and higher vacancy levels.

The following three key observations on real estate cycles is made by Pyhrr et al (1999):

1. Most of the real estate investors and analysts disregard cycle and changes in cycles during the booming phase due to high amount of profits and exceptional income received from fees and commission. Investment decisions are made as if the boom will never end;
2. In terms of the recovery and expansion phase, the cycle normally increases faster than expected and the market usually produce over-priced real estate;
3. The main element for successful investments is timing and investors need to be willing to make noteworthy adjustments to their portfolios to make the best of the constantly changing property market conditions.

Figure 4 indicates the different phases of the cycle as well as where the different sectors currently find themselves in the cycle.

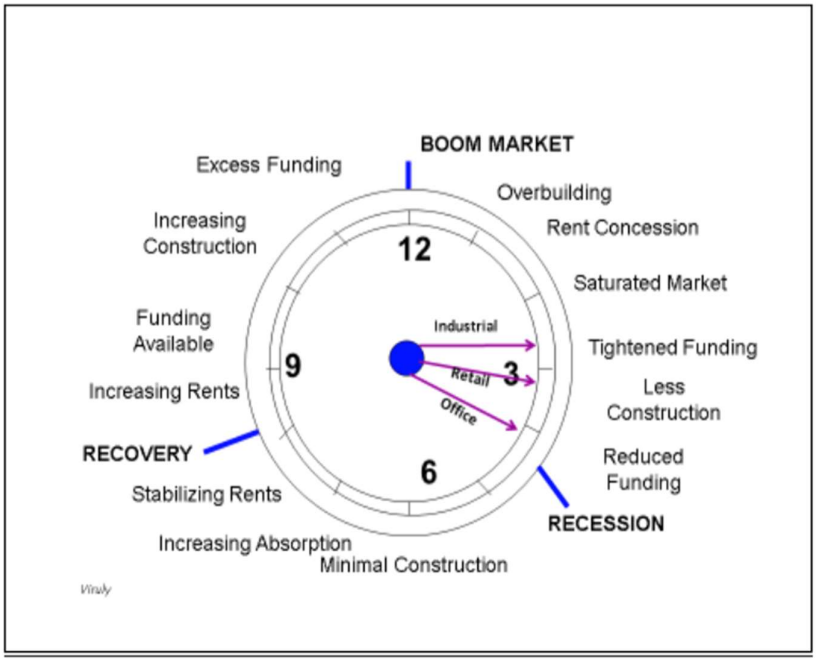


Figure 4: Viruly clock for commercial property market (Viruly, 2016)

As indicated in Figure 4, the current phase that office space is in is almost in the Recession Phase. This means that the office sector is currently under immense pressure and the rental

rates for the investor is lower and the vacancies are increasing. To successfully conduct this research, as stated by Pyhrr et al (1999), it is extremely important to note in which phase of the cycle the office sector is in so that the investor can make the right timing decision of when to acquire new property and when to depose property. For the purpose of this study, it is also important to look at the current state that the four main cities and the nodes in this city are in, in respect of the office sector, as this is the main focus of the research study.

According to the South African Property Owners Association (SAPOA) data, as well as the Broll report, the four cities with the largest gross lettable area (GLA) is Johannesburg, Pretoria, Cape Town and Durban (Broll, 2014/2015). It is therefore important to understand the current office sector's market conditions in each of the above-mentioned cities because this research will have the limitation of only focusing on these cities and not the whole of South Africa.

Firstly, it is important to indicate where the major provinces and cities are located in South Africa as indicated in figure 5. This enable the reader to clearly see where the different cities are located before the differentiation is made to the different nodes in each of the cities that this study will focus on. Appendix B contains of maps of the different cities with the specific nodes in each city that this research will focus on.

Map: Provinces & Major Cities

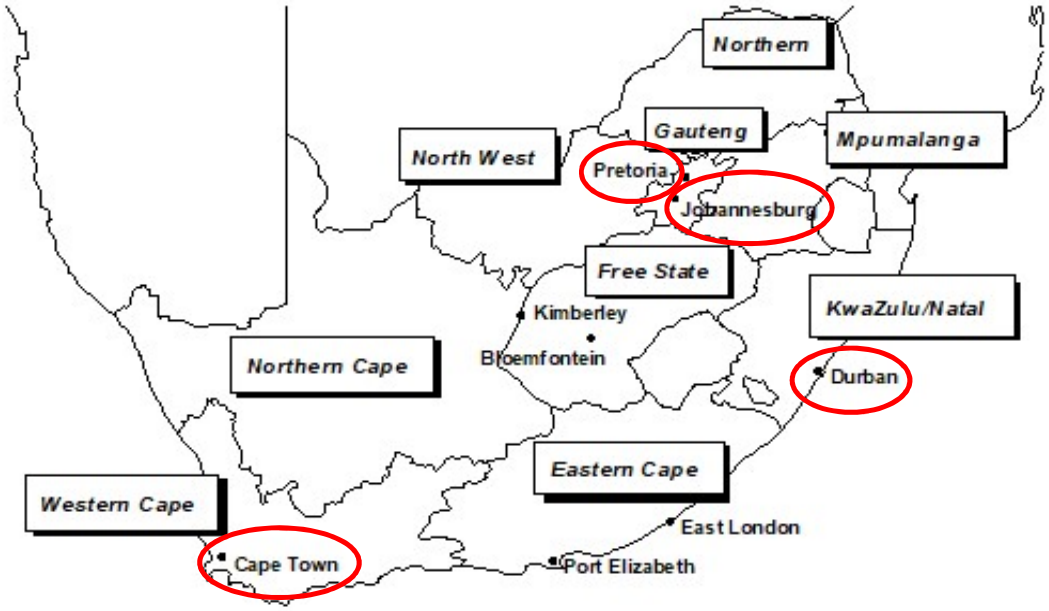
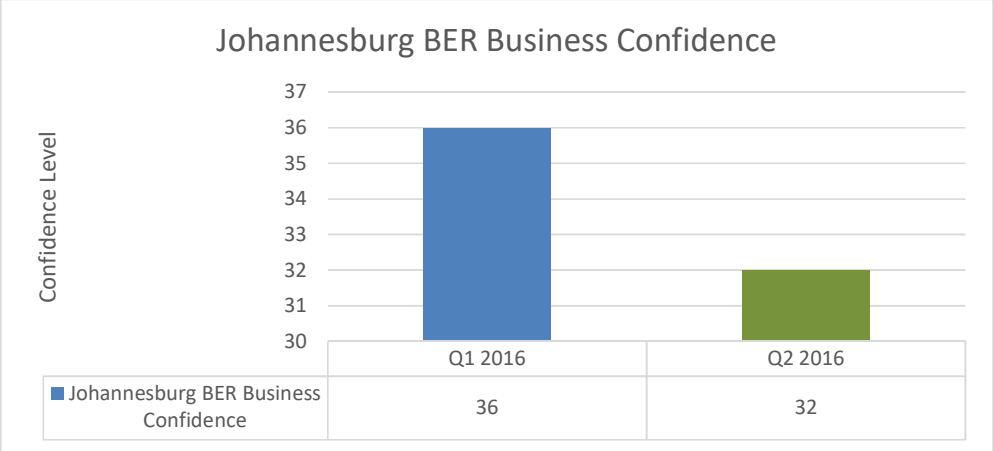


Figure 5: Map - Provinces & Major Cities in South Africa (MSCI, 2015)

1.2.5.1.1 Johannesburg

Regardless of the high level of oversupply in the office market in Johannesburg, it is expected that the P-Grade office space will keep on outperforming the other grades of office space (Jones Lang LaSalle, 2016(b)). Despite the present economic constraints, the demand for prime office space continues to be strong with a 3.0% vacancy rate (Jones Lang LaSalle, 2016(b)). The developers are now more focused on signing leases preceding to completion of the development which results in developments being more tenant driven. In Rosebank, an example of this is the 9,000m^2 that was preleased with Herbert Smith Freehills that will be taking 2,400m^2 in this development, expected to be finished in 2017 (Jones Lang LaSalle, 2016(b)). As the refurbishment of buildings and new developments keep going, the confidence of the developers in the office market in Johannesburg continues to be strong (Jones Lang LaSalle, 2016(b)). In Q2, the rental rates stayed mainly unaffected (Jones Lang LaSalle, 2016(b)).

Table 12: Johannesburg BER Confidence (Jones Lang LaSalle, 2016(b)).



The office sector in Johannesburg continues to be under stress consistent with the present "slowdown" shown in the decrease of the "BER business confidence index". This indicates that the index decreased from 36 in Q1 of 2016 to 32 in Q2 of 2016, reaching one of the lowest confidence levels since Q4 of 2009 where the index was 28, as indicated in table 12 (Jones

Lang LaSalle, 2016(b)). Due to the present setback in the economy, this enables the tenants to be in a very fortunate position for lease renewals due to obtaining more negotiating power (Jones Lang LaSalle, 2016(b)). There is still a continuous increase in rentals, as well as low vacancies due to the new developments and P-Grade buildings that keep on performing beyond the market. The ease of accessibility and location continues to be of high importance as well as the cost effectiveness and the experience of the workplace, as this turns out to be more important to companies. Most of the companies are searching for office space that is well located in terms of reliable public transportation services as well as taking into consideration the distance that their employees will have to travel to and back from their workplaces (Jones Lang LaSalle, 2016(b)). There has been an increase of 4.0% in the office stock of Johannesburg on a year-to-year basis.

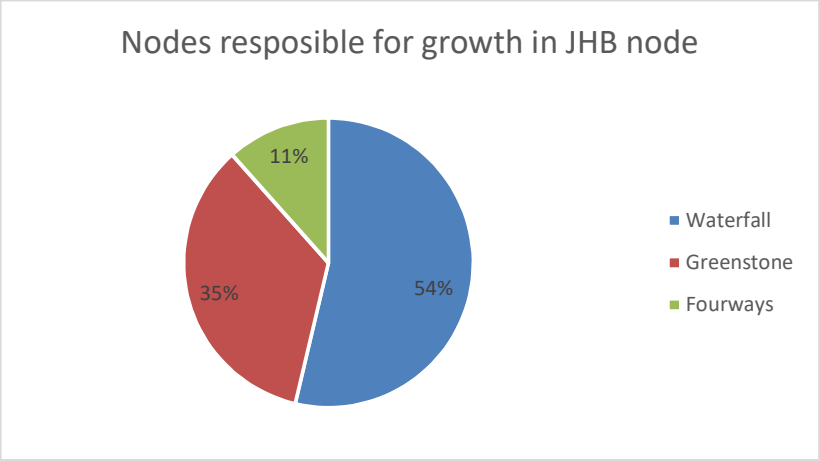


Figure 6: Nodes responsible for growth in JHB node (Jones Lang LaSalle, 2016(b)).

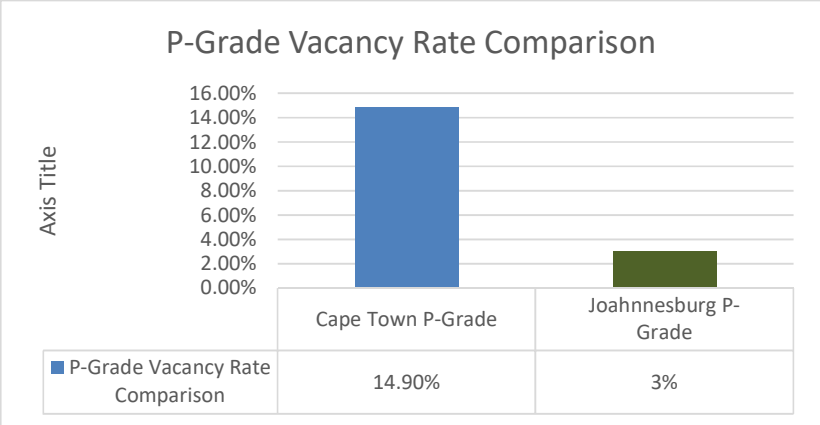
According to the SAPOA data, the three nodes that caused most of the growth in Johannesburg was Waterfall (51.0%), Greenstone (33.0%) and Fourways (11.0%), as indicated in figure 6. The present developments that are taking place are mainly focused on Sandton, Rosebank and Bryanston. These new developments will be finished by the end of 2016 and will consist of 138,575m^2. Notwithstanding the current economic conditions, the confidence of developers in the Johannesburg node remain afloat (Jones Lang LaSalle,

2016(b)). Although the analysis projected there is an oversupply of office space, the P-Grade office space is perceived to keep on outperforming the other office space classes (Jones Lang LaSalle, 2016(b)). Older buildings that are well located in this node are perceived to be very popular for refurbishments, especially in Rosebank. The trend is expected to persist in the key nodes as the demand for good quality office space in these areas increase (Jones Lang LaSalle, 2016(b)).

In the P-Grade office space, the current average for rentals is R196/m^2 and remained mainly unchanged for the past quarter. In Rosebank and Sandton, being prime nodes, the rentals ranged from R207/m^2 to R230/m^2. There has been a borderline decrease of 0.86% in the average rental rates for A-Grade office space which was mainly steered by the 13% decrease in the Rosebank A-Grade office accommodation (Jones Lang LaSalle, 2016(b)). Regardless of the decline in the rentals in these nodes, there has been a decrease in the vacancy rates in the A-Grade office accommodation and this is due to the continual demand in this node.

The conclusion is that the rental rates, in the short term in the Johannesburg node, is projected to show a symbol of improvement (Jones Lang LaSalle, 2016(b)).
On average, the vacancy rates for this node stayed more or less the same from Q1 of 2016 at 12%, which is higher than the national average (Jones Lang LaSalle, 2016(b)).

Table 13: P – Grade Vacancy Rate Comparison (Jones Lang LaSalle, 2016(b)).



Regardless of the current economic conditions, a high level of demand for P-Grade office accommodation upholding a low 3% vacancy rate in comparison to Cape Town's P-Grade vacancy rate of 14.9% remains, as indicated in table 13. When looking at the year-on-year analysis, there have been certain nodes in Johannesburg where the node fought to keep the vacancy rates low. In Bryanston, the vacancy rate was 6.2% in Q2 of 2015 and is now at 13%. Two other nodes that also saw a significant increase was Illovo (an increase of 8.8%), as well as Woodmead who saw an increase of 5.9%. The main reason for the increase in the vacancy rate is due to the increased amount of available A-Grade office accommodation (Jones Lang LaSalle, 2016(b)).

Due to the bleak economic growth outlook that is currently less than 1%, the economy continues to stay stagnant in the overall market. South Africa's currency continues to be quite weak despite the fact that the Rand is strengthening which is opening a gap for foreign investors to re-evaluate South Africa as an option to invest in commercial property. A confidence booster in the quarter that will give international firms comfort in investing in Johannesburg is due to Moody's upgrade of the City of Johannesburg, as well as the Ekhuruleni Municipality (Jones Lang LaSalle, 2016(b)).

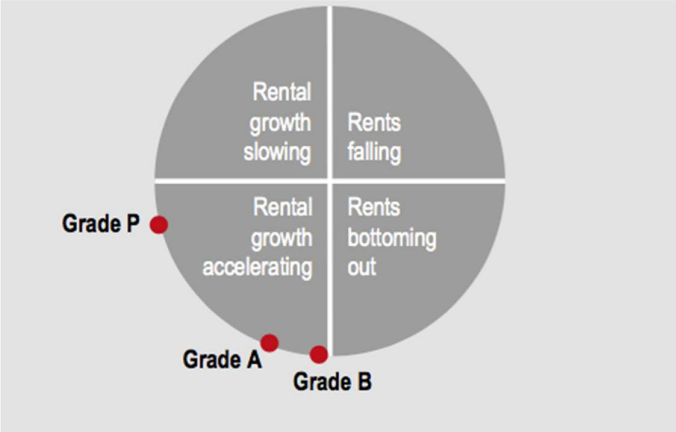


Figure 7: Johannesburg market outlook Q2 of 2016 (Jones Lang LaSalle, 2016(b))

1.2.5.1.2 Pretoria

Over the last couple of years the CBD of Pretoria has been exposed to the relocation of robust companies to decentralised nodes. This has resulted in an increase in the vacancy rates and a rise in the arrival of inferior calibre tenants. Governmental departments mainly occupy this node although a couple of departments have moved to the Centurion node (Broll, 2016). A couple of buildings that have been either been fully redeveloped or refurbished to A-Grade office accommodation have been required from the Department of Public Works e.g. the Department of Environmental Affairs, as well as the Department of Health which currently has a 6-Star Green Star rating and P-Grade building, situated in Arcadia (Broll, 2016). A well-known landlord in the CBD area of Pretoria, City Property, is currently busy with upgrades to many of the buildings that the company owns in the CBD. To name a few of the changes, the redevelopment of C-Grade buildings into residential buildings along with the introduction of popular brands into new ground floor retail (Broll, 2016). One of the main reasons for investors and business owners to refuse to invest in the vacant space in the CBD of Pretoria is mainly due to the restricted parking ratio of one bay per 100m^2 which is extremely low (Broll, 2016).

The linkage of Hatfield and the northern suburbs with the CBD of Pretoria, due to the completion of the A Re Yeng Buss Rapid Transit, has eased the traffic clogging as well as increased the node's accessibility. Business travel around and in the CBD of Pretoria has significantly improved due to the Hatfield Gautrain station that links Pretoria's main nodes with Centurion, Midrand, Sandton and O.R Tambo International Airport (Broll, 2016).

Limited new construction has taken place in the CBD of Pretoria over the last couple of years. There has been a limitation on the amount of construction work. Work done is mainly refurbishment and redevelopment of the existing buildings (Broll, 2016). There have been restorations to heritage buildings in the CBD, although most landlords are not able to optimize most of the historical value.

The redevelopments that took place ultimately increased the high-rise residential space in the node. The establishment of retail in the ground floor of buildings also had a positive effect on the node (Broll, 2016).

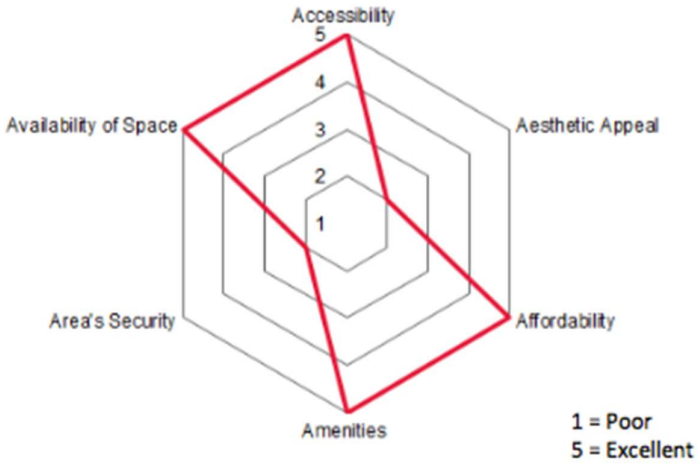
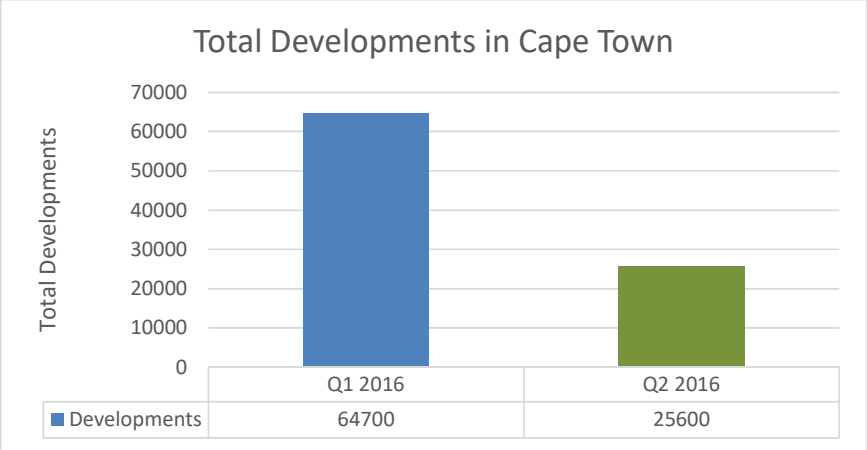


Figure 8: Broll insight in the CBD of Pretoria (Broll, 2016)

1.2.5.1.3 Cape Town

In Cape Town, most of the big developments for P-Grade office space have expanded greatly with most of the developments being almost completed. There are very few new developments for office space, with the most construction for office space currently built at the V&A Waterfront and in the CBD of Cape Town. There has been an increase in the vacancies in the Waterfront node due to the relocation of Maersk to the CBD of Cape Town. There was also a slight improvement in the rental rates in Cape Town (Jones Lang LaSalle, 2016(a)).

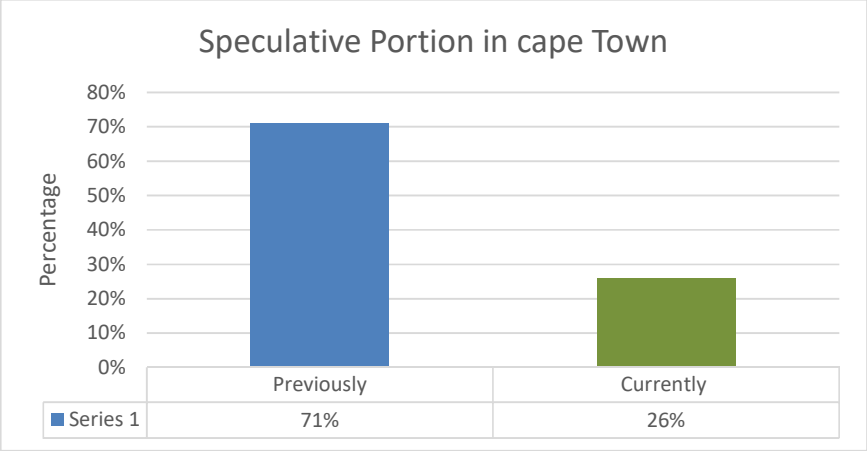
Table 14: Total Developments in Cape Town (Jones Lang LaSalle, 2016(a)).



The amount of developments expressed in approvals, commencement and completion in Cape Town has decreased from 64,700m^2 in Q1 of 2016 to 26,500m^2 in Q2 in 2016, as indicated in table 14. The reason for the sudden decrease is the amount of developments that reached completion. The main development activity which is currently taking place at the Waterfront is the development of the Silos, as well as the Waterway House that will be adding 33,000m^2 of office space in the mixed-use development. One of the other developments that will add another 16,00m^2 of office space is the KPMG building that is currently under construction in the Cape Town CBD (Jones Lang LaSalle, 2016(a)).

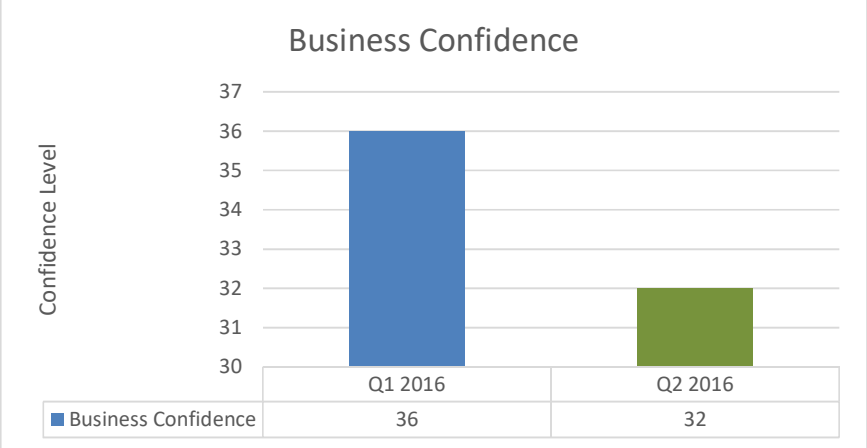
The amount of speculative developments in Cape Town is starting to decrease and this is evident in the high level of vacancies especially in P-Grade office space that also caused the speculative portion to decrease from 71% previously to 26% currently (Jones Lang LaSalle, 2016(a)).

Table 15: Speculative portion in Cape Town (Jones Lang LaSalle, 2016(a)).



The turnover of businesses in South Africa are declining as the country's economy is currently slowing down and the investors' confidence in South Africa is decreasing. The BER Business Confidence Index stipulates that the confidence of investors is currently reaching one of the "lowest levels since Q4 of 2009" (Jones Lang LaSalle, 2016(a)).

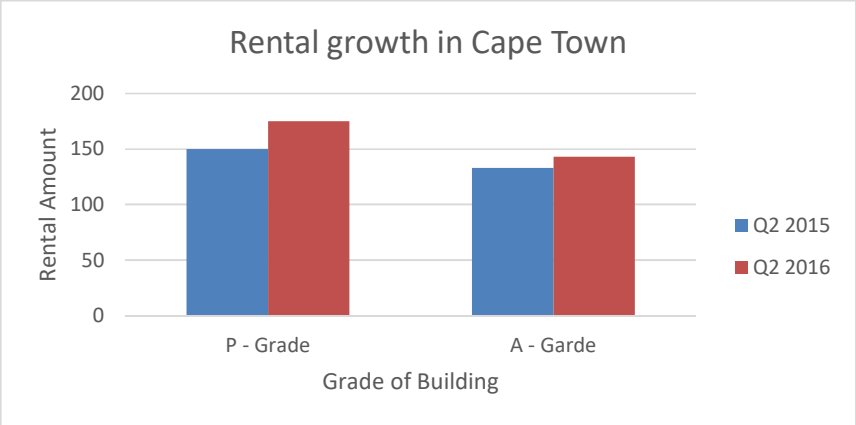
Table 16: Business Confidence (Jones Lang LaSalle, 2016(a)).



The confidence level as indicated in table 16 decreased from 36 in Q1 of 2016 to 32 in Q2 of 2016. The low confidence of investors, who are currently not investing in the real estate market, can be seen in the absence of new entries in the market (Jones Lang LaSalle, 2016(a)). The general demand in Cape Town continues to be steady, though there are external influences that are beginning to affect the office market (Jones Lang LaSalle, 2016(a)).

There has been a small movement in the rental rates from Q1 especially in the A-Grade office space, and in the Tygervalley and Bellville areas which had the greatest quarterly change with a growth rate in Q2 of 4.24% (Jones Lang LaSalle, 2016(a)). When looking at the year-to-year basis, rental rates in the P- and A-Grade office space have indicated a strong growth with B-Grade building rental rates staying unmoved.

Table 17: Rental Growth in Cape Town (Jones Lang LaSalle, 2016(a)).

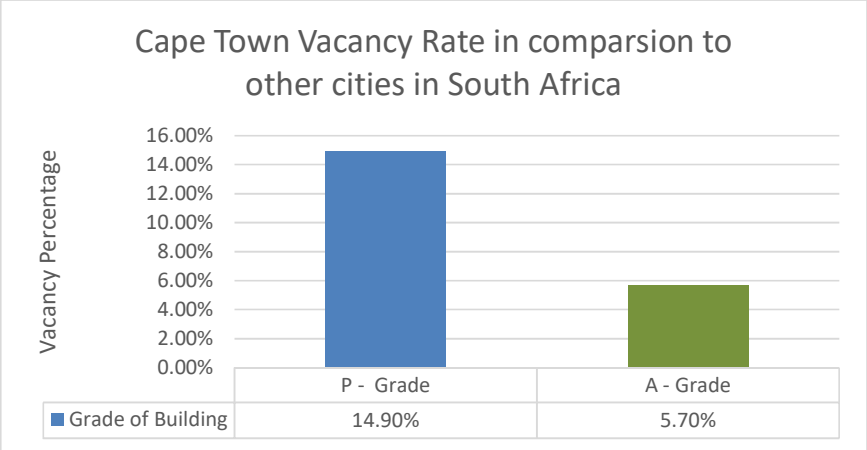


The rental rates have seen a massive growth in the year-to-year basis as indicated in table 17 the in the P-Grade office space in the CBD of Cape Town increased with R25/m2 from R150/m^2 in Q2 of 2015 to R175/m^2 in Q2 of 2016. A-Grade office accommodation also increased from R133/m^2 to R143/m^2 in the similar interval (Jones Lang LaSalle, 2016(a)).The latest office rental space developments in the V&A Waterfront is marketed at R235/m^2. Despite

the prominent increases in vacancies in the Waterfront node, it is interesting to note that the rental rates still saw an increase (Jones Lang LaSalle, 2016(a)).

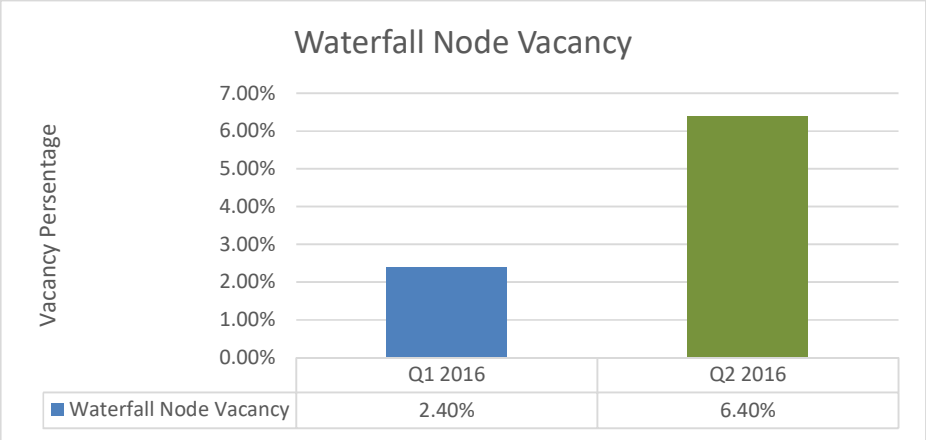
The vacancy rate in Cape Town was the lowest among KwaZulu-Natal and Johannesburg and was recorded at 7.8%. The vacancy rate was also substantially lower than the national vacancy rate for office space which was recorded according to the SAPOA office vacancy report as 10.5%.

Table 18: Cape Town Vacancy Rate in comparison to other cities (Jones Lang LaSalle, 2016(a)).



In Cape Town, it is interesting to note that in contrast to Johannesburg and other metropolitan areas, the vacancy rate for office space in P-Grade buildings are currently the largest with a vacancy rate of 14.9%, as indicated in table18. In the A-Grade building, the vacancy rates are significantly lower with a rate of 5.7%. The main reason for the high level of P-Grade vacancies is due to a high level of supply of this office space and definitely not because of a decrease in demand. Due to this high level of vacancies of prime buildings that were recently completed, this may result in caution by developers to refrain from breaking ground in the city, which could describe the reduction in the developments in the pipeline (Jones Lang LaSalle, 2016(a)).

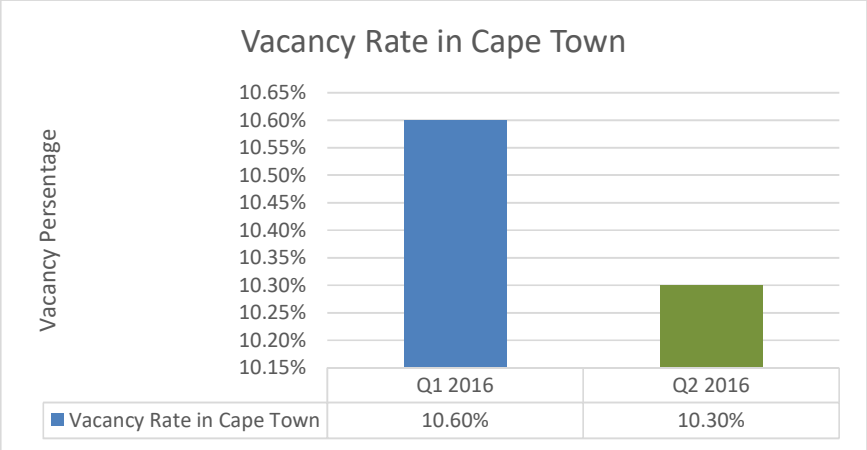
Table 19: Waterfall Node Vacancy (Jones Lang LaSalle, 2016(a)).



The Waterfront node, as indicated in table 19, has shown an increase in the vacancy rates that is beyond the norm with the node's current vacancy rate at 6.4% and increased from 2.4% in Q1 of 2016. This is mainly due to Maersks' move out of the Waterfront to the CBD of Cape Town. The good news is that due to the rising demand for office space in the Waterfront node, the high vacancies will only be for a short period of time (Jones Lang LaSalle, 2016(a)).

There has been a small decrease in the office space vacancy rate in the Cape Town CBD from 10.6% in Q1 of 2016 to 10.3% in Q2 2016. In Cape Town, the CBD still has the greatest vacancy rate in the city (Jones Lang LaSalle, 2016(a)).

Table 20: Vacancy rate in Cape Town (Jones Lang LaSalle, 2016(a)).



Although there are some areas in Cape Town where the vacancy rates of P-Grade buildings are having double digit, the newly developed office space is predicted to do well due to the steady demand that exists for excellent office space within Cape Town's office market (Jones Lang LaSalle, 2016(a)). The expectancy is for the vacancy rates to decrease in the medium to longer terms. There may be limited ongoing growth in the shorter terms due to the rental growth of the city that upheld healthy rental growth in the last three years. Vacancy rates in the city have also continued to be lower than other big metropolitan cities that point out the steady demand in threatening economic climates (Jones Lang LaSalle, 2016(a)).

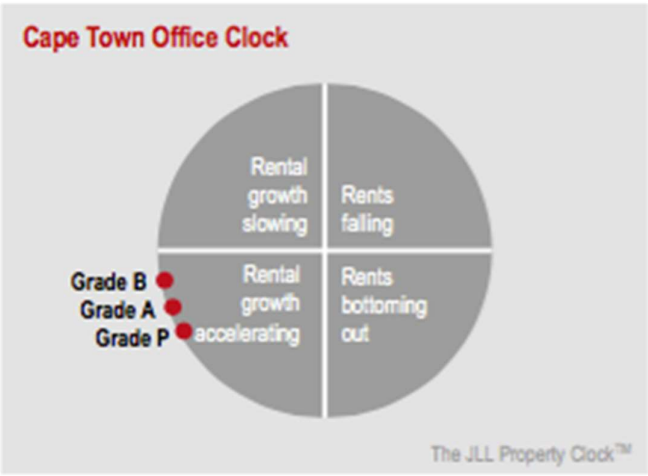


Figure 9: Cape Town market outlook Q2 of 2016 (Jones Lang LaSalle, 2016(a))

1.2.5.1.4 Durban

The CBD of Durban is highly accessible for the public through either private transportation or the use of the variety of public transportation options. Public taxis, the Durban Transport Bus system, as well as the Metro Rail are just some of the public transportation options available that service the CBD of Durban (Broll, 2016).

Roughly half of the buildings in the Durban CBD are graded as C-Grade buildings. Most of the B-Grade buildings have either been upgraded to A-Grade buildings through refurbishments, or been regularly maintained. A- and B-Grade buildings respectively form a quarter of the total supply respectively.

In terms of amenities that are currently available to the public in the CBD of Durban, most of these are convenience stores and “street front retail outlets” (Broll, 2016). This node is also struggling with security issues due to negative incidents that took place, but this issue is currently being addressed by the police. Currently 85% of A- Grade and C-grade building space in the CBD of Durban is let, although it is clear that the vacancies for the B-Grade office space is somewhat lower than the other grades (Broll, 2016).

It is interesting to notice that in the market overview of Durban, the office space in the CBD of almost half of the entire office accommodation in KwaZulu-Natal. Roughly half of the current office stock available in the CBD is C-Grade buildings and the other half is equally shared between A- and B-Grade buildings (Broll, 2016). One of the most important challenges that the node is currently facing is the fact that there is a huge oversupply of inferior quality office accommodation situated in an environment disposed to a lot of dirt, filth and homeless people (Broll, 2016).

This oversupply in the CBD of Durban is due to the historical event of decentralisation of the CBD node, which once was the main dominant commercial node in Durban (Broll, 2016). Some of the landlords have recently decided that due to the high vacancies in this node, they will redevelop the buildings that they own into residential units for low-income groups in order to decrease these vacancies and to produce an income, following the trend currently in the Johannesburg CBD. The problem with this trend however, is the fact that it was not as successful as they hoped. There seems to also be difficulty in reaching an agreement in terms of what direction the CBD should take (Broll, 2016). The current viewpoint of the node is steady although there is a decrease in the level of market activity (Broll, 2016).

There is a significant limitation on the amount of new buildings being developed in the CBD of Durban, aside from the refurbishment projects. The opportunities for new developments in this node are also very scarce due to the fact that there is no vacant land available in this node and the demolition of “completed redevelopments” are rare (Broll, 2016). A large development that will have a positive effect on the node is the extension of the Tsogo Sun Holdings’ Suncoast Casino, which is only a 10-minute drive north of the city. The development will consist of 49,00m^2 of retail space as well as additional restaurants (Broll, 2016).

This node will probably observe an increase in the market activity due to the maturing of the developments that are situated in the north, as well as the looming launch of Go! Durban and the road upgrades related to this event (Broll, 2016).

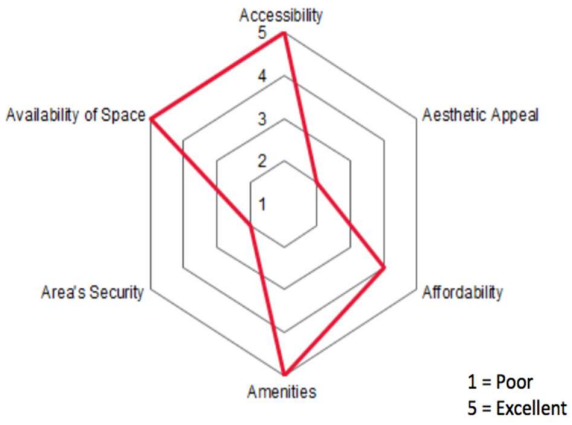


Figure 10: Broll insight in the CBD of Durban (Broll, 2016)

1.3 Importance of research

Even in the extremely transparent markets, there is a continuous need for research as it is challenging to make accurate future predictions trends on real estate investments and market developments (Clayton, Fabozzi, Giliberto, Gordon, Liang, Mackinnon & Mansour, 2013).

A wide variety of office sector data is available in the property industry relating to the past performance of the different office nodes. The data made available by the MSCI indicates amongst others the total return of office nodes, over a three- and five-year period. This data is quite valuable for the asset manager to determine if they have made a good investment decision.

The real challenge however, is not just to receive confirmation of good historical investment but to be able to predict the office nodes that would be the best performing office nodes, outperforming the average nodes. This research is an attempt to understand the KPIs that could impact the performance of the nodes as well as formulating a model that will be able to make use of the top KPI's to predict the best performing office nodes. By formulating the correct model, one would be able to make use of this model to predict the top performing office nodes five years from today.

1.4 Problem statement

For different investors different factors are important in order to classify the investment as a profitable investment. According to Prof. Francios Viruly (2013), well known South African property economist and professor, the main challenge in commercial property lies in obtaining a total return on both your capital growth and the yield. Viruly further states that information for investment decisions tend to be poor due to investors that tend to rely on word of mouth or the media (Viruly, 2013).

According to a recent study done by Sah, Gallimore and Clements (2010) on the impact that experience has on property investment decision making, the findings summarise that there is not a globally accepted model that includes all the aspects in decision making for the current condition and relevance of the literature. There thus exists a great need for research in the decision-making methods used by investors to make investment decisions in respect of the office sector, as indicated by Pfnuer et al. (2004). The author stated that the decision-making process that is followed by the investors or decision makers in the real estate environment is based on “insufficient information basis” and is mostly controlled by the “investment perspective” (Pfnuer et al., 2004). The necessity of assessment for the future performance and the investigation of the historical performance is recognized and addressed as valuable by large investors (Adair et al.,1994).

What becomes evident is that there are no specific decision-making models or tools developed for the office sector in the property industry in relation to investment decisions. Many of the authors of studies clearly state that there is a need for a decision-making model or tool that will advance the investment decisions made by investors in the office sector.

1.5 Purpose statement

The purpose of this study is to make use of the historical nodal data that is freely available to investors, and to formulate a model that will take into account the most relevant KPIs that could be used to predict the best performing office nodes in the future. The purpose is to make use of the historical data (that in itself cannot be of any indication of what the performance will be on the different nodes in the future), and to formulate a model that, by looking at specific KPIs, one would be able to predict the nodes that will best in the future.

Factors that contribute to the determination of the best performing office nodes are constantly changing. It will be of great importance for investors to have a tool that will enable the asset managers or investors to establish where and in which nodes to invest in in the future. The historical information and data (gathered by/for e.g. MSCI and SAPOA) of office nodes are freely available but the challenge that investors encounter is to make use of this historical data to make predictions and decisions for the future use.
This study has the intention to provide the investors with a reliable and easy to use tool based on scientific data that would enable the investor to identify the top performing nodes in South Africa.

1.6 Research objective

In this section, the general objective is set out, followed by the more specific research objectives.

1.6.1 General objective

The overall objective of this study is to determine the KPIs that could be used to predict the best performing office nodes in the future.

1.6.2 Specific objectives

The following specific research objectives are formulated to realise the general research objective.

The specific objectives of this research are to:

- examine the different decision-making models, in literature, that were formulated to predict the best performing office nodes in the future;
- determine through the literature what the possible KPIs would indicate that an office node is performing well;
- determine through the interviews what the property specialists regard as the KPIs that could be used to predict the performance of office nodes;
- make use of the results from the literature and interviews, regarding the best KPIs, to formulate a statistical model that will use the KPIs to predict the future performance of the office nodes;
- make use of the model to predict the performance of the nodes over a one-year, three-years and five-year projection and to determine the model with the most accuracy in portraying the actual results; and
- make future research recommendations in the office property sector.

1.7 Research problem, sub problems

1.7.1 Main research problem

Could historical nodal data be used to predict the best performing office nodes in South Africa?

1.7.2 Sub research problems

1) What readily available KPIs can be used as a screening or first indication of the best office nodes to invest in in the future?

2) Is it possible to make use of historical nodal data to make predictions in the future and how far into future can the model predict?

3) Can the formulated model be used to rank the best performing office nodes in the future to invest in, or not?

1.8 Hypotheses

Normal multiple regression formula:

$$y_i = B_0 + B_1X_{1i} + B_2X_{2i} + B_3X_{3i} + \cdots B_kX_{ki} + \varepsilon i \ldots\ldots\ldots\ldots\ldots\ldots 1$$

Thus

$$: Total\ Return \neq B_0 + B_1CV_n + B_2CGR_n + B_3CG_n + B_4CSoN_n + \varepsilon i$$

$$H_0: Total\ Return = B_0 + B_1CV_n + B_2CGR_n + B_3CG_n + B_4CSoN_n + \varepsilon i$$

Where

Bo = Y intercept

Yi = Total return

CV_n *= Change in vacancy at time n, with n 1 or more values between 0 and 15 (amount of years)*

CGR_n *= Change in gross rental at time n, with n 1 or more values between 0 and 15 (amount of years)*

CG_n= *Capital growth at time n, with n 1 or more values between 0 and 15 (amount of years)*

$CSoN_n$= *Change in size of node at time n, with n 1 or more values between 0 and 15 (amount of years)*

β1 = Slope of Y with variable X1, holding all the other variables constant

β2 = Slope of Y with variable X2, holding all the other variables constant

β3 = Slope of Y with variable X3, holding all the other variables constant

β4 = Slope of Y with variable X4, holding all the other variables constant

εi = Random error in Y for observation

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The purpose of this literature review is to determine a theoretical framework for the research. The literature review will also define the main terms, terminologies, and definitions as well as examine studies or models that have already been published by other researchers in this specific field.

As an introduction to the study field, it is important to determine the advantages as well as the disadvantages of investing in property, in relation to the different asset classes available for investments. The main disadvantages concerning investment in the property industry, compared with financial assets, would be indivisibility, illiquidity, as well as the absence of flexibility (Newell & Fife, 1996).

Table 21 indicates the different classes of investments as well as how the different classes stereotypically differ from one another in terms of risk, total return, current yield, growth and inflation protection.

Table 21: Major asset classes of investments classified stereotypically (Geltner, Miller, Clayton & Eichholtz, 2007)

	Stocks	Property	Long - Term Bonds	Treasury bills
Risk	High	Med – Low	Med – Low	Lowest
Current Yield	Low	High	Highest	Moderate
Growth	High	Low	None	None
Inflation Protection	Good in L-T	Good	Bad	Best if Reinvested

It is clear that in Table 21 property has a medium to low risk rate as well as a moderate total return, and a high current yield with a low growth rate, and is a preferable vehicle for inflation

protection (Geltner, Miller, Clayton & Eichholtz, 2007). In relation to the other classes, property is a good investment vehicle and increased focus is placed on the investor to make use of the best decision-making model.

2.2 Property diversification, risk and investment

Since the 1970's there has been a strong belief that the growth of property as an investment option is due to multi-asset portfolios that will provide the investor with a secure investment of capital income in economic environments that are unstable, as well as enable the investor to create stable returns. Property investment is somewhat complicated due to the existence of potential problems that involves research about selecting a variety of investments with appropriate risk and the anticipated return. Another complication the investors need to decide on is the suitable level of capital obligations by considering the acceptable level of risk (Adair et al., 1994).

In effect, two characteristics of property portfolio management is evident, namely, a rational model used for the selection process of possible investments that will fulfil the objectives within the investors complete investment strategy. The second characteristic being the act of doing thorough research of the portfolio by examining the past performance and determining the performance of such investments in the future (Hargitay & Yu, 1993).

The investor's style that is most widely used by institutional investors, according to Hargitay and Yu (1993), a conservative investment style, where the main purpose is to derive the highest return allowing for the minimum amount of risk in the chosen portfolio. A more rational way to describe this style is that the investor selects market fields that are acceptable by the criteria set out in the investment policy of the company (Hargitay & Yu, 1993). By observing the statement above, it becomes prominent that the investments that yield both high returns and risk are not appealing for most of the organisations due to the fact that the success or

failure of the management policy is revealed by the performance of the fund (Hargitay & Yu, 1993). This stands in contrast to a portfolio of stock market securities which need a low level of internal management and which can be developed almost instantly, as to the property portfolio which emerges over a longer period of time (Hargitay & Yu, 1993). This means that it influences the practicality of moving in and out of property specifically in multi-asset portfolios (MacGregor, 1990).

One of the main challenges for investment in property is the fact that the search for the most appropriate properties take place in an ineffective marketplace with limitations on the necessary data regarding the risk and return analysis, which can result in major problems to the management of the investment (MacGregor & Nanthakumaran, 1992). In combination with other market aspects, the poor switching component vigorously restricts the liquidity of the capital (Hargitay & Yu, 1993). Investment institutions will employ their resources and exposure to the above mentioned problems to develop a comprehensive analysis of the economic situation, as well as the market area study which includes the financial projections that is incorporated into the operating budgets and property management programme (Vos, 1993).

Effective diversification includes the consolidation of investments in order to decrease the risk of the investment, without giving up the portfolio returns. Normally the lower the interrelationship of the return of the asset, the lower the risk would be (Hargitay & Yu, 1993). The traditional method used by investors to expand their investments is by means of property type as well as geographical regions. One of the key factors to consider is whether it is more effective to expand across regions within one sector or across sectors within one region. In the past, international investors usually stayed within one region based on the main city and investing in the office sector, being the most international of the property classes (Hargitay & Yu, 1993).

One of the advantages of investing in property is the low to moderate levels of exposure to risk with a long-term return on the investment. According to Hargitay and Yu (1993), institutions depend highly on empirical and quantitative techniques to measure both the risk and the return associated with the investment. In order for the investor to come to an accurate conclusion in terms of the risk and return of the investment, the investor will have to have access to market transparency, a strong research base, as well as large volume of high quality data (Hargitay & Yu, 1993). Respecting the decision making, organisations invest in markets in which they have the ability to obtain a high level of quality information, and which are familiar to them. One of the major problems that the authors have found is matching the current investment activity with the sectors that are performing the best at any point of time due to the components of discrepancy that unavoidably occur (Hargitay & Yu, 1993).

Through the study it became evident that it is now important for institutions to make use of empirical and quantitative techniques to determine risk and return which also includes the determination of the internal rate of return, index series as well as monitoring of return shifts (Hargitay & Yu, 1993). The utilisation of the above mentioned aspects need “market transparency”, great quality of data, as well as being backed by a substantial research base (Hargitay & Yu, 1993).

The way that the investors observe the risk involved in the investment is essential in the decision-making process. Risk plays a fundamental role as investment decisions are made under uncertain conditions. According to French (2001), the risk associated with the asset allocation model where the investor is uncertain of realising the required return, when the risk associated with decision is not corresponding with the performance of competitors, is uncomfortable. An important question will always be how much one should invest in real estate, taking into consideration what amount is available, what will be acceptable by the company as well as the risk factor (French, 2001).

2.3 Investment decision making models of real estate investors

The identification of the different investment decision-making models that are available for the making of good and enlightened decisions in the property investment industry in the future should be investigated in order to build on the existing models. The basis of any real estate analysis is dependent on the interaction of financial, legal and physical aspects (French, 2001).

Due to the fact that property is increasingly viewed by investors as a good investment option, there is an increasing focus on the performance of property as an investment asset. The necessity of assessment of the future performance and the investigation of the historical performance is recognized and addressed as very valuable by large investors (Adair et al., 1994).

Decision theory can be defined as the action that leads to rational choice, through the study where different processes of judgement are involved (French, 2001). In relation to real estate, there are different models used for the pricing and distribution of assets. The asset allocation model suggests that there is a trade-off for an investor between maximum allocation of assets against performance and risk (French, 2001).

Investment decisions are based on certain benchmarks i.e. the marginal influence of the production of an efficient multi-asset mean-variance portfolio that is subject to the objective set out by the investor, and the capital limiting restrictions. Due to uncertainties that lie outside the current conditions, it is very important for the decision maker to make use of mathematical models and not only the normative model. These mathematical models can be loss functions, probability based, or any other form of statistical representations of opinions (French, 2001). According to an asset allocation model (mathematical model), it may be believed that a decision is made according to the current business constraints and expectations, but the final

decision can also be influenced by facts that are not part of the mathematical model (French, 2001).

French (2001) also formulated and identified three different forms of decision-making models. The “normative analysis” being the model which recommends how one should make a decision; the “descriptive analysis” which indicates how the decision is made and assists in the deciding phase; and the “prescriptive analysis” which makes use of the normative model to direct the decision maker in terms of other limiting rational parameters.

French (2001) further examined the evolution of the normative model by applying parameters that previously had an influence on decisions that were made as defined in the descriptive model, to ultimately develop the prescriptive model. The prescriptive model can now be described as the application of the normative concepts that result in decision makers making a “good” decision.

It is sometimes difficult to see the realisation of the normative model and it being effective in practice, as the theory of what should be done is not always visible in the final decision process. This could be due to the normative model being faulty or that it did not take into consideration all the factors that influence the decision. For this, Phillips (1984) gave a solution and proposed an amended model namely a requisite decision model that can address the differences between normative and descriptive models. A requisite model can be described as one that will work well although it is not always textbook based. The model was based upon the normative model, by including parameters that were taken into consideration by previous decisions as explained by descriptive models, ‘and captured within the sensitivity analysis by the current value judgements of the decision- maker’ (French, 2001).

Modern portfolio theory (MPT), that is also of normative nature, utilises asset allocation with a specific reference to the utility function. MPT is assumed to be based on the financial outcome

only, meaning that the model does not take into consideration the parameters that are outside the ideal financial outcome. The model relies on definite inputs and provides the investor with specific answers. In the asset allocation model formulated by Markowitz (French, 2001), the risk associated with the investment is defined separately from the expected return. Minimising the risk is the primary requirement at any given return (French, 2001).

A number of problems are identified regarding the MPT models. Investors assign too many positive attributes to possible investments that the investor thinks are going to show huge returns, investments with small variances, as well as “negative correlations” and underestimates the weight of investments with opposite factors (French, 2001). This results in the over-expected results of the portfolio while the risk factor is underestimated. The second and more important factor is that the misestimating can result in not considering better portfolio mixes (Matysiak, 1993).

The main factor to consider in the asset allocation model is a thorough analysis of the risk and return profiles of the different asset classes over a specific period of time (Baum, 1988). To enable the model to provide the investor with advice, the model makes use of historical data to offer the investor insight on the allocation of assets in the future. A negative factor of the model is that is refers back to historical data. This is due to it only considering the past and not the present perception of the different asset classes (French, 2001).

One of the main problems for investors regarding asset options, is to indicate what the most favourable option in future will be and for that, investors need to know the future “return and volatility” of the market. The solution according to Markowitz (1959) is to make use of “ex-post data” to predict the best asset option. A problem that exists is that the historical performance data will not always reflect correct future returns. Thus forecasting is very important in this model and would, to a large extent, depend on expectations made from different sources. This model will also depend on how accurately the investors have forecasted the markets.

Furthermore, it is important to note that “market sentiment’ of the investors is not a good measuring tool for any forecast. Investors tend to hold on to market beliefs that result in a degree of comfort, but this does not necessarily lead to performance (French, 2001).

The normative model cannot incorporate all of the above-mentioned factors and therefore a more prescriptive model would be of great value to the investor in the decision-making process (French, 2001). There can be a vast difference between what the investor’s decision in asset allocation is perceived and what the final outcome would be in real estate investment. As a professional, one could either make an effort to develop a prescriptive model that will enable the investor to determine the beliefs, prejudgments and preferences in relation to the problems at hand, or one could just accept the status quo (French. 2001). Ultimately, one could not justify a decision based on the risk of one outcome, but it is important to judge the process that the decision maker or investor used and whether this led to satisfactory returns (French, 2001).

In relation to property portfolio management, the normative model would suggest that a certain allocation should be obtained in order to gain the best return possible with the associated risk. Yet there are still other business risks that will have to be considered, thus this model is not optimal as it omitted the important attribute of risk (French, 2001).

Samuelson and Zeckhauser (1988) further stated that the best decisions are made through rational choice, meaning that the economic partakers make use of their most preferred alternative in a ranking order. Following this statement, it is clear that the investor would rather prefer a decision-making model that will rank the decisions from best to worst. It is important to notice that in the model one uses, the investor’s choice should not vary by adding or removing an irrelevant alternative (Samuelson & Zeckhauser, 1988).

2.4 Main elements of the property investment decision making process

One of the first stages that the investor will have to go through is the strategic phase where the investor determines what the main goal or aim of the investment would be. This stage will enable the investor to determine where he or she is heading and to envision what the end purpose would be. According to Parker (2014), this stage is called the "*envisioning*" stage and various steps are included in this phase. According to Pyhrr, Cooper and Wofford (1989) as well as Baum (2002) there are a series of steps that can be included in this phase namely: the vision, the style of management, the goals, strategic plan that the organisation will follow, and the objectives set out by the management team.

The second stage would be to measure all the alternatives and determine what the target position would have to be for the acquisition of the properties. This stage according to Parker (2014) is called the "*planning"* phase.

The third stage would be for the investor to transform the potential properties into possible transactions, by evaluating and deciding on the best possible properties for investment opportunity. This stage is called the "*dealing*" stage (Parker, 2014).

The last stage would be the due diligence stage and actual transaction documentation transfer, the implementation of the decisions made in the previous steps, as well as the auditing stage. This stage is called the "*executing*" stage (Parker, 2014).

After formulating the four-stage property investment decision-making steps, Parker (2014) further formulated the four stages and twenty step normative model for decision making in property investment as set out in Table 22.

Table 22: Four stage 20 step property investment decision-making process (Parker, 2014)

STAGE	STEP	STEP	STEP	STEP	STEP
ENVISIONING PLANNING	VISION	STYLE	GOALS	STRATEGIC PLAN	OBJECTIVES
PLANNING	PROPERTY PORTFOLIO STRATEGY	STRATEGIC ASSET ALLOCATION	TACTICAL ASSET ALLOCATION	STOCK SELECTION	ASSET
DEALING	PRELIMINARY NEGOTIATION	PRELIMINARY ANALYSIS	STRUCTURING	ADVANCE FINANCIAL ANALYSIS	PORTFOLIO IMPACT ASSESSEMNET
EXCECUTING	GOVERNANCE DECISION	TRANSACTION CLOSURE/ DOCUMENTATION	DUE DILLIGENCE/ INDEPENDENT APPRAISAL	SETTLEMET	POST AUDIT

Property investment decision-making literature is scarce and is poorly incorporated due to the fact that it is treated as if the investment behaviours are highly structured and formulized (Gallimore, Hansz & Gray, 2000). These viewpoints that investors who are responsible for making the investment decisions, are rational and fully informed is grounded solely in theory (Dubben & Sayce, 1991). Most investors depend on the use of rational evaluation methods to enlighten their decision making, the MPT and capital asset price model (CAPM) (Roberts & Henneberry, 2007).

According to a study done by Roberts and Henneberry (2007), there was noteworthy evidence from the office markets in the UK that the best investment decision-making processes are not the ones that would be made from rational decision-making models (Rowley & Henneberry, 1999). Theory rather suggests that the investor would invest in investments that will result in optimum performance with in the investor's risk/return profile (Roberts & Henneberry, 2007).

The paper written by Roberts and Hanneberry (2007) reasons that the way that investors currently treat the decision-making process is insufficient, and that it does not have the ability to present the real world viewpoint of the process of decision making. It further states that in order to better our understanding of the pattern that property investments follow, the investor needs to have an improved appreciation for the characteristics and nature of the process

required for decision making. The way that the authors thought best to improve the decision-making process is by way of making use of “geographical diversification” as a method of considering the present mismatch between what theory stipulates and the true evidence in respect of the decision-making process (Roberts & Henneberry, 2007).

2.4.1 Normative models

Through a thorough literature review process that the authors Roberts and Hennebery (2007) followed, the following information regarding the normative decision-making model have been formulated. Normative models are used as an attempt to offer the investor a structure within which the investor would be able to make investment decisions that will maximize their wealth. Literature concerning the rational decision-making approaches are conceptualized as a multi-level process. The investor is expected to have expert knowledge and understanding of the nature and structure of the process of investment as well as the property investment market (Roberts & Henneberry, 2007).

The following normative model has been compiled through the combination of different normative decision-making models founded through literature (Eilon, 1969; Farragher & Kleinman, 1996; Feeney, Evans & Clibbens, 2000; Gallimore et al., 2000; Hargitay & Yu, 1993; Jaffe & Sirmans, 1995; Phyrr et al.,1989; Tyebjee & Bruno, 1984). The stages are as follows:

1. The first stage is for the investor to determine the main goals for the investment and setting out the criteria according to which the investor will make their decisions.
2. The second stage is for the investor to determine and formulate a well distinct decision-making approach.
3. The third stage is for the investor to do research and to find suitable properties.
4. The fourth stage requires the investor to do in depth market research to analyse the market conditions.

5. The fifth stage is to determine the risk and return level of the proposed investment option.
6. The sixth stage is the submission of the decision criteria.
7. The seventh stage requires the investor to determine the best investment opportunity through trade-offs between different properties.
8. The eight stage is the project screening of the different properties.
9. The ninth stage is the final investment decision.
10. The last stage consists of the negotiation and post investment activities as well as the resolution of the deal.

In relation to the reality of decision-making models, the following five step integrated normative decision-making model was formulated by Roberts and Henneberry (2007) as proposed by the research done and opinions formulated by the interviewees. The model consists of the following steps:

1. The first step is the phase of formulating the investment goal and setting the precise decision-making criteria in conjunction with formulating the international property database (IPD) benchmarks according to each of the investor's strategies.
2. The second stage of the model suggests that the investors do thorough research about all the appropriate geographical areas but according to the interviews, it is important to only do research about the predetermined geographical areas normally in the mid-city.
3. The third stage incorporates a couple of elements in a single step. This stage consists of conducting an in depth market analysis of the market conditions of each of the properties in order to come to a conclusion to predict the investment outcome. The market analysis conclusion is then used in the application of the decision-making criteria where the different properties are compared with each other and the properties that are most suitable for the investment are then considered in the next stage.

4. The fourth stage is the stage where the interviewees identified the need that the investor should first consult with different parties before making the final decision about the investment. This stage is important due to the fact that the investors are normally an employee of a company and not an independent individual (Baker, 1998).
5. The last stage of the decision-making process is the final selection of the investment and then the negotiation, through post investment activities, of the normative process.

2.4.2 Behavioural decision-making theory/model

The rational decision-making approach has been challenged by the behavioural decision-making theory which focuses on the field of cognitive psychology. The behavioural theory focuses to seek a more accurate view of the decision-making process rather than recommending a theoretical model for decision making. One of the main differences between the rational decision-making theory and the behavioural perspective is that the behavioural theory accepts that decision making takes place in an environment where the markets are imperfect and in a real imperfect investment world (De Bondt, 1998). With regard to the previous statement on imperfect market conditions, the process that one would make use of could therefore not be limited to a fully rational view, but should rather be viewed as markets that are vulnerable to various forms of bias and error (Eiser & White, 2004).

Over the last couple of years, the behavioural perspective has had a big impact on a variety of fields such as management and accounting (Black & Diaz, 1994; Caverni & Peris, 1990; Johnson & Schkade, 1989; Nagata, 1992; Wright & Anderson, 1989; Assere, 1992; Krull, Reckers & Wong-on-Wing, 1993). In contrast, the property researchers have lagged behind to accept the behavioural theory as a valid decision-making model.

Roberts and Hanneberry (2007) noted that in the property investment decision-making context, there is significant evidence that a robust and tremendous important behavioural and social component exists to investment decision-making process. Behavioural decision making focuses more on the features of the decision process than the difference between individual decision makers, so that each participant participates in an imperfect and disordered decision environment, where the investors and individuals are exposed to various forms of inaccuracy and partiality. To name only a few of the behavioural issues that the investors and individuals will have to overcome are: assumptions made about quantitative data; rational, informed decision making being blemished by markets that are imperfect; information that is imperfect; as well as personal based inputs (Roberts & Henneberry, 2007; Gallimore et al., 2000; Gallimore & Gray, 2002).

Another behavioural issue is the use of inductive rather than deductive reasoning processes (Black, Brown, Diaz, Gibbler & Grissom, 1997). The fact that the decision-making environment is portrayed as unproblematic and the ease of orderly decision making, it is contrasting to the dynamic and chaotic decision-making environment in the real world (Gallimore et al., 2000; Roberts & Henneberry, 2007). Experience of the investor is a serious factor that has an impact on the information that is searched, as well as the decisions made after the research has been done (Sah et al., 2010).

According to the article published by Parker (2014), the author formulated various behavioural issues that will have an impact upon the decisions made regarding property investments. The behavioural issues that the author considered as important are as follows:

- The fact that investors make assumptions about “rational, informed, quantitative based decision making” that is blemished by the opinions of the investors as well as “sentiments and judgements” and personal and emotional based inputs (Roberts & Henneberry, 2007; Gallimore et al., 2000; Gallimore & Gray, 2002);

- Reasoning models that are inductive in nature rather than deductive, information and confirmation that is bias as well as “anchoring and susceptibility to feedback pressure” (Black et al., 2003);
- Expectations about decision-making models that they are “unproblematic” and the assumption that decision making can be done “orderly” is blemished by the difficulties of the real world as well as the disorganised, and changing environment of decision making processes (Gallimore et al., 2000; Roberts & Henneberry, 2007);
- The information searched by the researcher as well as the selection behaviour is influenced by the experience of the researcher (Sah et al., 2010);
- The satisfaction of the investor where the investor, after founding the first appropriate property, drops the search and is satisfied without doing thorough research and considering all the options (Gallimore et al., 2000); and
- Investors or decision makers making use of “heuristics and cognitive” methods to simplify the decision making process and in the process exposing the decision to the power of judgements and bias opinions and sentiments (Roberts & Henneberry, 2007).

2.5 Forecasting in property

According to Geltner et al. (2007), the property market analysis could be referred to as “the quantitative and qualitative characterization of the supply and demand side of a specific space usage market that is relevant to a given decision.”

The analysis described by Geltner et al. (2007) is formulated to assist in the following decisions:

1. Determine what the right type of property would be as well as which geographical location will enable the investors to capitalize on the increasing rents;
2. Establish the most feasible type and size of property to develop on the specific site;
3. Determine the correct time to undergo construction and development on the specific

project;

4. Define the correct rental cost as well as what the correct termination date on the certain lease should be; and
5. Establish which stores should be included into new retail outlets and where the new stores should be located.

Certain of the above-mentioned decisions of the market analysis can be highly specific for e.g. the examination of the need for different grade office space developments in a certain location, or generally assessing the overall supply of retail space nationally.

A geographic scope of the different sectors of property namely offices, industrial or retail is specified in the definition of the property market. The different variables that quantitatively characterizes the demand and supply curves in the property industry according to Geltner et al. (2007) can be summarised as the following:

-Rental rates

-Vacancy rates

-The amount of new developments that started

-The amount of new developments that are completed

-The absorption rate of the newly finished developments

In relation to commercial property investments, the forecasting and modelling of rental rates are indicated as a critical process. The forecasting of these rental rates are used to make decisions concerning possible acquisitions and portfolio approaches that are formulated as a result of the forecasting of rentals rates and the accuracy of these models used to capture future movement that is implicitly tested in the market place (Chaplin, 2000).

From the 1980's and the beginning of the 1990's, after the real estate crash that took place in the United Kingdom (UK), an increasing focus has been placed on predictive models with the main aim being to understand the performance indicators and specifically the factors that have

an impact on the rental rates in the instable office sector. The Investment Property Forum (IPF) in Europe regularly conducts surveys of the forecast in property and lists the forecasts to supply a consensus view (Tsolacos, 1998). In order to formulate these forecasts, IPF makes use of the average of individual forecasts on capital growth, rental growth, as well as the total returns per property sector gathered by property funds, property consulting companies as well as fund managers. These surveys results are then published quarterly and are available to all the members who subscribe to the IPF (Chaplin, 2000).

In South Africa, a related situation is evident where the commercial property information is formulated and supplied by SAPOA, and where SAPOA data is mainly supplied through the Rhode Report to subscribers (Viruly, 2013). SAPOA mainly obtains the data that the company uses in the formulation of their reports from the MSCI, as this company is one of the largest data companies with the most accurate information.

One of the most essential elements that the investor will have to forecast accurately, implicitly or explicitly, is the yield. For the forecast to be meaningful to the investor, the forecast will have to not only be “justifiable” but also “intuitive” (Buchner, 2008). The rental’s forecastings are mainly based on “economic relations” and derived from “econometrics” (Mitchell & McNamara, 1997). Mitchell and McNamara (1997) additionally state that the determination of commercial property rental values are determined by residential property prices that are widely converted to determine the rental rates of commercial property.

It is interesting to note that while the residential markets make use of capital value of the properties instead of rental value, the national real house prices change that take place over the long run, signifies a “positive function of real personal disposable income or real financial wealth” (Buchner, 2008).

Clarke and Daniel (2006) formulated an econometric model that is used for the forecasting of change in the residential properties and this model integrates seven different economic variables. According to Clarke and Daniel (2006), the model is capable to clarify “78% of the variations in the South African property growth rate series” (Buchner, 2008).

This includes:

1. Change in the ALSI
2. Take notice of trends in approved building plans
3. Business confidence index
4. Debt to income change index
5. Take notice of trends in approved building plans
6. Business confidence index
7. Debt to income change index
8. GDP changes
9. Any changes in the gold price
10. Any increase or decrease in the motor vehicle sales
11. Any changes in the oil price
12. An increase or decrease in the prime interest rate

The lack of a transparent “theoretical underpinning” to some of the models that are used, decreases the credibility that is attached to the specific forecast. The lack of credibility of a certain model is clearly indicated when a similar macroeconomic, as well as supply side scenarios are used but the market forecast differs greatly. One of the most significant challenges in the property industry is the failure to formulate a hierarchy of models, especially across the different sectors in the property industry (Mitchell & McNamara, 1997).

Predicting Office Returns:

The national or local office market could be better evaluated by investors through understanding the aspects that is motivating office returns. Numerous studies have

analytically confirmed the influence that certain market fundamentals such as absorption and vacancy rate has on the change in office rentals.

2.6 Modelling and forecasting of the property market

The property market forecasting and development of models is a crucial activity in property investment (Mitchell and McNamara, 1997). Numerous studies focused on the property forecasting and modelling issue (Jadevicius & Huston, 2015). Therefore, various models have been developed to enable investors to predict markets (Brooks & Tsolacos, 2010). Harris and Cundell (1995, p.76), stated that the "market crash which traumatised the property industry between 1991 and 1994 has led the institutions in particular to seek greater predictive input to their portfolio management and investment decisions" (Harris & Cundell, 1995). According to McDonald (2002) researchers acted on the crisis subsequent to the 1980's property boom and therefore significant advancement have been made in the property market research and predictions. Tonelli et al. (2004, p.1) stated, "numerous econometric models have been proposed for forecasting property market performance, but limited success has been achieved finding a reliable and consistent model to predict property market movements". Various researchers in the property industry including "McGough and Tsolacos (1995), Wheaton et al. (1997), Barras (2009) and Bork and Moller (2012)", stated that one can predict the property market.

2.6.1 Investigating simple and complex models

Camaniti (2004, p 1992) stated that models are an "invaluable tool". Models enable users to formulate a better understanding of complex systems, permitting the testing for different scenarios, forecasting outcomes, as well as supporting the user in setting certain priorities.

According to Byrne et al. (2010) models have been developed for various of different reasons for example to increase one's understanding on the specific subject and it's processes, to forecast, or explore different scenarios or to provide a platform for decision making.

Notwithstanding all the benefits of models one must understand the concerns regarding the application of these models. STOWA/RIZA (1999) determine through a study that general use of these models will most likely increase the risk of inexpert use which could lead to untrustworthy modelling outcomes. Middlemis et al. (2000) similarly stated that if the model formulated is poorly designed or does not signify the system being modelled properly, all the attempts to formulate the model is practically in vain or probable to produce inaccurate predictions.

Jakeman et al. (2006) therefore states the difficulties that is associated with models. According to the author, the use of models can result in unwanted outcomes due to “limitations uncertainties emissions and subjective choices in models” (Jakeman et al, 2006, p.603). The concerns with the use of models and the application thereof is likewise addressed by Box and Draper (1987, p.424), “essentially all models are wrong, but some are useful”. Resulting in the bold statement of Mellor et al. (2003, p.16) “models offer more hindrance than help”. Following Sterman (2002, p.525) who stated, “all decisions are based on models, and all models are wrong”. According to Sterman, due to models that are only a simplification and a generalisation of the system and with no solid foundation failure is therefore assembled into these models. Furthermore, Sterman is of the opinion that models are generally built on untrustworthy human discernment and understanding. Nevertheless, despite the disapproval, academics including Parker et al. (2002) and Caminiti (2004) indicate that models are assets rather than liabilities and vital components in understanding and predicting complex systems

2.6.1.1 The difference between simple and complex models

Chorley (1967) might have been the first to develop a modelling classification, although within chronological predicting there exist limited direct comparisons of simple and complex models. Further to this statement, the difference between simple and complex remains vague (Buede, 2009). Various academics as well as Armstrong et al. (1984), Armstrong (1986), Wilkinson (1999) as well as Sterman (2002) refers to models that are simple and complex without supplying the reader with "working structural definitions".

According to Batty and Torrens (2001), one can define a complex system as "an entity which is coherent in some recognisable way but whose elements, interactions, and dynamics generates structures admitting surprise and novelty which cannot be defined a priori" (Batty and Torrens,2001, p.2). Holland (1995), defined a complex system as a system that retains its consistency and composition over the period. Allen and Straven (2015) stated that in the instance of socio-economic environment, a simple model is one that has a fixed structure and foreseeable behavior whereas a complex system is one in which a variety of probable structured amendment can appear. Buede (2009) stated that a complex system normally requires higher amounts of data, as well as a larger set of relationships. Chaplin (2009) is of the opinion that complex models, which normally refers to econometric models vary in relation to simple models as the complex models comprises of more variables as well as larger amount of estimates. Brooks and Tsolacos (2000) suggest that "time-series" predictive models namely Exponential Smoothing or Autoregressive Integrated Moving Average (ARIMA) are atheoretical, meaning that these models are not grounded on any underlying economic theory. In contradiction to these models, the more complex models are mainly grounded on specific economic theory relevant to the specific subject.

It is clear from the discussion that the models that are complex analytical models consist of more variables, comprises of a higher amount of estimates and accounts for "attributes of the

external environment" (Jadevicius & Huston, 2015). In contradiction to the complex models the simple models consist of a straightforward set of rules, minimum amount of variables and in which case they are fixed structured and normally make predictions into the future by making use of the historical values of the time series itself (Jadevicius & Huston, 2015).

2.6.1.2 Determining if complex models is able to better predict the future?

The real question that needs to be answered is whether complex structured models are better at forecasting than simple models. It is suggested through the research done by Armstrong et al. (1984) that the comparative accuracy of both simple and complex predictive models advise that simple models produce a comparable degree of accuracy in relation to more complex models. The author came to a similar conclusion stipulating that forecasters should be in favor of the simple predictive models over the more complicated and complex models (Jadevicius & Huston, 2015).

When focusing on the property industry, the predictive literature suggest that most of the simple models such as SR, Exponential Smoothing or ARIMA "outperform" the more complex predictive models, this is inclusive of the economic and VAR techniques, generating highly comparable outcomes (Chaplin, 1999; Newell et al., 2002; Stevenson and McGarth,2003). Newell et al. (2002) is of the opinion that notwithstanding the increase in complexity of the property market modeling methodologies, the simple techniques mostly perform just as well as the more complicated and complex models.

Markidakis (1988) suggest that the main advantages of a simple model is that they avert "noise" that potentially can have an effect on the multiple sources of the more complicated and complex techniques. Pant and Starbuck (1990, p. 442) is of the opinion that "more complex, subtle, or elegant techniques give no greater accuracy then simple, crude or naive ones" (Pant

& Starbuck, 1990). More complex methods might promise to extract more information from data, but such methods also tend to mistake noise for information.

Taking all this into account, Mahmoud (1984) motivate analysts to make predictive models as user friendly as possible and for researchers to place higher emphasis on the advancement and improvement of simpler predictive models or simplifying the more complicated and complex models. Armstrong et al. (2013) promote for “conservatism when forecasting”. Thoreau (1987, p.144) summarized these suggestions very well for more than hundred years ago and wrote: “simplicity, simplicity, simplicity! I say let your affairs be as two or three and not as hundreds or thousands […] simplify, simplify.”

In conclusion, the simple and complex forecasting models yield a state of “equifinality”, meaning that the simple techniques are just as good as the complex models (Jadevicius & Huston, 2015). This study resolved the debate through comparing the forecasting capabilities of five different modelling systems to predict the commercial property markets rent in the UK. This study focused on the “ARIMA, ARIMAX, SR, MR and VAR models” (Jadevicius & Huston, 2015). The forecasting precision of the 169 specifications were then evaluated in a five- year out of sample period, which generated 845 predictions in total (Jadevicius & Huston, 2015). Notwithstanding the fact that the more complicated and complex VAR systems fitted well, this system did not yield accurate out of sample predictions (Jadevicius & Huston, 2015). Whilst there was no agreement between the competing specifications, the evaluations suggest that the less complicated and complex SR and ARIMA models yields more accurate modeling outcomes (Jadevicius & Huston, 2015).

The conclusion can therefore be made that this research calls for the implementation of a “Loconic or Keep It Sensible and Simple” modelling technique (Jadevicius & Huston, 2015). The recommendation therefor for the researchers and analysist is to formulate predictive models that are user friendly and that are easily understandable (Jadevicius & Huston, 2015).

Researchers should focus to make simplicity the center of their predictive modeling techniques and to make “use of human judgement to aid forecast or employ a combination of forecasting approach” (Jadevicius & Huston, 2015).

2.7 Forecasting Office Returns

The local and national office market predictions can be better evaluated when the investors understand what the driving factors for office returns are. Numerous studies have empirically confirmed the impact that fundamental elements such as the change in rental rates, the vacancy rate and absorption has on real estate market. There is limited, if any research done on examining empirically the direct relations between the above mentioned market fundamentals and rental rates achieved. (Dokko, Edelstein, Pomer, and Urdang (1991); Hartzell, Hekman, and Miles (1987), Fogler, Granito, and Smith (1985)).

The author therefore had two objectives with the research firstly to test the effect that the office market fundamentals, specifically the vacancy rate has on office returns, and secondly to make use of the formulated model to make some predications into the future performance of institutional office investments (Sivitanides, 1998).

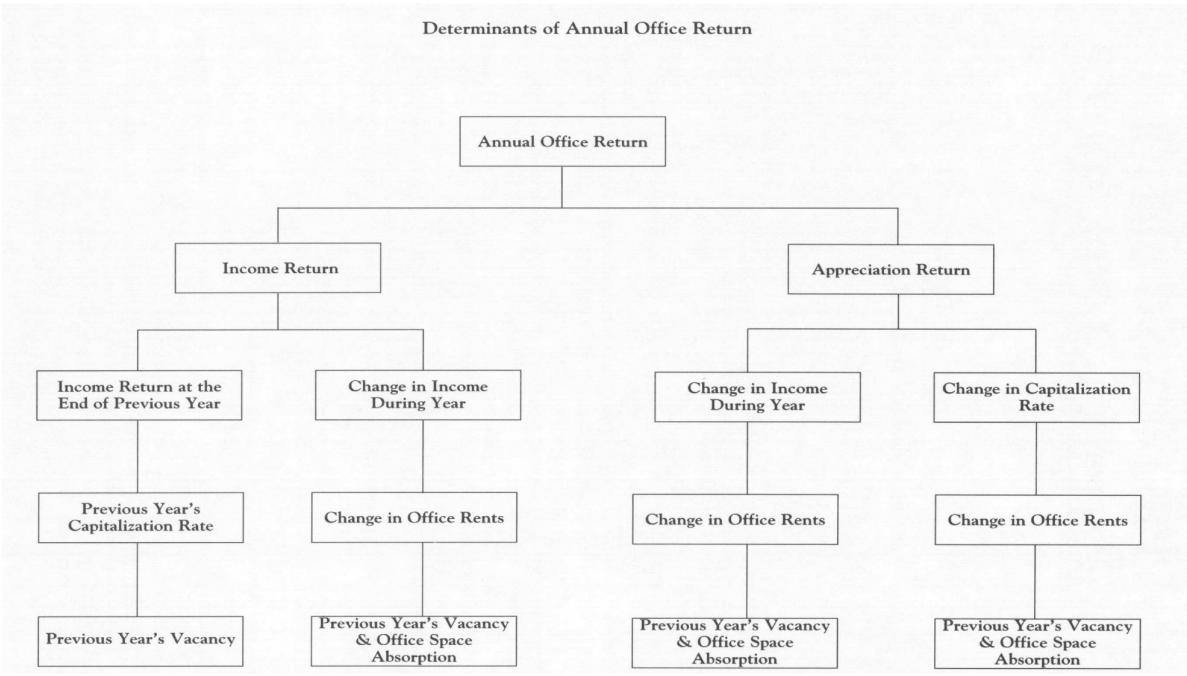


Figure 11: Determinants of Annual Office Returns (Sivitanides, 1998)

Figure 11 indicates the components that have various influences on income return and appreciation return. The figure explains that every years realized income return is calculated by the realized income return at the end of the previous year as well as the change in income during the year that is examined. The market capitalization rate of the previous year is considered equal to the same years income return (Sivitanides, 1998).

The preceding year's market capitalization rate is expected to be reliant on the previous year's predominant vacancy rate (Sivitanides, 1998). The foundation of this statement is that the investors observe the vacancy rate as a thorough indicator of the strength of the market and therefore can be seen as an indicator for growth in rentals and potential risks (Sivitanides, 1998). The variables should positively relate to one another due to the perceived risk in leasing the property as well as the risk associated with plummeting rentals and the value of the property may be higher in times where the vacancy rate is very high, requiring the investors to motivate higher capitalization rates (Sivitanides, 1998). There is also the possibility that these two variables relate negatively with one another, assumed that buildings that currently have high vacancy rates have larger potential for income increases if these units gets fills and therefor one can assume that investors will purchase these properties at a lower capitalization rate (Sivitanides, 1998). The positive relationship of these two variables have been validated empirically through analysis of average metrowide transaction, both cross-sectionally and intertemporally. Indication that the specific risk concerns associated with high vacancy rates are solider than the result of income growth expectation (Sivitanides, 1998).

The change of income during the period under consideration is also a determinant of income return (Sivitanides, 1998). This change in income ought to be motivated through the change in office market rentals, since the most important income component earned by properties is rental income (Sivitanides, 1998).

Only a part of every years market rent change is revealed in the properties income change. This is due to the fact that almost all of the institutional office properties are rented by multiple tenants with lease periods of three, five and even sometimes ten or twenty years (Sivitanides, 1998). Due to these multi-year rental contracts, the properties' income is affected by market rent changes only as lease expire and rollover to the new market rent (Sivitanides, 1998). Even though the change in annual income only represent a small portion of the change in market rent, these two variables should greatly correlated if the proportion of leases rolling over each year does not vary significantly (Sivitanides, 1998). Thus change in the average income return are motivated by the change in the average office market rentals (Sivitanides, 1998).

The change in office rents was considered as a function of the previous year's vacancy and the same year's office space absorption according to Wheaton and Torte (1994) and Sivitandides (1997). Market rentals are formulated through the negotiation process between the landlord, whose reservation rentals are determined by lease – up time expectations, and potential tenants. There is a negative correlation between the lease up period and negotiated rental rates, the longer the lease up period the lower the negotiated rental rates (Wheaton and Torto (1994); Sivitanides (1997)).

Figure 11 clearly indicates that the determinants for one of the main components of yearly office returns namely appreciation return is calculated through the change in income earned by the building and the change in the capitalization rate (Sivitanides, 1998). This hypothesis are formulated from the income capitalization methodology that states that a property's

transacted value at the end of a certain period is normally equal to the ratio of the buildings Net Operating Income (NOI) divided by the dominant market capitalization rate (Sivitanides, 1998). The appreciation yield could actually be stated as the change in the value of the property during the year under consideration (Sivitanides, 1998).

The change in the income earned form the specific property should be determined by the change in market rentals (Sivitanides, 1998). The change in the capitalizations rate should therefor also be determined from the change in office rentals (Sivitanides, 1998). The though process behind this statement is that should the rentals be decreasing, then this will trigger a positive effect on the market capitalizations rate, due to the risk that increases (Sivitanides, 1998). It is therefore evident that these two variables have a negative correlation with one another. For a specific property where the rentals decrease and the capitalizations rate increases, the property price should therefor also decrease as well as the realized returns (Sivitanides, 1998).

One could therefore argue that the capitalizations rate could be considered as a function of prevailing vacancy rates; the change in capitalizations rate should be therefore articulated as a function of the change in vacancy rates (Sivitanides, 1998). Vacancy rate may stay at high levels and therefore results in minimal change, there is thus a resistance in making use of change in vacancy rate as opposed to change in rentals (Sivitanides, 1998). It is highly possible that such tenacity may cause negative rental rates that could increase the risk associated with the office investment, this could therefore result in an increase in the capitalization rate and causing a decrease in the property values (Sivitanides, 1998). The negative correlation between change in office rentals and office capitalisation rates have empirically been validated by Sivitanidous and Sivitanides (1999).

The results of this study firmly suggest that the lagged-vacancy rate is a key predictor of office returns and is in favour of the proposal that there exists a negative correlation between the

lagged – vacancy rate and the return, and not a linear relationship (Sivitanides, 1998). The studies suggest that the insight that is gained from this study, can assist practical investors to make more enlightened decisions in a number of different ways (Sivitanides, 1998). Firstly, proven that the change in the vacancy rate leads changes in office returns, investors now have the advantage to gain a very good insight of the extent and direction of the change in the average return through measuring the direction and extent of the changes in the national vacancy rate in the previous year (Sivitanides, 1998). Secondly, investor can make predictions of the office market through the development as well as finding other forecasts (Sivitanides, 1998). The investors can make use of the developed or obtained forecast to determine their "return implications", with the purpose "to make better asset- allocation decisions" (Sivitanides, 1998). Thirdly, in the unavailability of the "return forecasting models" one can make use of vacancy and office employment forecast to produce return forecast for a particular metropolitan market, to indicate markets suitable for future investments (Sivitanides, 1998).

2.8 Indicators for International Direct Office Real Estate Returns

Conventionally, direct office real estate yields have been studied by predictive models for rents in one country or one specific region (De Wit & van Dijk, 2003). Historically empirical studies noted that rents are probable to respond to economic growth as well as the availability of space (De Wit & van Dijk, 2003). Almost all of the studies indicates that changes in the supply and demand curve results in the change in rental rates (see, for example, Giussaini and Tsolacos,1993; Rosen, 1985; Wheaton, 1987; Gardiner and Henneberry, 1988, 1991; Wheaton and Torto, 1988). Other research studies indicate the strong relationship that exist between real estate returns and inflation (see for example, Hartzell et al., 1987; Wurtzenbach et al., 1991). Another known documented finding indicates that rent gradually adjust to changing economic environments as a result of the regulation and other market inefficiencies (see, for example, Sivitandes, 1997). The researchers investigated the factors that influence any change in rental rates and office prices (De Wit & van Dijk, 2003). The researcher

endeavored to determine the most significant indicators of these progressions and to comprehend the key implications for the investors in real estate (De Wit & van Dijk, 2003). For this reason, the researchers utilized real estate and economic growth as demand and supply factors (De Wit & van Dijk, 2003).

In Asia and Europe, the Gross Domestic Product (GDP) as well as the change in the employment level measure economic growth. In the United States, economic growth is measured by the changes in the gross metropolitan product as well as in the employment level on a metropolitan statistical level (De Wit & van Dijk, 2003). The variables in real estate are change in stock as well as the vacancy for the key office districts in Asia, Europe and the United States (De Wit & van Dijk, 2003). The real estate data for Asia and Europe was gathered from Publications by Jones Lang LaSalle (De Wit & van Dijk, 2003). Torto Wheaton Research is the source of the US office information, in combination with National Real Estate Index information (De Wit & van Dijk, 2003). The researchers expanded the literature by analyzing total return, “which is the sum of the change in capital appraisals and the rent as a percentage of the last price” (De Wit & van Dijk, 2003).

The researchers depart from prior Studies by looking at the real estate market in a worldwide setting, as opposed to for a solitary nation or area (De Wit & van Dijk, 2003). The study assess the essential components of office costs and rental rates on a board of 56 quarter and 46 areas in Asia, Europe and the United States (De Wit & van Dijk, 2003). The explanation behind extending the research to the whole world is twofold (De Wit & van Dijk, 2003). To begin with, capital markets are getting increasingly global, in this way expanding the significance of worldwide real estate analysis instrument (De Wit & van Dijk, 2003). Secondly, economic growth and supply factors demonstrate a substantial scattering in a worldwide setting than in a local setting (De Wit & van Dijk, 2003). This adds to the intensity of observational tests (De Wit & van Dijk, 2003). The innovation in the researchers approach is the utilization of a dynamic panel- data model (De Wit & van Dijk, 2003). The dynamic panel- data Model can be

understood as a limited adjusted model for the dependent variable, which may be changes in rents, as well as changes in capital evaluation and aggregated return (De Wit & van Dijk, 2003). The model can likewise be understood as a model in which current informative factors influences returns as well as illustrative factors of past periods (De Wit & van Dijk, 2003). The researchers measure the outcomes from the dynamic panel-data model with static terms (De Wit & van Dijk, 2003).

The principal discoveries made by the researchers are that economic growth prospects and the gap between new supply and demand conclude the virtual desirability of office space as an investment vehicle (De Wit & van Dijk, 2003). The researchers' analysis demonstrates that the GDP/GMP and inflation have a positive impact on the real estate prices, whereas on the contradictory, changes in the unemployment and vacancy rates have an adversely effect on prices. Rentals rate correlate positively to changes in the GDP/GMP in a worldwide analysis (De Wit & van Dijk, 2003). An increment in office stock, vacancy rate, and unemployment rate have a negative impact on rents (De Wit & van Dijk, 2003). Vacancy rate and total return have an inverse correlation (De Wit & van Dijk, 2003). The faster the growth in GDP/GMOP, the greater the total return (De Wit & van Dijk, 2003). Similar holds for the correlation amongst total return and inflation (De Wit & van Dijk, 2003). The contrasts between the discoveries from the static and dynamic models demonstrate that it is vital to remedy for the stickiness that is generally found in real estate rental rates and property prices (De Wit & van Dijk, 2003).

Financial markets in the global context, is normally influenced positively by new innovating information technologies as well as cross boarder merges in the financial sector (De Wit & van Dijk, 2003). The globalization trends motivate more noteworthy enthusiasm for transnational investments and as an outcome cause increases in international capital flows (De Wit & van Dijk, 2003). Particularly in Europe financial investors look past their national outskirt for fascinating investment opportunities (De Wit & van Dijk, 2003). The main reason investors consider investing globally is mainly the chase for higher returns and diversification (De Wit &

van Dijk, 2003). Without a doubt, the globalization trend in the financial market expands enthusiasm for “transnational investments within direct real estate markets” (De Wit & van Dijk, 2003). The globalization trend also create certain significant concerns for real estate owners, investors and advisors. Most importantly the amount of potential investment sites that the researcher will now have to consider increases (De Wit & van Dijk, 2003). Secondly, the specific factors that the researcher will now have to take into consideration are now no longer linked to their home market (De Wit & van Dijk, 2003). These factors make the investment process very complicated as well as the roll of the advisors. Therefore, any research conducted with the purpose of discovering the relation between “economic growth, district specific factors and commercial property market performance on a global level” is there for highly essential (De Wit & van Dijk, 2003).

The following states the hypothesis that the researchers were interested to test on a global level:

- “A negative relation exist between change in rent, change in capital value, total return, and changes in the gap between supply and demand. This gap is measured by vacancy rate” (De Wit & van Dijk, 2003).
- “A negative relation exist between change in rent, change in capital value, total return, and change in supply of office buildings. Supply is measured by change in stock” (De Wit & van Dijk, 2003).
- “Demand variables are positively related to real estate rent, capital value, and total returns. Consequently, the proxies for demand GDP/GMP, and unemployment rate are, respectively, positively and negatively related to rent, capital value, total return” (De Wit & van Dijk, 2003).
- “Change in inflation is a determinant of short-term adjustments in prices within the real estate market. Short-term price mechanism is revealed by the positive effect of change in inflation on change in rent. Where is the long-term price is influenced by the level of

inflation. The long-term price make is revealed by change in capital value and total return" (De Wit & van Dijk, 2003).

- "Returns in real estate markets are persistent and a significant positive relation exist between current return and return in the previous period" (De Wit & van Dijk, 2003).

Regarding the hypothesis of the study, it can be concluded that change in GDP/GMP positively correlates with changes in real estate prices (De Wit & van Dijk, 2003). Change in inflation positively correlated to change in real estate prices in a global context (De Wit & van Dijk, 2003). Changes in the unemployment and vacancy rate correlate negatively with real estate prices. The change in the real estate price is also affected by the change in stock. Changes in the GDP/GMP in a global context positively correlated with rental rates (De Wit & van Dijk, 2003). The change in rental rates are negatively influenced by the following elements unemployment, vacancy rate, and the change in stock (De Wit & van Dijk, 2003). Change in inflation appears to have "no direct influence on rents" (De Wit & van Dijk, 2003). The change in the price of an office building is highly related to the change in the value of the former period (De Wit & van Dijk, 2003). There also exist a strong correlation between rental rates and rental rates in previous quarters (De Wit & van Dijk, 2003). The hypothesis stated in this study can therefore be accepted: return in real estate markets are persistent and there is a significant positive relation between current return and return in the previous period (De Wit & van Dijk, 2003). The conclusion overall can therefore be made that change in vacancy rate and change in unemployment rate are the most significant factors to take into consideration in a "long term return analysis" on a global level (De Wit & van Dijk, 2003).

2.9 A review of the REEFM - and FDW models, analysing the capital and space markets in South Africa

Weimer (1966) recorded the first study regarding the difference between capital and space markets. Hendershott and Ling (1984) firstly conducted the incorporation of the space and

capital markets. Corcoran (1987) further built on the study by formulating an illustration of the space market, separately although “interdependent” from the capital market to differentiate the long and short “supply of space”. Fisher (1992:167) also developed a model similar to the one done by Corcoran to demonstrate where the “equilibrium” exists among the long- and short-term state of the capital and space markets. The model was later further developed by DiPasquale and Wheaton (1992) and Fisher, Hudson-Wilson and Wurtzebach (1993), called the “diagrammatic model” by Viezer (1999:504). According to Archour-Fischer (1999:33), the “Fischer-DiPasquale-Wheaton model” is a sophisticated image specifically based on the property market, incorporating the different markets in the building industry.

Boshoff (2013) considered the different models and theories available “surrounding the distinction and interdependencies between space- and capital markets”. Boshoff (2013) firstly discussed the theory of space and capital markets with reference to the REEFM and FDW models. The distinction between the two models is that the FDW model provides a graphic illustration of the property markets actions. The REEFM focuses on predicting these actions through statistical values and econometrics to be able to understand specific variables given. Being the more in-depth analysis, Boshoff (2013) was the first to test this model’s relevancy in South Africa.

Boshoff (2013) tested each of the equivalences that the REEFM model was built on, and only one did not have any insignificant numerical value regarding decision-making behaviour in the office sector (this is open for further research). The hypothesis according to the calculated data of all the combined equations was then individually tested. The hypothesis at each equation is therefore tested according to the calculated data from all the equations combined. The combined data set could be accepted due to the relevancy of each of the equations (Boshoff, 2013).

Summary

It is clear from the literature review that property has a medium to low risk rate as well as a moderate total return, and a high current yield with a low growth rate, and is a preferable vehicle for inflation protection (Geltner, Miller, Clayton & Eichholtz, 2007). Hargitay and Yu (1993) agrees with this statement and is of the opinion that one of the advantages of investing in property is the low to moderate levels of exposure to risk with a long-term return on the investment. Stipulating that property is a good investment vehicle and increased focus is placed on the investor to make use of the best decision-making model. In order for the investor to come to an accurate conclusion in terms of the risk and return of the investment, the investor will have to have access to market transparency, a strong research base, as well as large volume of high quality data (Hargitay & Yu, 1993). This statement therefore validates the reason for choosing the property industry as the study field for this thesis.

Due to property being increasingly viewed by investors as a good investment asset class, there is an increasing focus on the performance of property as an investment asset. The necessity of assessment of the future performance and the investigation of the historical performance is recognized and addressed as very valuable by large investors (Adair et al., 1994).Theory suggests that the investor would invest in investments that will result in optimum performance with in the investor's risk/return profile (Roberts & Henneberry, 2007). Therefore the forecasting and modelling of rental rates are indicated as a critical process. The forecasting of these rental rates are used to make decisions concerning possible acquisitions and portfolio approaches that are formulated as a result of the forecasting of rentals rates and the accuracy of these models used to capture future movement that is implicitly tested in the market place (Chaplin, 2000). It is clear for the statements that rental rates should be considered as one of the key performance indicators in the model formulated by the researcher.

Through the study done by Jadevicius & Huston (2015) it is clear that forecasters should be in favor of the simple predictive models over the more complicated and complex models (Jadevicius & Huston, 2015). The recommendation therefor for the researchers and analysist is to formulate predictive models that are user friendly and that are easily understandable (Jadevicius & Huston, 2015). Researchers should focus to make simplicity the center of their predictive modeling techniques and to make “use of human judgement to aid forecast or employ a combination of forecasting approach” (Jadevicius & Huston, 2015). The researcher therefore endeavor to formulate a model that will consist of KPI’s where the data of these KPI’s is readably available and that can be used in different countries without taking into account specific economic and social factors.

The results of this study firmly suggest that the lagged-vacancy rate is a key predictor of office returns and is in favour of the proposal that there exists a negative correlation between the lagged – vacancy rate and the return, and not a linear relationship (Sivitanides, 1998). The change in the vacancy rate leads changes in office returns, investors now have the advantage to gain a very good insight of the extent and direction of the change in the average return through measuring the direction and extent of the changes in the national vacancy rate in the previous year (Sivitanides, 1998).

The hypothesis stated in this study can therefore be accepted: return in real estate markets are persistent and there is a significant positive relation between current return and return in the previous period (De Wit & van Dijk, 2003). The conclusion overall can therefore be made that change in vacancy rate and change in unemployment rate are the most significant factors to take into consideration in a “long term return analysis” on a global level (De Wit & van Dijk, 2003). It is clear that change in vacancy rate is a very import KPI to include in the formulated model as well as the fact that historical data have a positive relation between current return, validating the reason for making use of historical data to predict future returns in this study.

CHAPTER 3: METHODOLOGY

The methodical course of action that was followed to collect and analyse the data is described in this chapter. This section explains the research design process that takes into account firstly the research philosophy, secondly the research approach, thirdly the research methods and lastly the data collection process.

3.1 Research design

3.1.1 Research philosophy – Interviews

The selection of a particular philosophy for a research study is impacted by practical implications. In quantitative research, one normally makes use of positivist research philosophies and in qualitative research, one makes use of interpretivist research philosophies. The semi-structured interviews in this study are classified as interpretivism research philosophy (Saunders, Lewis & Thornhill, 2012). This type of research philosophy normally consists of a small sample, as well as collecting in-depth data.

One of the main advantages of the interpretivism research approach is that the primary data obtained through this type of research philosophy could be related with a high level of validity for the reason that data in these types of studies have a tendency to be honest as well as trustworthy (Collins, 2010).

3.1.2 Research philosophy - Model

The data gather from the MSCI can be defined as a positivist research philosophy. Positivist philosophy depends on quantifiable interpretations that lead themselves to statistical analysis. One of the main characteristics of positivism studies is that the researcher is independent from

the study, meaning that the research is purely objective and that there are no provisions for human interest within the study (Crowther & Lancaster, 2008).

The data gathered by the MSCI is strictly independent and objective. The nodal data gathered in terms of performance of that specific node at a specific point in time is calculated and what that specific performance amounts to, that is the value used by the researcher.

3.1.3 Research approach

3.1.3.1 Qualitative research

The researcher refined the broad set of topics to be covered and generated an appropriate set of questions that are unique to this study's research topic of the KPIs that could be used to predict the best performing office nodes in South Africa. Qualitative research, being the semi-structured interviews, are used to support the findings of other sources, such as previous literature studies (Openakker, 2006).

3.1.3.2 Quantitative research

A quantitative, non-experimental research method was used in order to gain numerical data that can be transformed to useable statistics. "It is used to quantify attitudes, opinions, behaviours and other defined variables" (Wyse, 2011). The data gathered by the MSCI forms part of the quantitative research of this study. This data will statistically be used to predict the future best performing office nodes by referring back to the historical data.

3.1.3.3 Strategy of inquiry

Belli (2009) makes a distinction between two different types of quantitative strategies of inquiry, specifically experimental and non-experimental. The non-experimental research is

research that does not manipulate any of the attributes in the natural state (Belli, 2009). In this study, the nodal data gathered from the MSCI is classified as non-experimental due to the quantitative variables that are not controlled in any manner and probability sampling is not employed (Belli, 2009).

3.1.3.4 Cross-sectional

The semi-structured interview data is regarded as cross-sectional since all the data gathered from the interviews was collected at a single time, to determine the relationship between the answers of the respective interviewees. There are a number of advantages and disadvantages of cross-sectional studies. According to Levin (2006), the advantages comprise of the fact that a variety of risk factors and outcomes can be analysed. It is efficient in terms of time and money and there is no loss of participants due to the regular follow-ups required. According to Levin (2006), a disadvantage of the cross-sectional design is that if the interviews took place at a different time, the results might have been quite different. Another disadvantage would be that it is challenging to formulate a casual conclusion.

3.1.3.5 Longitudinal design

The data gathered by MSCI to formulate the model is regarded as longitudinal. In the model formulated, the changes of the nodal data over time is very important. The changes of the variables over time enables the researcher to predict the best performing office nodes in the future.

3.1.4 Research method

3.1.4.1 Target population- Interview

The target population consists of highly skilled and experienced professionals in the property industry in South Africa. Highly skilled professionals are employees that have the capability of carrying out duties with responsibility, normally have a supervisory skill and are able to form good independent judgements (Olckers, 2011).

For a person to be included in this study, he/ she had to hold at least a managerial position in a company in the commercial property industry. The researcher only included professionals who were either a Chief Executive Officer (CEO), Regional Asset Manager, Director, Chairman or Executive Head at a company in the commercial property sector.

3.1.4.2 Sampling method – Interview

Non-probability samples were used as the population was difficult to find and preliminary studies had to be done in order to develop the interview schedule (Maree, 2010). For this reason, the researchers will apply two types of non-probability techniques, namely criterion and convenience sampling. Criterion sampling refers to the decision of including certain respondents based on the characteristics of the study, whereas convenience sampling refers to the selection of respondents that are readily available (Berg, 2004; Maree, 2010; O'Neil, 2014).

The criteria used in this study included specialisation in the investment environment, office sector specialists and other professions. This assisted with the selection of suitable respondents who have experience in their fields and are able to give meaningful insights into the research topic.

Convenient sampling was employed by the researcher since the sample comprised of participants who were accessible, convenient and the researcher had access to them through networks and relationships.

3.1.4.3 Sampling method - MSCI Nodal Report

When considering which set of nodal data to use for the purposes of this study, the researcher decided on IPD data due to all the interviewees making mostly us of this data source and perceive this data as being the most accurate. MSCI (Morgan Stanley Capital International) “is a company that constructs a variety of indices covering many different asset classes, countries and regions”. MSCI make use of the IPD data to formulate and publish an annual nodal report. This annual nodal report is used in this thesis.

The main reason for selecting MSCI is because this research is mainly focused on the performance indicators in the office investment industry and MSCI is one of the largest suppliers of accurate data in relation to the drivers.

It is very interesting to note in Figure 12, that the South African IPD index coverage in relation to the total market in South Africa, is almost 60%.

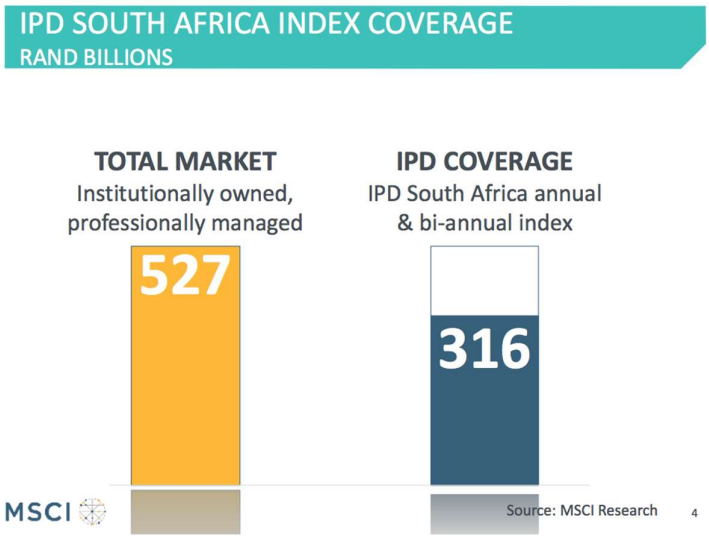


Figure 12: IPD South Africa index coverage in Rand billions (MSCI, 2013)

The MSCI coverage is R316 billion and the total market in South Africa is R527 billion. The accuracy of data is mostly linked to the amount of coverage that the company can offer the clients.

The coverage, as of the end of 2015 consists of:

- 14 Number of investments
- 1524 Number of assets
- 19.5 million square metre floor space of coverage
- R291.6 billion gross capital value of real estate
- 65% of coverage of domestic professionally managed market

The MSCI has, for more than 40 years, helped the world's leading investors to develop and manage better portfolios through the "MSCI-research based indexes and analytics" (MSCI, 2013). The clients of MSCI data is dependent on the offerings in order to enable the investor to have insight into the drivers of performance as well as the risk involved in the portfolios of

the respective companies. This company also supplies investors with information regarding broad “asset class coverage” as well as “innovative research” (MSCI, 2013).

The MSCI is a self-governing supplier of “research-driven insights and tools” specifically for established investors. The company has intense knowledge and expertise in the field of performance indicators as well as risk that is based on not only real-world experience but also academic research experience.

The company’s comprehensive product line enables the company to support the different clients’ needs and to supply them with a continuous outlook on the performance measures as well as risk involved in the investments across all the major asset divisions (MSCI, 2013).
The company also enables its users a flexible business adaptable model, this allows the clients to make the selection of individual products and services that the specific company needs and makes it possible for the user to incorporate the MSCI services into the companies’ own investment models (MSCI, 2013).

MSCI provided all the data for the respective KPI’s used in this study. The data was gathered from the MSCI South Africa Nodal Reports for the period being 1995 to 2015.

It is important to have a clear understanding of the units that the data was measured in for all the KPI’s used in the regression model.

- Change in Vacancy Rate (CVR) - Measured through the percentage of change year to year (MSCI, 2013). “Calculated as both the sum of market rental value in vacant units as a percentage of total market rental value excluding development units, and the sum of vacant floor area in completed properties as a percentage of total lettable floor area” (MSCI, 2013)

- Total Return (TR) – Measured through percentage change per annum. The definition of total return as set out by MSCI is: Total Return is calculated as the change in capital value, less any capital expenditure incurred, plus net income, expressed as a percentage of capital employed over the period concerned. The sum of capital growth and income return for any single month (MSCI, 2013).
- Capital Growth (CG) – Measured by the percentage change per annum. The definition of capital growth as set out by MSCI is calculated as the change in capital value, less any capital expenditure incurred, expressed as a percentage of capital employed over the period concerned (MSCI, 2013).
- Change in size of node (CSoN) – measured in million square meter in comparison with the previous year (MSCI, 2013).
- Change in Gross Rentals (CGR) – measured as the average monthly R/sqm in comparison with the previous year's average monthly R/sqm. The definition of Change in Gross Rentals growth as set out by MSCI is the rent due from the tenants calculated on a daily basis, taking into account rent reviews, vacancies and rent-free periods but not arrears of payment (MSCI, 2013).

In order to determine the cities, and the nodes in the different cities, that will be used from the MSCI data, the researcher looked at the different cities based on their ranking in terms of total office GLA.

Table 23: IPD largest nodes according to GLA (IDP, 2015)

Ranking	City	GLA
1.	Johannesburg and Environment	9 372 477 m^2
2.	Pretoria and Environment	7 183 390- m^2
3.	Cape Town and Environment	2 361 834 m^2
4.	Durban and Environment	1 364 695 m^2

Each of the existing office nodes located in the cities mentioned in Table 23, identified by SOPOA, will be included in this research. The reason for making use of GLA is to make the study more relevant. Office investors would mainly invest in the biggest cities in the country.

3.1.4.3.1 The main cities used as well as the nodes in the city are as follows:

Johannesburg and Environment - Johannesburg CBD, Braamfontein, Parktown, Hyde Park, Rosebank, Sandton CBD, Sandton Environments, Woodmead, Bryanston, Rivonia/ Edenburg, Houghton/ Illovo, Bedfordview, Sunninghill/ Fourways and Midrand.

Pretoria and Environment - Pretoria CBD, Hatfield/ Hillcrest, Arcadia/Sunnyside, Pretoria Eastern Suburbs and Centurion.

Cape Town and Environments - Cape Town CBD, Durbanville/Bellville, Claremont/ Rondebosch and other Cape Town.

Durban and Environments - Durban CBD and Durban Decentralised.

3.1.4.4 Sample size - Interviews

The researcher conducted 18 interviews with highly successful commercial property specialists being at least in an asset manager position in the respective leading property companies to enable the sample to be homogeneous. The property specialists were chosen because of their expertise in the subject matter and with the view that the asset manager will have the same goals and opgectives as the CEO's. The researcher achieved saturation at the 15th interview but in order for the researcher to ensure that the point of saturation was achieved, the researcher went beyond the point of saturation to ensure that no new main concepts emerged in the interviews that followed.

Guest, Bunce and Johnson (2006) stated that saturation frequently occurs between more or less 12 participants in homogeneous groups. Crouch & McKenzie (2006) also suggest that a sample size smaller than 20 participants in a qualitative study enables a researcher to build and sustain a close relationship and therefore increases the "open" exchange of information.

3.1.4.5 Sample size – Model

The possibility exist that a more accurate representation of the characteristics of the factors under consideration increases as one's sample size increases (Cronbach, Gleser, Nanda & Rajaratnam, 1972). The advantage of larger samples is that it normally also decreases the estimation error and increases the power of the study, meaning that it decreases the possibility of rejecting a false null hypothesis (Van Voorhis & Morgan, 2007). Comrey and Lee (1992) stated that in conducting factor analyses, a sample size of 100 is regarded as poor, 200 is fair, 300 is regarded as good and 500 is very good. The sample size of the nodal data gathered by the MSCI was N= 3500. The sample size in this study is regarded as very good. This means that of the four cities used in this research, a total of 3500 data points were gathered for the respective 26 nodes. The data gathered by the MSCI consist of nodal data from the year 1995 to 2015.

3.1.4.6 Research participants - Interview

Only 18 professionals participated in this study after 33 requests for participation were circulated. The response rate of 54.54% was thus obtained. Table 24 indicated the characteristics of the participants and it is clear that the sample consisted out of 100% male participants. With respect to ethnicity, the majority of the sample were white (88.89%). The home language of the majority of the sample were English (72%).

Seven out of the eighteen participants of the sample are CEOs of companies in the property industry. One of the eighteen participants is the Chief Investment and Development Officer of a company in the property industry. One of the participants is the Managing Director for a property company. Four of the participants are Directors at leading companies in the property industry. Three of the participants are Regional Asset Managers. One of the participants is Executive Manager in a company in the property industry and one of the participants is the Regional Head at a company.

These participants in the survey are identified as key decision makers in respect of office investments. Depending on the size of the company and the expertise within the company, it is foreseeable that decision makers could have different seniority levels, meaning that for example the Chief Investment and Development Officer of a large listed property company reports to the CEO of the South African property company, who intern report to the group CEO. Neither of the two CEO's has the focus to make in principal property investment decisions and rely in this regard on the Chief Investment and Development Officer's expertise. In smaller companies, this decision could rest with the CEO. One could further assume that irrespective of the interviewees' seniority the opinions of the interviewees would be in line with the company's board approved strategy.

Table 24: Characteristics of the Interview Participants

Item	Category	Frequency	Percentage
Gender			
	Male	18	100%
	Female	0	0%
Race			
	Black	1	6%
	White	16	89%
	Coloured	1	6%
Home Language			
	English	13	72%
	Afrikaans	4	22%
	Other	1	6%
Job Title			
	CEO	7	39%
	Chief Investment and Development Officer	1	6%
	Managing director	1	6%
	Director	4	22%
	Commercial office Executive	1	6%
	Regional Head	1	6%
	Asset Manager	3	17%
Role			
	Developer	3	17%
	Investor	15	83%
City			
	Johannesburg	8	44%
	Cape Town	7	39%
	Pretoria	2	11%
	Durban	1	6%

3.1.5 Data collection

3.1.5.1 Interviews

The data collection process can be described as the manner in which information is gathered. The choice of method is influenced by the data collection strategy, the type of questions asked and variables for which data is collected, the level of accuracy required, the collection point, and the skill of the enumerator. Links between a variable, its source, and practical methods for its collection can help in choosing appropriate methods.

The study is based on a qualitative approach rather than quantitative. Reasons for a qualitative approach was to optimise the validity of the data and to also improve the data analysis method. The quantitative research is also aimed at valid in-depth practical variables, rather than qualitative motives and generalizations. For these specific reasons, 18 informal interviews were conducted with selected experienced professionals specialising in the field of office investment decisions. The research questions were asked to 18 top management executives at large investment and development companies in Pretoria, Johannesburg, Durban and Cape Town.

Face-to-face semi-structured interviews were conducted to collect the required data and this served as the main method of information collection. This type of interview yields the highest response rate in survey research (Maree, 2010; Openakker, 2006). According to Shneiderman and Plaisant (2005), interviews can be highly productive due to the fact that the interviewer can pursue specific matters of concern which could result in more focused and helpful suggestions to the specific study. The most important advantages of the interview method of collecting data are that direct contact with the professionals in the specific study field often leads to specific, useful suggestions. Secondly, interviews are able to obtain detailed

information and thirdly, a small sample size is needed to collect rich and comprehensive data (Shneiderman & Plaisant, 2005).

The interviews are aimed at collecting information concerning what professionals in the property industry regarded as the KPIs that could be used to determine the best performing office nodes in the future. The interviews also aimed to determine what models or tools are currently being used by the professionals to make investment decisions in the office sector. Recordings of the interviews were made to ensure that ethical standards were complied with as it minimised opportunities for data tampering or misrepresentation.

During each interview, open-ended and non-leading questions were asked. The researchers' also used non-verbal cues, namely eye-contact and maintaining appropriate postures. Elaboration probes were applied to acquire the full picture by asking respondents to give examples or elaborate on answers where necessary. The ten open-ended interview questions are attached in Appendix A.

3.1.5.1.1 Formulating the regression model

The multiple regression roadmaps that assisted the researcher to develop a regression model that will deliver the required outcome necessary in order to formulate the correct model is set out in Annexure E.

3.1.5.2 The definition of performance for the purpose of this study

The manner in which performance will be determined, defined, as well as calculated in the study needs to be clearly determined and set out. According to the MSCI, the most recognized manner to determine performance is by measuring the total investment return over a specific period. The total return includes both the income and capital components that is calculated as

the percentage (MSCI, 2013). For the purpose of this study, total return will be used as the measure of performance against which the other KPIs will be examined.

CHAPTER 4: RESULTS

4.1 Introduction

The purpose of this study was two-fold. Firstly, to understand through interviews with highly successful Real Estate Practitioners what's considered to be the top 10 key performance indicators to predict the best performing office nodes in future as well as what models and tools these professionals make use of to currently predict the best performing office nodes. Secondly, to make use of the top key performance indicators to formulate a model that will enable any investor to predict the best performing office node in the future with readably available data.

As mentioned earlier the researcher conducted 18 interviews with highly successful commercial property specialists being at least in an asset manager position in the respective leading property companies. The researcher ought to find out what models are there that the practitioners are comfortable to use and to establish if there is a lack of such a model to provide them with one that will see to all the needs raised in the interviews.

The researcher asked questions relating the effectiveness of the current investment decision-making models as well as what the top 10 key performance indicators (KPI's) are and if the investors make use of ranking tools to indicate what node outperforms the rest of the nodes. This chapter states the results of the interviews, the model formulated through the results of the interviewees as well as testing the model formulated through the regression models in a 1-, 3- and 5-year period.

The researcher made use of the results of the interviews to formulate a model that will enable the investor to predict the best performing office nodes. This model was then tested over a 1-year, 3- and 5- year projection period to establish the projection that is the most accurate.

4.2 Interview

The following section gives a brief outline of the results of the interview process, were a full discussion of the results will be explained in chapter 5.

4.2.1 Decision making models or tools used by the professionals

Table 25: Cross- Tabulation Question 1

CITY	INTERVIEWEE	JOB TITLE	RESPONCE TO QUESTION 1	DEVELOPERS	INVESTORS
Johannesburg					
	Interviewee 1	Chief Investment and Development Officer	Yes		1
	Interviewee 2	Asset Manager	Yes		1
	Interviewee 3	Head of Asset Management	Yes		1
	Interviewee 4	CEO	No		1
	Interviewee 5	Director	No		1
	Interviewee 6	Director	No	1	1
	Interviewee 7	CEO	No		1
	Interviewee 8	Asset Manager	No		1
Pretoria					
	Interviewee 9	CEO	No	1	
	Interviewee 10	Director	Yes		1
Cape Town					
	Interviewee 11	Asset Manager	Yes		1
	Interviewee 12	CEO	Yes		1
	Interviewee 13	Managing Director	No		1
	Interviewee 14	CEO	Yes		1
	Interviewee 15	Commercial Office Executive	No		1
	Interviewee 16	CEO	Yes		1
	Interviewee 17	CEO	No	1	
Durban					
	Interviewee 18	Regional Head of Company	Yes		1

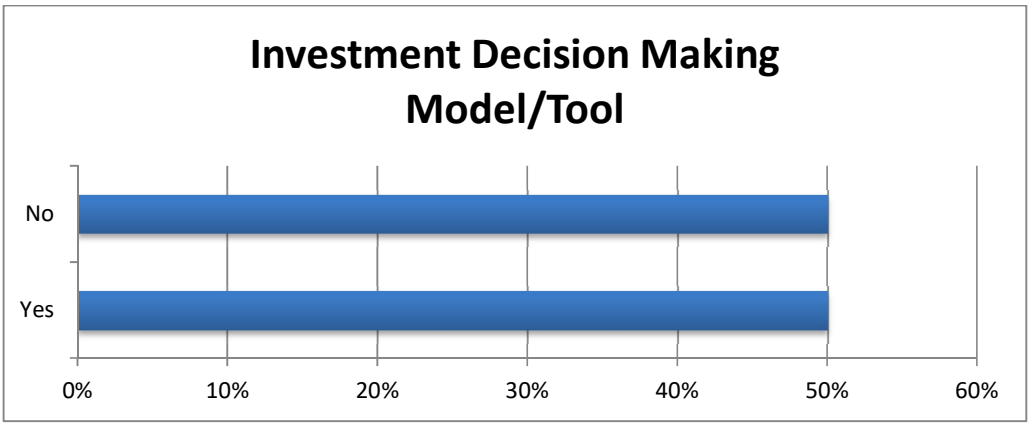


Figure 13 Question 1- Do you make use of a research model or tool to make decision in respect of your office sector?

Table 25 clearly indicates that none of the developers make use of investment decision-making models or tools, in contradiction to 9 of the 15 investors who place lot of emphasis on models to make investment decisions.

Figure 13 indicates that 50% of the interviewees specified that the company make use of a certain decision-making model or tool. The quotations of specific answers that were provided by the interviewees are attached in Annexure D.

4.2.2 Perception regarding the effectiveness of the decision-making strategy in the respective companies

Table 26: Cross- Tabulation Question 2

CITY	INTERVIEWEE	JOB TITLE	RESPONCE TO QUESTION 2	DEVELOPERS	INVESTORS
Johannesburg					
	Interviewee 1	Chief Investment and Development Officer	Yes		1
	Interviewee 2	Asset Manager	Yes		1
	Interviewee 3	Head of Asset Management	Yes		1
	Interviewee 4	CEO	Yes		1
	Interviewee 5	Director	Yes		1
	Interviewee 6	Director	Yes	1	1
	Interviewee 7	CEO	Yes		1
	Interviewee 8	Asset Manager	Yes		1
Pretoria					
	Interviewee 9	CEO	Yes	1	
	Interviewee 10	Director	Yes		1
Cape Town					
	Interviewee 11	Asset Manager	Yes		1
	Interviewee 12	CEO	Yes		1
	Interviewee 13	Managing Director	Yes		1
	Interviewee 14	CEO	Yes		1
	Interviewee 15	Commercial Office Executive	Yes		1
	Interviewee 16	CEO	Yes		1
	Interviewee 17	CEO	Yes	1	
Durban					
	Interviewee 18	Regional Head of Company	Yes		1

All respondents indicated that they believe their decision making proses is effective, which seems to be logical, as they are all top performing enterprises with an excellent track record.

4.2.3 The most important challenges that investors face currently in the office market

Table 27: Cross- Tabulation Question 3

CITY	INTERVIE-WEE	JOB TITLE	RESPONCE TO QUESTION 3	DEVE-LOPERS	INVES-TORS
Johannesburg					
	Interviewee 1	Chief Investment and Development Officer	Low economic growth cycle; unpredictability of nodal performance; political factors		1
	Interviewee 2	Asset Manager	Cost of finance; Increased interest rates; low level of demand for office space		1
	Interviewee 3	Head of Asset Management	Increased Interest rates; yield fluctuation		1
	Interviewee 4	CEO	Lack of accurate information; political factors		1
	Interviewee 5	Director	Over supply in the market		1
	Interviewee 6	Director	High vacancy rates; over supply; cost of finance; interest rates	1	1
	Interviewee 7	CEO	Lack of accurate information; low economic growth cycle		1
	Interviewee 8	Asset Manager	Low demand levels for office space		1
Pretoria					
	Interviewee 9	CEO	Biggest challenge signing long leases with blue chip tenants	1	
	Interviewee 10	Director	Political and Economic Factors		1
Cape Town					
	Interviewee 11	Asset Manager	Cost of finance; signing longer term leases; oversupply in office stock		1
	Interviewee 12	CEO	Over supply of office stock; low demand for office space		1
	Interviewee 13	Managing Director	Low economic cycle; retaining tenants due to over supply		1
	Interviewee 14	CEO	Over supply; cost of finance; retaining tenants due to over supply		1
	Interviewee 15	Commercial Office Executive	Challenging to predict growth nodes		1
	Interviewee 16	CEO	Retaining tenants; low economic growth cycle; challenge to predict growth nodes		1
	Interviewee 17	CEO	Political factors; Instability in the market place; cost of finance; low level of demand for office space	1	
Durban					
	Interviewee 18	Regional Head of Company	Cost of funding; retaining tenants; over supply		1

The top 5 challenges mentioned by respondents were:

1. Economic factors
2. Over supply
3. Cost of Finance
4. Political factors
5. Demand

4.2.4 The top 10 KPIs

Table 28: Cross- Tabulation Question 4

CITY	INTERVIE-WEE	JOB TITLE	RESPONCE TO QUESTION 4	DEVE-LOPERS	INVES-TORS
Johannesburg					
	Interviewee 1	Chief Investment and Development Officer	Nodal Size; % of new developments; vacancy rate; change in vacancy rate; rental rates; rental growth; nodal return; capitalization rate		1
	Interviewee 2	Asset Manager	Size of node; % new developments; vacancy rate; change in vacancy, rental rates; nodal return; capitalization rate		1
	Interviewee 3	Head of Asset Management	Size of node; nodal return; location; access of the building; transportation; is it an office node; demand node; rental rates; vacancy rate;		1
	Interviewee 4	CEO	Infrastructure; green environment; transportation; demographics; politics in the area		1
	Interviewee 5	Director	Rentals achieved; other income from the building; municipality service delivery;		1
	Interviewee 6	Director	Yield; vacancy rate; transportation, availability of land	1	1
	Interviewee 7	CEO	Gross rentals; rental yield; proximity to other uses		1
	Interviewee 8	Asset Manager	Vacancy rate, income return, capital growth		1
Pretoria					
	Interviewee 9	CEO	Access; length of leases; transportation; type of tenant; yield; demand in the node for office space	1	
	Interviewee 10	Director	Political and economic factors		1
Cape Town					
	Interviewee 11	Asset Manager	Transportation; change in vacancy; size of node; rentals; security and safety in the node; the calibre of the business based on sector and size; proximity to other uses		1
	Interviewee 12	CEO	Vacancy rate; return; business confidence in the node; demographics in the area; rentals; security and safety; tenant mix		1
	Interviewee 13	Managing Director	Vacancy rate; location; proximity to other uses; vacancy rate; escalation rate; length of leases;		1

	Interviewee 14	CEO	Vacancy rate; rental growth; % new developments; tenant mix; transportation; location; rentals; length of leases; amount of green buildings; proximity to other uses		1
	Interviewee 15	Commercial Office Executive	Access; vacancy rate; proximity to other uses; transportation; rentals; yield		1
	Interviewee 16	CEO	Location; return; lease term; construction cost; levies; services cost; cost of finance; access		1
	Interviewee 17	CEO	Return; achieved yield, demand; transportation.	1	
Durban					
	Interviewee 18	Regional Head of Company	vacancy rate; transportation; return; location; demographics; rentals; capitalization rate; safety and security in the node; proximity to other uses; amount of green buildings		1

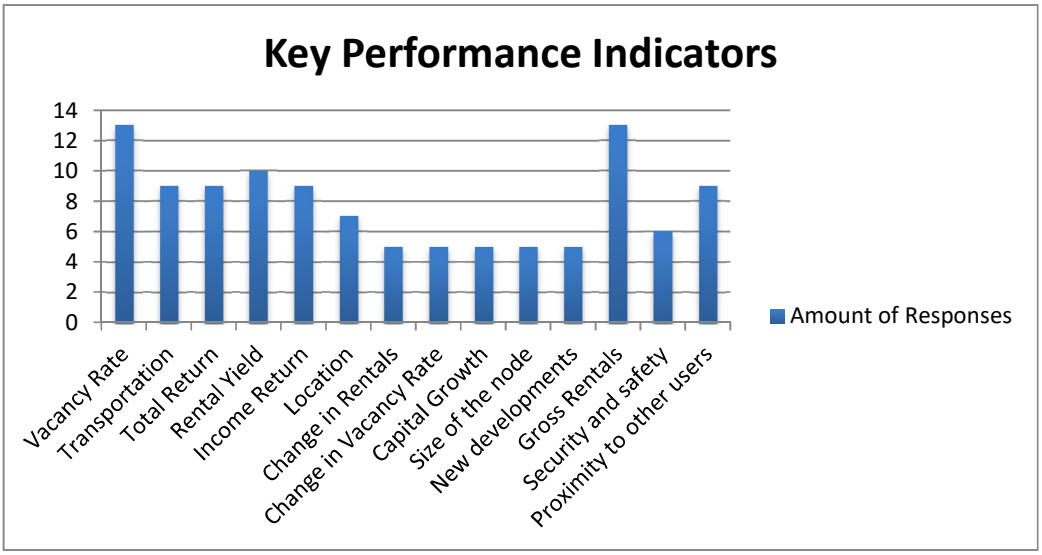


Figure 14 The key performance indicators used by the professionals

Interviewees top 10 KPIs:

- Vacancy rate
- Change in vacancy
- Total return

- Rental yield
- Rental growth
- Income return
- Capital growth
- Size of node
- Gross rentals
- Change in rentals

For the purpose of this study, it is important to note that the researcher did not supply the interviewees with a list of KPIS's, but that each interviewee needed to sate which KPI's is regraded important for the specific companies decision making strategy. Therefor the interviewee knew exactly how to differentiate between the different definitions of KPI's listed above. The reseracher looked at all the KPI's mentioned by the interviewees and listed them as the top KPI's. In Chapter 5 the researcher discuss how overlapping between these KPI's was dealt with. The definitions of the KPI's are stated in Appendix C. The researcher differentiate between the different KPI's used in the model, according to these definitions.

4.2.5 Tools used to rank the top performing office nodes in the future

Table 29: Cross- Tabulation Question 5

CITY	INTERVIEWEE	JOB TITLE	RESPONCE TO QUESTION 5	DEVELOPERS	INVESTORS
Johannesburg					
	Interviewee 1	Chief Investment and Development Officer	Yes		1
	Interviewee 2	Asset Manager	Yes		1
	Interviewee 3	Head of Asset Management	Yes		1
	Interviewee 4	CEO	No		1
	Interviewee 5	Director	No		1
	Interviewee 6	Director	No	1	1
	Interviewee 7	CEO	Yes		1
	Interviewee 8	Asset Manager	Yes		1
Pretoria					
	Interviewee 9	CEO	No	1	
	Interviewee 10	Director	No		1
Cape Town					
	Interviewee 11	Asset Manager	Yes		1
	Interviewee 12	CEO	No		1
	Interviewee 13	Managing Director	No		1
	Interviewee 14	CEO	No		1
	Interviewee 15	Commercial Office Executive	No		1
	Interviewee 16	CEO	No		1
	Interviewee 17	CEO	No	1	
Durban					
	Interviewee 18	Regional Head of Company	Yes		1

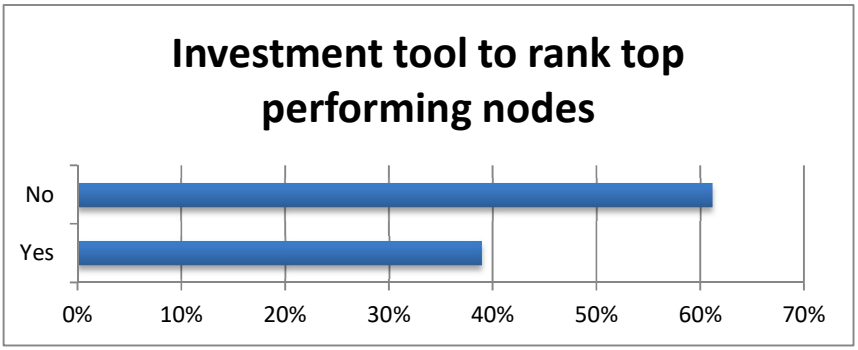


Figure 15: Do the professionals make use of an investment tool or model to rank the top performing office nodes?

Of all the interviewees, 38% of respondents as indicated in figure 15 that they make use of an investment tool to rank top performing nodes. The main reasons the investors provided for making use of ranking tools is to enable the tool to confirm the investment decision that needs to be made as well as using the ranking tool to enable the company to make sure they are not under or over exposed in a certain node.

4.2.6 The value of making use of historical data such as KPIs to predict the best office nodes in the future

Table 30: Cross- Tabulation Question 6

CITY	INTERVIEWEE	JOB TITLE	RESPONCE TO QUESTION 6	DEVELOPERS	INVESTORS
Johannesburg					
	Interviewee 1	Chief Investment and Development Officer	Yes		1
	Interviewee 2	Asset Manager	Yes		1
	Interviewee 3	Head of Asset Management	Yes		1
	Interviewee 4	CEO	Yes		1
	Interviewee 5	Director	Yes		1
	Interviewee 6	Director	No	1	1
	Interviewee 7	CEO	No		1
	Interviewee 8	Asset Manager	Yes		1
Pretoria					
	Interviewee 9	CEO	No	1	
	Interviewee 10	Director	Yes		1
Cape Town					
	Interviewee 11	Asset Manager	Yes		1
	Interviewee 12	CEO	Yes		1
	Interviewee 13	Managing Director	Yes		1
	Interviewee 14	CEO	Yes		1
	Interviewee 15	Commercial Office Executive	Yes		1
	Interviewee 16	CEO	Yes		1
	Interviewee 17	CEO	No	1	
Durban					
	Interviewee 18	Regional Head of Company	Yes		1

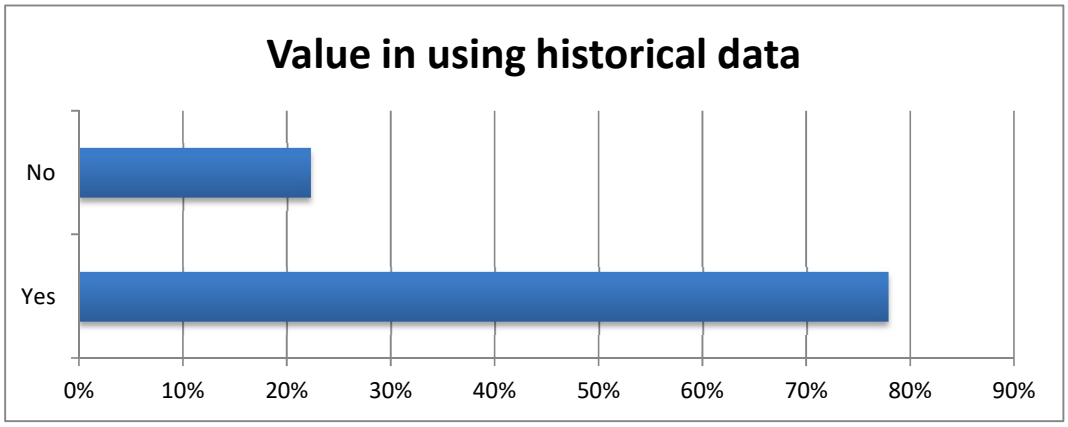


Figure 16: Determination whether there is value in historical data to predict the best performing office nodes in the future

Through the interviewees, it is clear that 78% of the respondents indicated that there is value in historical data, as per Figure 16. According to the respondents, these data enable the companies to see what market related rental rates are as well as to show the vacancy rates of the different nodes. This data also show some patters and can be used to make future predictions. Historical data according to the respondents will enable you to base investment decision on statistics, not only just experience and gut feel.

4.2.7 The reliance on any data from IPD to determine the best performing office nodes

Table 31: Cross- Tabulation Question 7

CITY	INTERVIEWEE	JOB TITLE	RESPONCE TO QUESTION 7	DEVELOPERS	INVESTORS
Johannesburg					
	Interviewee 1	Chief Investment and Development Officer	Yes		1
	Interviewee 2	Asset Manager	Yes		1
	Interviewee 3	Head of Asset Management	Yes		1
	Interviewee 4	CEO	Yes		1
	Interviewee 5	Director	Yes		1
	Interviewee 6	Director	Yes	1	1
	Interviewee 7	CEO	Yes		1
	Interviewee 8	Asset Manager	Yes		1
Pretoria					
	Interviewee 9	CEO	Yes	1	
	Interviewee 10	Director	Yes		1
Cape Town					
	Interviewee 11	Asset Manager	Yes		1
	Interviewee 12	CEO	Yes		1
	Interviewee 13	Managing Director	Yes		1
	Interviewee 14	CEO	Yes		1
	Interviewee 15	Commercial Office Executive	No		1
	Interviewee 16	CEO	No		1
	Interviewee 17	CEO	Yes	1	
Durban					
	Interviewee 18	Regional Head of Company	No		1

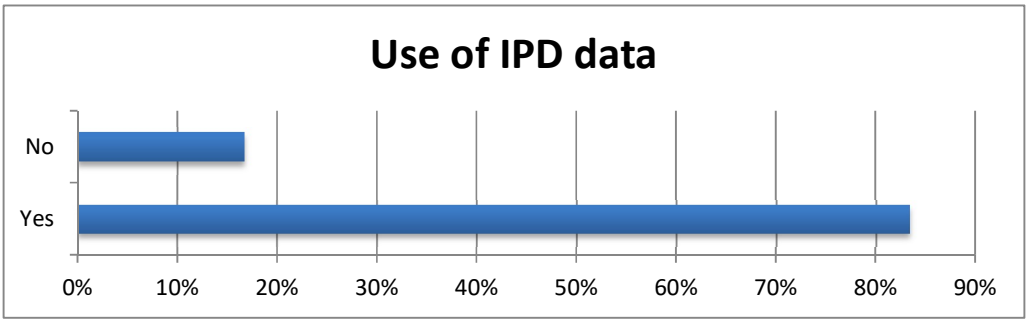


Figure 17: The use of IPD data in the office sector in the property industry

The use of IPD data in the industry is very high, with 82% of respondents that stated that they make use of this data. The respondents mainly look at rental rates, vacancy rate, cap rate, escalation percentages, operating costs, and expenditures. The data is also used to compare apples with apples and to have a method to measure performance. The companies also look at the performance of the nodes, the total return for the node to compare their buildings' total return against the IPD nodal performance.

4.2.8 Reliance on any data from SAPOA to determine the best performing office nodes as indicated in Figure 18:

Table 32: Cross- Tabulation Question 8

CITY	INTERVIEWEE	JOB TITLE	RESPONCE TO QUESTION 8	DEVELOPERS	INVESTORS
Johannesburg					
	Interviewee 1	Chief Investment and Development Officer	Yes		1
	Interviewee 2	Asset Manager	Yes		1
	Interviewee 3	Head of Asset Management	Yes		1
	Interviewee 4	CEO	Yes		1
	Interviewee 5	Director	Yes		1
	Interviewee 6	Director	Yes	1	1
	Interviewee 7	CEO	Yes		1
	Interviewee 8	Asset Manager	Yes		1
Pretoria					
	Interviewee 9	CEO	Yes	1	
	Interviewee 10	Director	Yes		1
Cape Town					
	Interviewee 11	Asset Manager	Yes		1
	Interviewee 12	CEO	Yes		1
	Interviewee 13	Managing Director	Yes		1
	Interviewee 14	CEO	No		1
	Interviewee 15	Commercial Office Executive	Yes		1
	Interviewee 16	CEO	Yes		1
	Interviewee 17	CEO	Yes	1	
Durban					
	Interviewee 18	Regional Head of Company	Yes		1

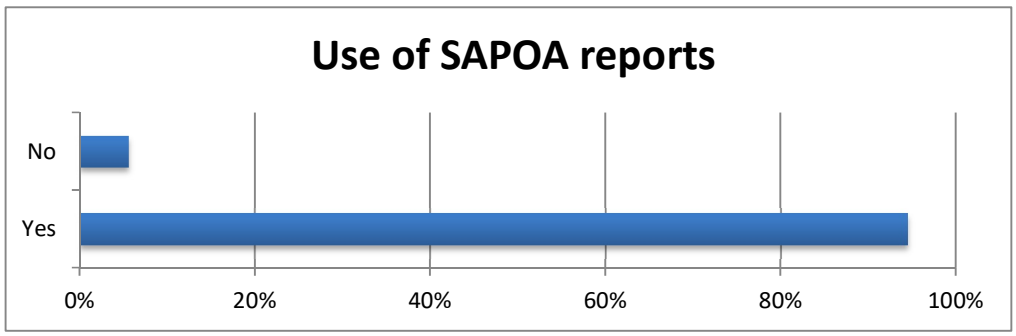


Figure 18: The use of SAPOA data in the office sector of the property industry

4.2.9 Other sources that the companies consult to assist in identifying the best performing office nodes

Table 33: Cross- Tabulation Question 9

CITY	INTERVIEWEE	JOB TITLE	RESPONCE TO QUESTION 9	DEVE LOPERS	INVES TORS
Johannes burg					
	Interviewee 1	Chief Investment and Development Officer	Brokers; Rhode Reports		1
	Interviewee 2	Asset Manager	Brokers		1
	Interviewee 3	Head of Asset Management	Brokers; Speak to developers; internal brokers in the fields		1
	Interviewee 4	CEO	Brokers; general knowledge of the area		1
	Interviewee 5	Director	Independent valuers		1
	Interviewee 6	Director	General knowledge	1	1
	Interviewee 7	CEO	Tenants relocation; market research		1
	Interviewee 8	Asset Manager	Brokers		1
Pretoria					
	Interviewee 9	CEO	Brokers; media; market research	1	
	Interviewee 10	Director	Brokers; reports - press media		1
Cape Town					
	Interviewee 11	Asset Manager	Brokers; reports -media		1
	Interviewee 12	CEO	Developers; market research		1
	Interviewee 13	Managing Director	Brokers; market research		1
	Interviewee 14	CEO	Brokers; reports - media		1
	Interviewee 15	Commercial Office Executive	Brokers; market research; reports - media		1
	Interviewee 16	CEO	Own network of developers and brokers		1
	Interviewee 17	CEO	Brokers and general knowledge of the area	1	
Durban					
	Interviewee 18	Regional Head of Company	Property Brokers		1

The top five sources the respondents consult are:

1. Brokers
2. Reports - press and media
3. Developers
4. Market research

5. General knowledge

4.3 Multiple regression analysis

The researcher built the model by doing multiple regression on the data set that the researcher had to his/her availability. The model was built by firstly looking at how well each of the independent variables explain total return as the dependent variable. By eliminating all the independent variables that had a low significance on the dependent variable, the researcher could increase the R-square value of the model as well as the adjusted R-square and F-value to formulate the most accurate model.

4.3.1 Regression model used to formulate the studies model

In this regression model, all the variables that have a high significance are included as well as the year that change in SoN had the highest significance being CSoN - 3 year lag.

Table 34: Descriptive statistics – Regression model used for model

Variables Entered/Removed			
Model	Variables Entered	Variables Removed	Method
1	CV - 5 year lag CV - 7 year lag CV - 8 year lag CGR - 4 year lag CGR - 6 year lag CGR - 10 year lag CG - 1 year lag CG - 4 year lag CG - 5 year lag CG - 8 year lag CG - 9 year lag CG - 10 year lag CSoN - 3 year lag		Enter

Table 35: Model summary - Regression model used for model

Model Summary					
Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Durbin Watson
1	.663[a]	0.44	0.411	7.870703	1.933

The R-square value of this regression model is 44% and the adjusted R-square value is 41.1%.

Table 36: ANOVA table - Regression model used for model

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	12243.31	13	941.793	15.203	.000[b]
Residual	15610.89	252	61.948		
Total	27854.2	265			

The F-value of the regression model is 15.203, 41.1% of the dependent variable could be explained through the independent variables.

Table 37: Coefficient table - Regression model used for model

Coefficients							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	20.067	0.938		21.402	0		
CV - 5 year lag	1.356	0.413	0.163	3.28	0.001	0.905	1.106
CV - 7 year lag	0.832	0.406	0.101	2.048	0.042	0.91	1.098
CV - 8 year lag	0.787	0.299	0.13	2.632	0.009	0.918	1.089
CGR - 4 year lag	-7.595	3.296	-0.114	-2.305	0.022	0.915	1.092
CGR - 6 year lag	-9.864	3.151	-0.15	-3.131	0.002	0.966	1.035
CGR - 10 year lag	-7.161	3.329	-0.105	-2.151	0.032	0.94	1.064
CG - 1 year lag	0.176	0.059	0.16	2.989	0.003	0.778	1.286
CG - 4 year lag	-0.322	0.054	-0.327	-5.971	0	0.743	1.347
CG - 5 year lag	-0.122	0.056	-0.123	-2.153	0.032	0.676	1.479
CG - 8 year lag	-0.22	0.059	-0.225	-3.748	0	0.616	1.624
CG - 9 year lag	-0.268	0.072	-0.236	-3.723	0	0.554	1.805
CG - 10 year lag	0.161	0.073	0.125	2.211	0.028	0.695	1.439
CSoN - 3 year lag	2.62E-05	0	0.116	2.339	0.02	0.911	1.098

4.4 Accuracy of the formalized model

4.4.1 Testing the model: 1-, 3- and 5-year projection

The model formulated was tested over a 1-, 3- and 5-year projection in order to determine over what period the most accurate projection of the model is evident.

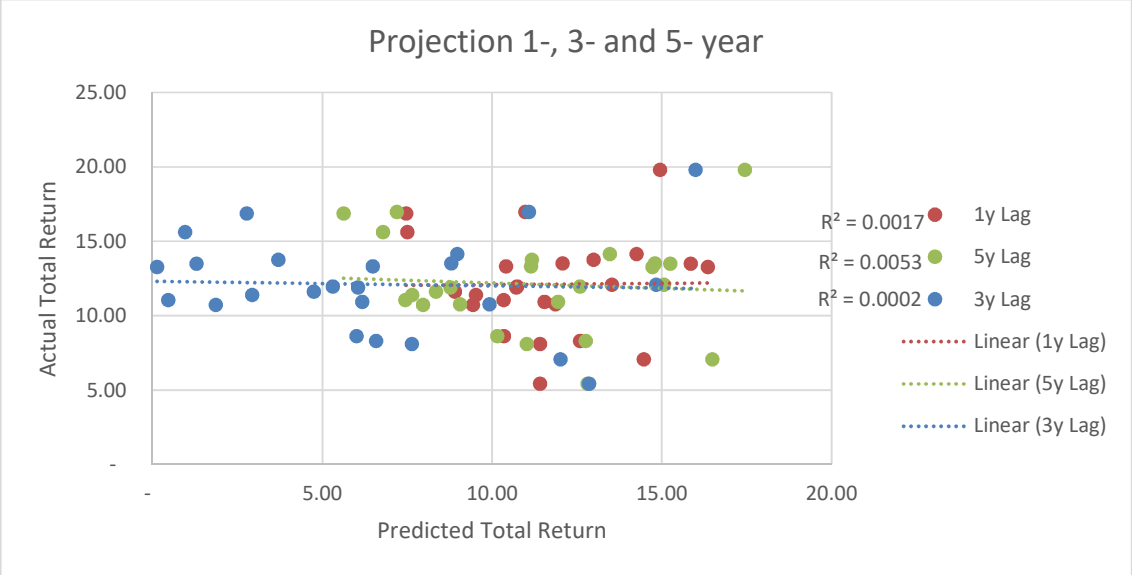


Figure 19: Projection of total return over a 1-year, 3-year and 5-year period

Figure 19 indicates that if the researcher includes all the 1-, 3- and 5-year projected total return values of the different nodes, even the nodes that are considered to be outliers, the model formulated is only able to deliver a R-square value of 0.17% for the 1–year projection, a R-square value of 0.02% for the 3-year projection and a R-Square value of 0.53 for the 5- year projection.

It is clear from Figure 19 that a couple of outliers that can distort the results of the model exist.

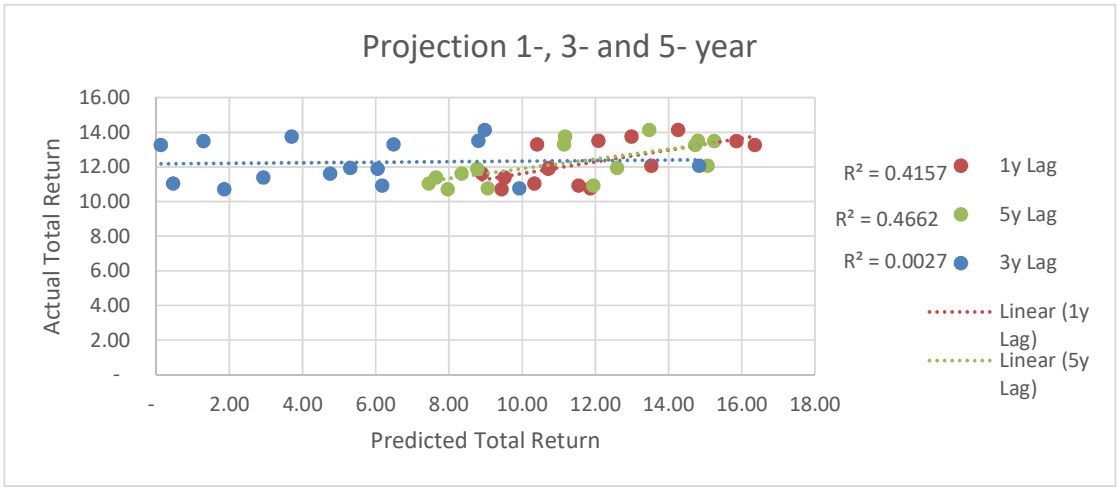


Figure 20: Projections of total return over a 1-year, 3-year and 5-year period

The researcher eliminated the outlier-projected values of the model. Figure 20 indicates that one can make a 41.5% accurate projection of what the total return will be in the specific node, one year into the future. A 0.27% accurate projection of what the total return would be in a specific node, three years in the future and a 46.6% accurate projection of what the total return would be five years in the future.

From Figure 20, it is clear that the model best predicts the total return over a 5-year period. One of the main research questions of the study is whether the model could accurately rank the top performing office nodes. The researcher made use of the 5-year projected total return as well as the volatility of the nodal data and by discarding all the data points from 2010 to 2015, the model was tested to indicate the predicted best performing nodes in 2015.

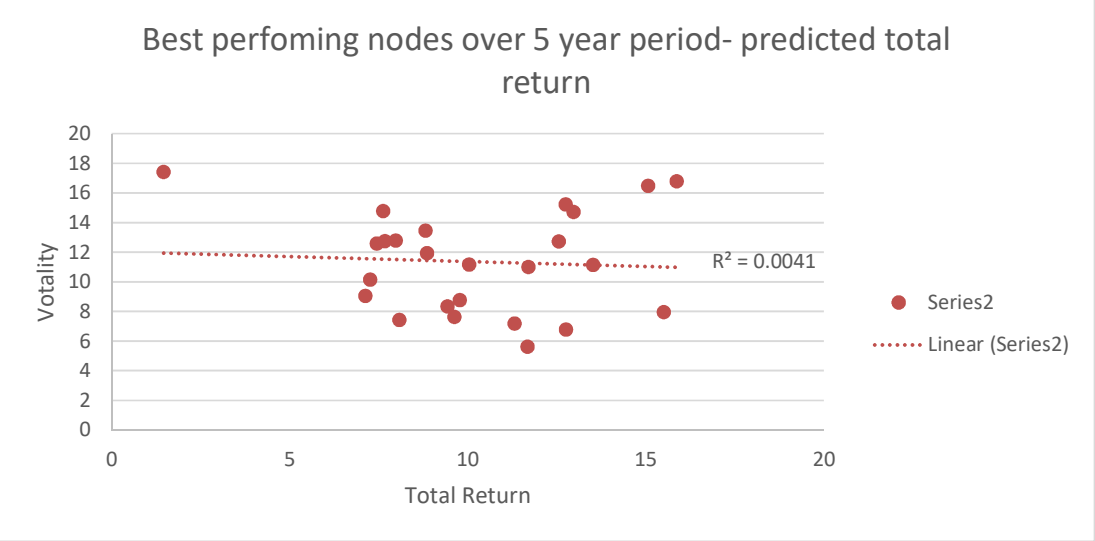


Figure 21: Best performing nodes over 5-year period

Figure 21 clearly indicates that the model is not reliable to predict the best performing office nodes 5 years from today due to an insufficient R-square value.

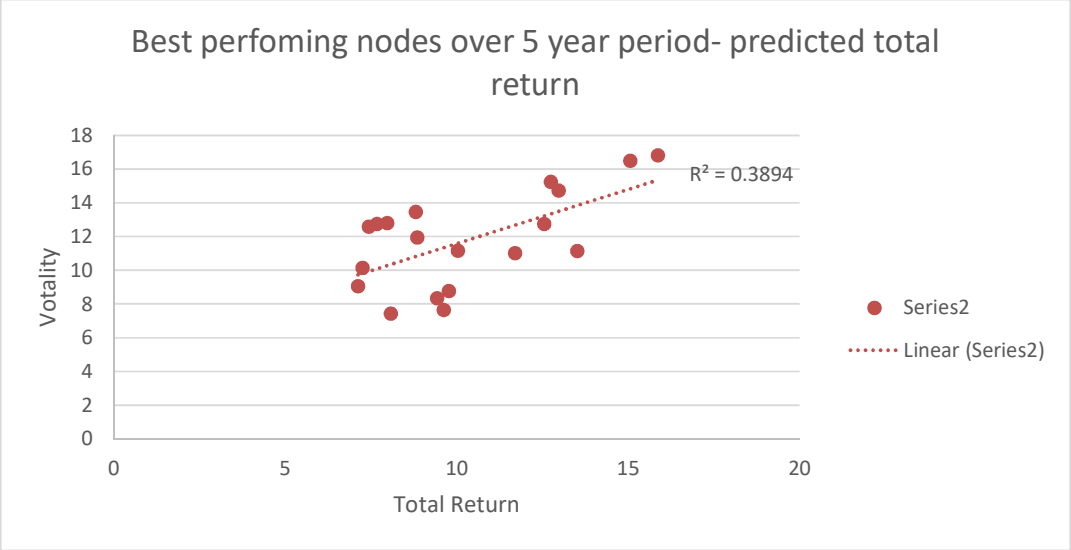


Figure 22: Best performing office nodes over 5–year period

As the model delivered a very low R-square value, through the process of a priori, the researcher then eliminated the outliers. The study focused on formulating only a screening or first sight model and therefore the researcher discarded the nodes that are volatile and do not represent the true picture. Figure 22 indicates that according to the model, the best performing office nodes in 2015 were: Durban CBD, Randburg, Rondebosch, Centurion, Woodmead, Sandon CBD, Rivonia, Illovo, Bedfordview, Fourways.

CHAPTER 5: DISCUSSION

5.1 Outline of results

5.1.1 Interviews

The purpose of this study was two-fold: firstly, to establish what the readily available KPI's are according to the literature review and interviews and to make use of these KPI's to formulate a model that will be able to predict the best performing office nodes. Secondly, after formulating the model, how accurately can the model predict the best performing office nodes in the future.

This study attempts to provide investors that would like to invest in the office market, with a reliable and easy to use model that will enable them to determine what the best performing office nodes would be in the future. This will enable the investor to have a competitive advantage and to ensure that the portfolio of office properties is located in nodes which are performing well and that will yield a profitable return.

According to Adair et al. (1994), the need for assessing the future performance as well as examining the historical performance is recognized and addressed by large investors as being very valuable. The researcher was therefore interested to know how the 18 property specialists perceive the current office market, as well as in gathering important information regarding their decisions-making models.

The researcher firstly wanted to determine if the respective companies make use of decision-making models or tools to make office investment decisions and if so, to compare this research tool or model with the tool or models that already exist.

Table 25 clearly indicates that none of the developers make use of investment decision-making models or tools, in contradiction to 9 of the 15 investors who place emphasis on models to make investment decisions. The reason for the developers not making use of investment decision making models or tools could mainly be due to developers developing office space where the client would like to be located, and not as an investment for the future as the investors thought process would be. When considering the geographical trends without taking into account the developers it is clear that in Johannesburg and Cape Town there is more interviewees that make use investment decision making models or tools than those who do not make use of it. In Pretoria and Durban the geographical trend is that the interviewees make use of investment decision making models or tools.

The interviewees that agreed that they make use of decision-making models or tools take into account rental growth, vacancies, cost of occupancy and the amount of stock available in the specific node. Another company stated that they consider the IRR, gut feel, experience and initial returns. Most of the companies also consider data available in the market such as SAPOA and MSCI data. Interviewees also indicated that their companies after years of experience, make use of scientific approaches to determine where to invest and when to dispose some of the office stock in certain nodes.

The nine interviewees that indicated they do not make use of a specific or formulated model or tool specified that they make use of the different market research available as well as determining the potential growth, income and return on the investment. The companies also look at the density of the tenants in the node, the market rentals in the specific node, identifying new upcoming nodes, the security in the node as well as who owns most of the land in the node. It is evident in the responses from the interviewees that there is a need for a decision-making model or tool to enable investors to make optimum decisions in respect of the office

sectors. Many of the respondents indicated that the companies do not have a formalized model or tool.

Through the literature review, the researcher noted that various methods of decision-making models exist, although none of them are specific to the office sector, with the aim to predict nodes that will perform well in the future. The researcher was very interested to also find out if the methods of investment decision making, used by leading companies, were perceived as effective. All respondents indicated that they believe the decision making process in their respective companies is effective which seems like a logical response as they are all top performing enterprises with an excellent track record.

It is very important to understand the challenges that the investors are confronted with in the decision making process of investing in the office sector. These challenges will most likely have an effect on the way that the company makes decisions in order to combat the challenges and to ensure that the company makes the best enlightened investment decisions, with the highest return on the investment. The challenges according to the interviewees in respect of investment decisions are economic factors, oversupply, cost of finance, political factors, and demand.

Economic risk can be defined as the likelihood of an investment that will be affected by the macroeconomic conditions (Investing Answers, 2017). Macroeconomic conditions could be explained as the economic factors in the country that change the whole state of the economy for e.g. changes in the gross national product as well as any changes in the employment level and the inflation and deflation in prices. This risk is evident whilst financing an investment opportunity, and it is possible that the opportunity will not supply the sufficient revenues in order to cover all the operational expenses as well as repaying the debt responsibilities (Ready Ratios, 2011). Before investigating an investment opportunity, it is important to consider the risk that is associated with the economic conditions of that country one is investing in. One of

the best ways to mitigate the risk is by verifying the possibility that the risk will be overshadowed by the benefits of this investment (Ready Ratios, 2011).

The change in the economic factors that will have an influence on the whole state of the economy, will also have an effect on the investments of companies. Thus the state of the economy has a huge influence in the decision-making process of investors. With South Africa's economic factor challenges for e.g. the low employment rate, it places constraints on the confidence levels of the investors to freely invest into opportunities in South Africa.

The oversupply has the same effect as the low demand for space. Due to the oversupply in the booming phase of the office sector, there are currently more offices supplied than demanded. The lower demand results in rental decreases and a higher vacancy rate. In contrast, shortages in the demand would increase the rental rates and decrease the vacancies. This oversupply in the office market causes investors to be very careful, leading to a decrease in the amount of investments made.

The definition according to Investopedia (2016(a)) of cost of finance is the cost of funds that is involved for financing the investment decision. The cost that is involved in financing the investment opportunity depends on the model of finances used by the company. If the company solely makes use of equity, it is the cost of equity and if the company solely makes use of debt, it is the cost of debt. Most of the companies make use of a combination of the two, also called "weighted average cost of capital" (Investopedia, 2016(a)). Subsequently the cost of finance signifies a "hurdle rate" that the company will have to overcome in order to produce value. Normally it is the "capital budgeting" formula that determines if the company should go forward with the investment opportunity or not (Investopedia, 2016(a)). The challenge with the cost of finance is that the hurdle rate that the company will have to overcome may be very high and may restrict the company to invest in the investment opportunity.

The political factors could also be expressed as the political risk that the companies will have to take into consideration when making an investment decision. The clear definition of political risk would be the risk that the companies' "investment returns" may experience due to the "political change" or the "instability" in the specific country (Investopedia, 2016(b)). The returns that will be affected by the instability may be caused by changes in the government, the legislative authorities, as well "foreign policy makers" (Investopedia, 2016(b)). Political risk is also referred to as "geopolitical risk", indicating that the risk becomes a more important factor as the time horizon increases of the investment (Investopedia, 2016(b)). The current unstable political state in South Africa places immense stress upon investors and causes a huge challenge in the investment industry in South Africa.

When considering the challenge of demand, for companies to make an investment, one of the most important drivers will be to make a good return on their investment. The higher the demand for office space, the higher the return in terms of rentals and the lower the vacancies. Currently the opposite is happening, specifically in the office sector. The demand for office space especially A-, B- and C-Grade office space is decreasing with the result that the vacancies increasing and the rental rates decreasing. Thus, the return on the investment will decrease. Investors are therefore more careful to invest in office space at the moment, due to the lower demand. In the three different property sectors, office space is, at the moment, the weakest one with the lowest return. It is cyclical and will most likely pick up soon, but for the purpose of this research report, it is currently important to note that due to the lower demand, the number of office space investments will also decrease.

It is clear in table 27 that the investors and developers experience more or less the same challenges. This is valid due to the fact that investors and developers have to make decisions within the same economic climate.

Through analysing all the challenges in the office sector currently in South Africa, it became evident that this sector is under immense stress and that it is now more important than ever for companies to make accurate office sector investment decisions to focus on the right nodes that will ensure the investor with a significant return in the future.

According to the 18 property specialists, the top KPIs as indicated in Figure 14, are namely vacancy rate; total return; rental yield; income return; change in rentals; change in vacancy; capital growth; size of node; gross rentals; transportation; location; new developments; security and safety; and proximity to other users.

It is clear through the cross tabulation, table 28, that the KPI's mentioned by the developers are more site specific than those mentioned by the investors. Developers mainly look at: transportation options in the nodes, the length of the leases signed, access, as well as the type of the tenant. While the investors are more concerned about the general performance of a node in totality. The investors are mainly concerned about i.e. rental growth, vacancy rates, % of new developments and demand.

It is important to note that some of the KPIs mentioned could not have been used in this study, and had to be discarded, namely transportation; location; new developments; security and safety; and proximity to other users.

The reason for discarding transportation as a KPI is the lack of measurement thereof and the wide variety of transportation that exists in the different nodes. There is no scientific way of measuring one node's transportation level with a different node's transportation level to effectively measure the performance of the different nodes. However, the research is taking into account the size of the node as a KPI. Transport infrastructure is included into the size of

the node as the node will not commence unless there is sufficient transport infrastructure. The size of the node is largely capped by the transport infrastructure.

Location was not used as a KPI due to the model that already took into account the different nodes in the different cities, which automatically includes the different locations. The research is also node specific and not location specific. The term location could have two different meanings. The first meaning would be the location of the specific development in the node, this will be whether the site is close to amenities, proximity to other uses etc. The other meaning is the location in respective to nodes with each other. In the opinion of the researcher, neither of these holds value as a KPI for the purpose of this research. In terms of the location of developments or investments, this research does not focus on the selection of sites within the nodes, but rather on the performance of the node. In respect of the meaning of the second location, the nodal location stays a difficult KPI to formulate. More importantly, the researcher is of the opinion that the desirability of the node is already embodied in the research through the other KPIs, for eg. size of the node: the more desirable the node, the larger the node will be; gross rentals: the more desirable the node, the higher the rentals; vacancies: the more desirable the node will be, the lower the vacancies would be; income return: the more desirable the node will be, the higher the income return would be.

New developments are arguably one of the best KPIs to indicate future growth of a node however, there is no data that is readily available, nor 100% accurate.. The percentage of new developments does impact the total return of the node. To some extent new developments is reflected in the impact on the following KPI's: Regarding the vacancy arte it is reasonable to expect that new developments will only be developed where the vacancy rate has reduced to a level that justify new developments, which is also evident in the change of vacancy. If will further be evident from gross rentals as the new developments would increase the gross rentals in the node and this could be evident through the change in gross rentals. Finally, it would have an impact on total return as one would expect newly completed developments to

show an increase in capital growth in relation to older buildings which in turn would show depreciation in value.

Safety and security was also not included as one of the main KPIs due to the fact that the research is node specific and not site specific. One could not exclude the whole node due to some parts of the node that are not safe and secure. There is no way of accurately measuring security levels in two different nodes as security is not scientifically measurable. However, the researcher does appreciate that the lack of security will have an impact on the rental rates and the vacancies in the node, as could be clearly be seen in the CBDs of Johannesburg, Pretoria and Durban.

Proximity to other uses was not used due to the research that is focused on identifying the best performing office node and not the best location or site for an office building. Proximity to other uses is difficult to accurately define and to measure. One must take note that the larger the node, the more the proximity would be to other uses. Thus if size is one of the KPIs, then the bigger the node, the higher the level of other uses would be in the node.
Therefore, for the purpose of this thesis, the KPIs that were used for further study are vacancy rate; total return; rental yield; income return; change in rentals; change in vacancy; capital growth; size of node; gross rentals.

It was also interesting to note that only 40% of the companies currently make use of some sort of investment ranking tool in order to make sure that the company will invest in future in the best performing office nodes. Table 29 stipulates that none of the developers make use of a tool to rank the top performing office nodes. This trend indicates that there is a difference in the outlook of the developer versus the investor. The developer needs to develop in the specific node required by the client and the investors have the outlook to make the best investment decision not limited to now but more importantly for the future.

Through the interviews, it became evident that 78% of the property specialists firmly believe that there is value in historical data and only 22% indicated that they do not believe historical data carries value. Table 30 indicates that 4 out of the 18 interviewees are of the opinion that there is no value in historical data, of which 3 of the 4 are developers. Again this stipulates that developers are not focused on the historical trend but more on what is currently happening in the market. As indicated by the various researchers in the literature review, it however is very important for investors to make use of historical data to predict what the future holds.

A huge difference in opinion exists between investors and developers. Developers are mainly focused on where the tenant wants to be located and they look at the development from a tenants' view. The developers develop a building that will satisfy their client's needs where the tenants want to be located. The whole development is tenant driven because the tenant decides where and in what location they want to be situated.

In terms of investors, the companies are more concerned with the total return that the investment will produce over a long period of time. The developments and investments made by investors are not only tenant driven, meaning that they mainly develop the building and only after the building is developed, find suitable tenants. Thus, investors find great value in looking at how a node has performed over a period of time, before determining if they want to invest into that specific node.

The researcher was curious to find out from which source the property specialists derived their data from to make investment decisions. The professionals were unanimous in favour of using IPD or SAPOA data. More than 80% of the respondents indicated that there is a need in the market for the data supplied by IPD. It is also clear from the response to this question that the professionals find value in historical data to make decisions in the office sector.

Table 31 indicates that only 3 out of the 18 interviewees do not make use of the data supplied by IPD. Although the developers are not focused on the historical trends of the data, all of the developers make use of IPD data. The fact that 15 of the interviewees make use of the IPD data stipulates the importance of this data.

According to the study done by Hargitay and Yu (1993), it became evident that in order for investors to come to an accurate conclusion in terms of risk and return of the investment, investors will have to have access to market transparency, a strong research base, as well as having access to large volumes of high quality data. This clearly indicates the value high quality data sources such as IPD and SAPOA have on the property industry, specifically in the office sector.

It is also clear from the 17 out of 18 respondents that the office sector professionals make use of the data reports from SAPOA. This confirms that there is therefore value in making use of these data sources when it comes to making office sector decisions in respect of identifying the best performing office nodes in the future. In table 32 it is also interesting to note that the interviewees that do not make use of IPD data make use of SAPOA data, therefore the conclusion can be made that for all the interviewees use either SAPOA or IPD data.

The complexity of the investment decisions require the investor to make use of a wide variety of sources to ensure that the best decision is made. For this reason, the researcher was interested to determine what sources, other than SAPOA and MSCI, are considered as valuable by the professionals. The top five sources most widely consulted by the professionals were: brokers; reports - press and media; developers; market research and general knowledge.

It is interesting to note in table 33 that the source that both investors and developers mainly consult to assist them with identifying the best performing office nodes, are property brokers.

5.1.2 Multiple regression analysis

The researcher analysed the top KPIs before conducting any of the regression models to ensure that none of these indicators correlate highly with one another or contain the same information.

The KPIs as determined through the interviews were:

- vacancy rate;
- total return;
- rental yield;
- income return;
- change in rentals;
- change in vacancy;
- capital growth;
- size of node and
- gross rentals.

The researcher made use of change in vacancy in the regression model instead of the normal vacancy rate. This was mainly due to vacancy rate as a number that is not able to indicate direction, as to whether the nodes vacancy has increased or decreased over a period of time. Making use of the change in the vacancy rate, the researcher is able to determine the direction of growth of vacancy over a period in a specific node. In a regression model where correlation distorts the results, the researcher was limited to include only therefore change in vacancy was used.

Gross rentals and change in gross rentals consisted of the same constraints as mentioned with the vacancy rate and the researcher discarded gross rentals and included the change in gross rentals in the model.

Gross rentals and income return both measure the level of profit that will be derived from the investment. In regression models, two variables that highly correlate with each other distorts the results of the model. Thus, the researcher will include, for the purpose of this study, only gross rentals. Another reason for discarding income return is due to total return being the dependent variable in the regression model and the formula to determine total return = income return + capital growth. The researcher had to eliminate income return to be able to use capital growth.

The researcher made use of change in size of node in the regression model instead of the normal size of node. This was mainly due to change in size of node causeing a higher R^2 value than just using size of the ode that as with vacancy rate is not able to indicate direction.

Rental yield is the income that is derived from the property divided by the property value and then multiplied by a 100. Gross rental is the income derived from the property without taking into consideration the property value. For the purpose of this thesis, the researcher is more concerned about the rental rates that are in the different nodes, than what each property is achieving. Therefore gross rentals will be used in this regression analysis.

The KPIs that the model will therefore consist of is:

- Change in vacancy;
- Total return;
- Capital growth;
- Change size of node;

- Change in gross rentals.

The researcher tested several regression models with different combinations of the variables with different lags to establish the regression model that will deliver the most accurate results. The models ran and the explanations of these models are attached in Annexure F.

In the regression model with the highest accuracy, all the variables that had a high significance are included as well as the lag that change in SoN had, the highest significance being CSoN - 3 year lag.

The adjusted R-square for this regression model was 0.441. In Table 36, it is evident that the F-value is also significantly higher than any of the previous regression models ran. This indicates that 41.1% of the dependent variable could be explained through the independent variables.

Table 37 indicates that all the variables in this regression model have very high significance in explaining the dependent variable. This table also indicates that the multicollinearity problem previously evident in some of regression models is now no longer a problem due to the tolerance and VIF values that are in line with the rule of thumb.

The researcher will examine the regression models validity in terms of multicollinearity, heteroscedasticity and outliers/ serial correlation. In this regression model, the two factors that indicate multicollinearity are tolerance and VIF. The VIF values are all considerably low and near 1 indicating that the variables in this regression do not correlate with one another in such a way that it will affect the credibility of this model. The tolerance values are all significantly higher than 0.1 indicating that there are no variables that correlate linearly with one another in this regression model.

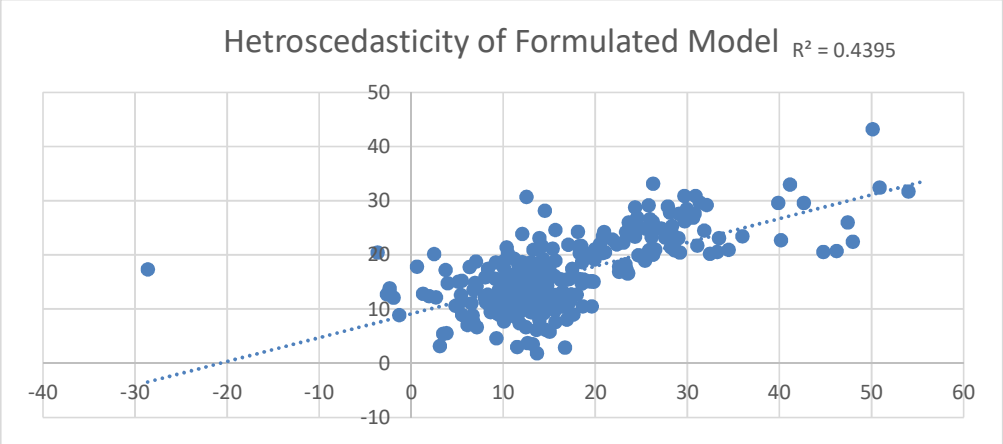


Figure 23 Scatter diagram – Most accurate Regression model

The scatter diagram, Figure 23, indicates that no string cone-liked figure exists and that most of the values are around the trend line. The conclusion can be made that no severe level of heteroscedasticity is evident in this regression model.

The outlier that is visible from the scatter diagram being the only outlier, the researcher came to the conclusion that this outlier will not have a severe effect on the accuracy of the model. The Durbin Watson value, that is used to indicate if auto or serial correlation is evident in the data, in this regression model is 1.933. A value of 2 in the Durbin Watson indicates that there is no auto or serial correlation present in the data. 1.933 is very close to the value 2 indicating that there is no auto or serial correlation present in this model that will affect the accuracy of the model.

The conclusion can be made that the KPIs that will therefore be used in this study to formulate the model that will enable an investor to predict the best performing office nodes in the future, are the variables that were included in this regression model. The reasoning is that this is the model with the highest tested R-square, adjusted R-square as well as F-value, with the lowest level of correlation between all the dependent variables. The KPIs are: CV - 5 year lag; CV - 7 year lag; CV - 8 year lag; CGR - 4 year lag; CGR - 6 year lag; CGR - 10 year lag; CG - 1

year lag; CG - 4 year lag; CG - 5 year lag; CG - 8 year lag; CG - 9 year lag; CG - 10 year lag; and CSoN - 3 year lag.

5.1.3 Accuracy of model formulated

The researcher made use of the existing data set and removed the 2015-year data for all the different variables. By making use of the KPIs mentioned in the regression model that delivered the highest significance, the researcher made use of the Beta values to determine the total return of the nodes for 2015. The researcher could then measure the actual total return against the predicted total return. The researcher tested the model over a 1- , 3- and 5-year projection in order to determine the time frame which will deliver the most accurate results.

In the 1–year projection of total return of the different nodes, explained through Figure 20, it is noticeable that the R-square value is very low. Thus, this indicates that the model is not able to make a relevant 1-year prediction of what the total return would be one year from today. Figure 19 also points out that there consists a couple total return projection data points that can be interpreted as outliers.

For the purpose of the study, the researcher will accept that all the projected total return values below 10 and above 15 will be regarded as outliers. For that reason, the researcher removed these nodal data points that were highly volatile to determine how accurate the model would be to predict total return.

Figure 20 points out that by eliminating these data points as outliers, the model's accuracy significantly increased. The R-square value increased from 0.17% to 41.5%. This stipulates that with the model formulated, it enables the investor to accurately predict 41.5% of the total return of the different nodes one year in the future.

The researcher was interested to determine if the model could predict the total return of the different nodes further than 1 year into the future. Thus, the model formulated is tested for a 3- and 5-year projection.

The researcher made use of the existing data set, although this time all the data points from 2012 to 2015 were removed. As indicated in Figure 16, the 3-year projection delivered the most inaccurate projection of total return. This projection had a significantly low R-square value 0.02%, indicating that the 3-year projection was not accurate.

In Figure 20, it is evident that even if the outliers are removed, the model still only produces a R-square value of 0.27%. In relation to the 1-year projection that delivers a 41% accurate projection, it is clear that the 3-year projection is not reliable.

In the 5–year projection, the researcher made use of the existing data set although this time all the data points from 2010 to 2015, as well as all the different variables were removed. The R-square value of the model, as indicated in Figure 16, is higher than what it was in the 1- and 3 -year projection, although still not sufficient for delivering an accurate result.
In Figure 20, it is evident that even if the outliers are removed in the 5-year projection model, the R-square value increased from 0.27% to 46.62%. In relation to the different projection models, the 5–year projection is the most accurate. The researcher made use of the volatility of the 5-year projection as well as the predicted total return in order to determine if the model is able to accurately predict the best performing office nodes 5 years into the future.

Figure 21 indicates that the model is not able to accurately predict the best performing office nodes due to the insufficient R-square value. The researcher eliminated the outliers in the model that gives a false impression and distorts the findings. Figure 22 indicates that by eliminating the outliers, the model's accuracy significantly increased. The model predicted the

best office nodes for 2015 as Durban CBD, Randburg, Rondebosch, Centurion, Woodmead, Sandon CBD, Rivonia, Illovo, Bedfordview, Fourways.

According to MSCI data, the best performing office nodes, making use of the KPIs in 2015 were: Arcadia, Pretoria CBD, Midrand, Rosebank, Illovo, Rondebosch, Other cape Town, Sandton Environment, Durban Decentralised, Parktown, Bedfordview.
The model is therefore able to accurately predict 4 out of the 10 best performing office nodes 5 years into the future indicating that the model is 40% accurate.

The alternative hypothesis (H_1: $Total\ Return = B_0 + B_1 CV_n + B_2 CGR_n + B_3 CG_n + B_4 CSoN_n + \varepsilon i$) was therefore accepted since the model formulated could accurately predict 60% of the top performing office nodes in the future. Thus, the null hypothesis could therefore be rejected. In order for the researcher to have come to the conclusion to accept the alternative hypothesis, the researcher made use of the top readily available KPIs as specified by the property specialists through the face to face interviews that were conducted.

Total return was chosen to measure the performance of the different nodes. The rest of the KPIs were used to determine what fraction of the variance in Y can be described by the independent variables X. The researcher conducted multiple regression analysis to find the regression models that consisted of the highest F-value, R-square, adjusted R-square value, as well as the model with the lowest level of correlation between the different variables.

Through the different regression models that were formulated, this regression model was identified as the most significant model to use to predict the best performing nodes in the future. This regression model consisted out of the following KPIs:

$CV_{(n-5)}$, $CV_{(n-7)}$, $CV_{(n-7)}$, $CGR_{(n-4)}$, $CGR_{(n-6)}$, $CGR_{(n-10)}$, $CG_{(n-1)}$, $CG_{(n-4)}$, $CG_{(n-5)}$ $CG_{(n-8)}$,

$CG_{(n-10)}$, $CV_{(n-8)}$, $CSoN_{(n-3)}$

The Beta values of the KPIs mentioned in the regression model were used to determine how accurately the model could predict the future. The 1-year projection accuracy was determined through eliminating all the 2015 data points and to run a regression model with all the data from 1995 - 2014. The researcher then multiplied the Beta values determined by regression model with the actual regression values identified through the regression of the 1995 - 2014 data, to predict 2015 total return. One could then measure the actual total return against the predicted total return. At first, the model delivered a very low R-square value and through the process of a priori, the researcher then eliminated the outliers. The reason for this is that in practice, the actual values lie between 10 and 15 and therefore the total return values that are in contradiction could not be used because it causes a false impression. By eliminating the nodes that are indicated as outliers, the accuracy of the model highly increased.

The researcher tested the model over a 1-, 3- and 5- year projection in order to determine what period will deliver the most accurate results. The 5–year projection delivered the most accurate projection results. The researcher therefore made use of the volatility of the 5-year projection as well as the predicted total return in order to determine the best performing office nodes in 2015. The model is therefore able to accurately predict 4 out of the 10 best performing office nodes, 5 years into the future indicating that the model is 40% accurate.

5.2 Practical implications

The study showed that change in vacancy; change in gross rental; capital growth and change in size of node are the KPIs that had the highest significance in predicting total return as the measure of performance of the different nodes.

By making use of these KPIs, the researcher was able to formulate a model that could predict, with a R-square value of 41.6, the future performance of the different nodes over a 1-, 3- and 5-year period.

When considering the best performing office nodes predicted by the model, in comparison with the best performing office nodes formulated by MSCI, the model formulated in this research has a 40% accuracy. This means that investors or leading commercial property companies can make use of the model formulated in this study for an indication or first screening of the best performing office nodes in the future. This will enable the investor as well as property companies to optimise their resources in terms of time and money by only focusing on the best performing office nodes identified through the model.

5.3 Limitations and recommendations

This study had several limitations. Firstly, the study was limited only to the four largest cities, measured by GLA, according to SAPOA and does not focus on the whole South Africa. The nodes in the four different cities will be limited further to the top nodes identifies by MSCI as office nodes. The data that was used in this study was MSCI data exclusively. Other countries wasn't included in this report. Secondly, this study did not differentiate between P-, A-, B- and C-Grade office space individually but looked at the nodes collectively.
A further limitation of the study was that the researcher made only use of highly knowledgeable professionals in the property industry, and therefore time could have been a restrictive factor as these professionals are extremely busy.

Another limitation is that the interviews in the study were a cross-sectional study meaning that the data gathered from the interviewees were gathered at a specific point in time. Although cross-sectional studies are highly effective in terms of money and time, a huge disadvantage described by Levin (2006) is that there is a high possibility that the results obtained in the

study may have looked differently should another time frame have been chosen. It would be advisable to do a longitudinal study when conducting research in future to decrease the disadvantages that exist when making use of the cross-sectional design.

One of the main limitations of this study is that the study focussed on the readily available KPI data that can be used to predict total return as the dependent variable as total return is used for the purpose of this study to measure the performance of the different nodes. The study is not focused on formulating a model that will make use of KPIs that will have a 100% accuracy in predicting total return, but rather in identifying the KPIs with the highest significance and making use of these variables in a model to predict the best performing office nodes in the future.

In terms of recommendations for investors in the property industry, it is crucial to identify the best future performing office nodes in South Africa. A variation of current and historical data is available for the investor to determine if the historical investment was successful but no such information is readily available for investors in making decisions about future performance of the different office nodes.

This is the first study that makes use of readily available historical KPI data, in a model, to predict the best performing office nodes in the future. This model can now be used by investors and large commercial property companies as a screening or first indication of which nodes will be outperforming the other nodes to enable the investor to have a competitive advantage. Explanatory research should be done to provide the investor with a more in-depth analysis of the performance of the different nodes as well as other KPIs that did not form part of this research and to refine this model. The model formalized by the researcher is therefore just an indication.

5.4 Conclusion

One of the main reasons for contemplating this research study is that the decision making process that is followed by investors or decision makers in the real estate market is perceived to be based on inadequate data.

Real estate investments are globally recognized as the third largest asset class for institutional investments and is the most significant alternative investment class. Therefore, it is important to determine the most effective decision-making approaches used by the industry when making decisions about current and future investment opportunities in the office sector.

It is clear that there is a demand in the office sector for a decision-making model or tool that will enable the investor to make use of historical data to predict the best performing office nodes in the future. This study thus enables the decision makers to combat some of the challenges that are evident in previous models or tools formulated that treat investors and the decisions they make homogeneously. The model formulated in this study only takes into account historical data that is already accurately measured.

By implementing this research the developer or investor can now more scientifically predict the best performing nodes. The investor is also able to minimise the risk due to the investor only focusing on the highest performing office nodes and employ the resources to that specific node and not to all the nodes.

In terms of the outcome of this research the KPIs to predict the best performing office nodes are: CV - 5 year lag; CV - 7 year lag; CV - 8 year lag; CGR - 4 year lag; CGR - 6 year lag; CGR - 10 year lag; CG - 1 year lag; CG - 4 year lag; CG - 5 year lag; CG - 8 year lag; CG - 9 year lag; CG - 10 year lag; and CSoN - 3 year lag.

The researcher tested the model over a 1-, 3- and 5-year projection in order to determine the time frame which will deliver the most accurate results. In relation to the 1-, 3- and 5 –year projection, it is evident that the 5–year projection is the most accurate. The researcher made use of the volatility of the 5-year projection as well as the predicted total return in order to determine the best performing office nodes in 2015.

The break through as a result of this research is the formulation of a model, comprising of only 4 KPI's (Change in Vacancy; Change in Gross Rentals; Capital Growth; Change in Size of Node) over a 5 year period, that is able to accurately predict 40% of the top ten best performing office nodes in the future.

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Annexure A – Interview Questions

This interview is conducted as an integral part of my MSc Real Estate thesis: Determining Key Performance Indicators (KPIs) to predict the future performance of office nodes.

Open-ended questions for the interviews:

1) Do you make use of an investment decision-making model or tool to make investment decisions in respect of the office sector in your company?

2) Do you perceive the current manner in which office sector investment decisions are made in your company as effective?

3) In your opinion, what are the most important challenges in the investment decision-making process office sector?

4) In your opinion, what are the top 10 key performance indicators (KPIs) used in your company when making an investment decision in respect of the office sector?

5) Do you currently make use of a research tool to rank the top performing office nodes?

6) Is there value, in your opinion, in using historical data such as certain key performance indicators?

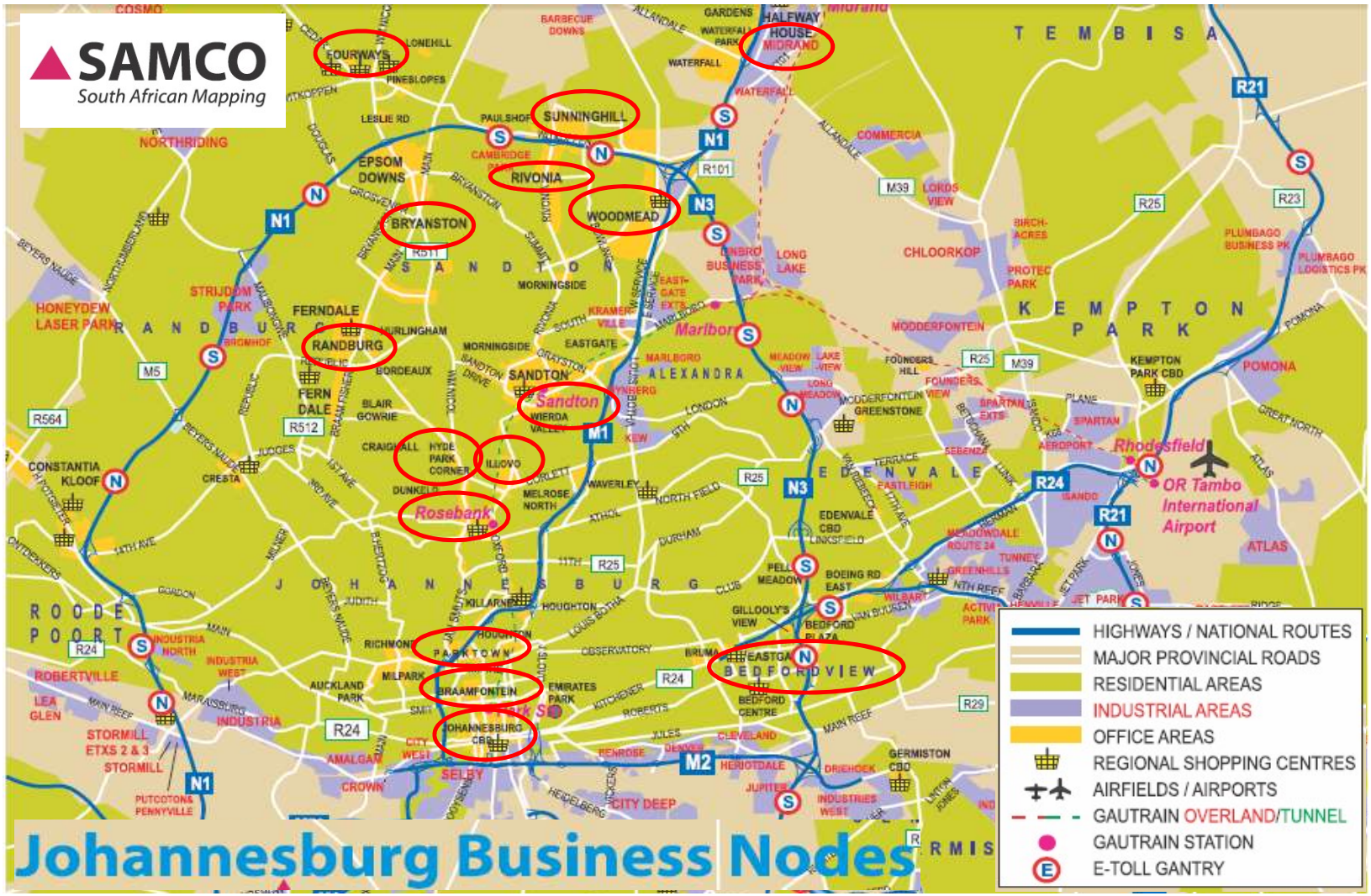
7) Do you rely on any data from IPD to determine the best performing office nodes?

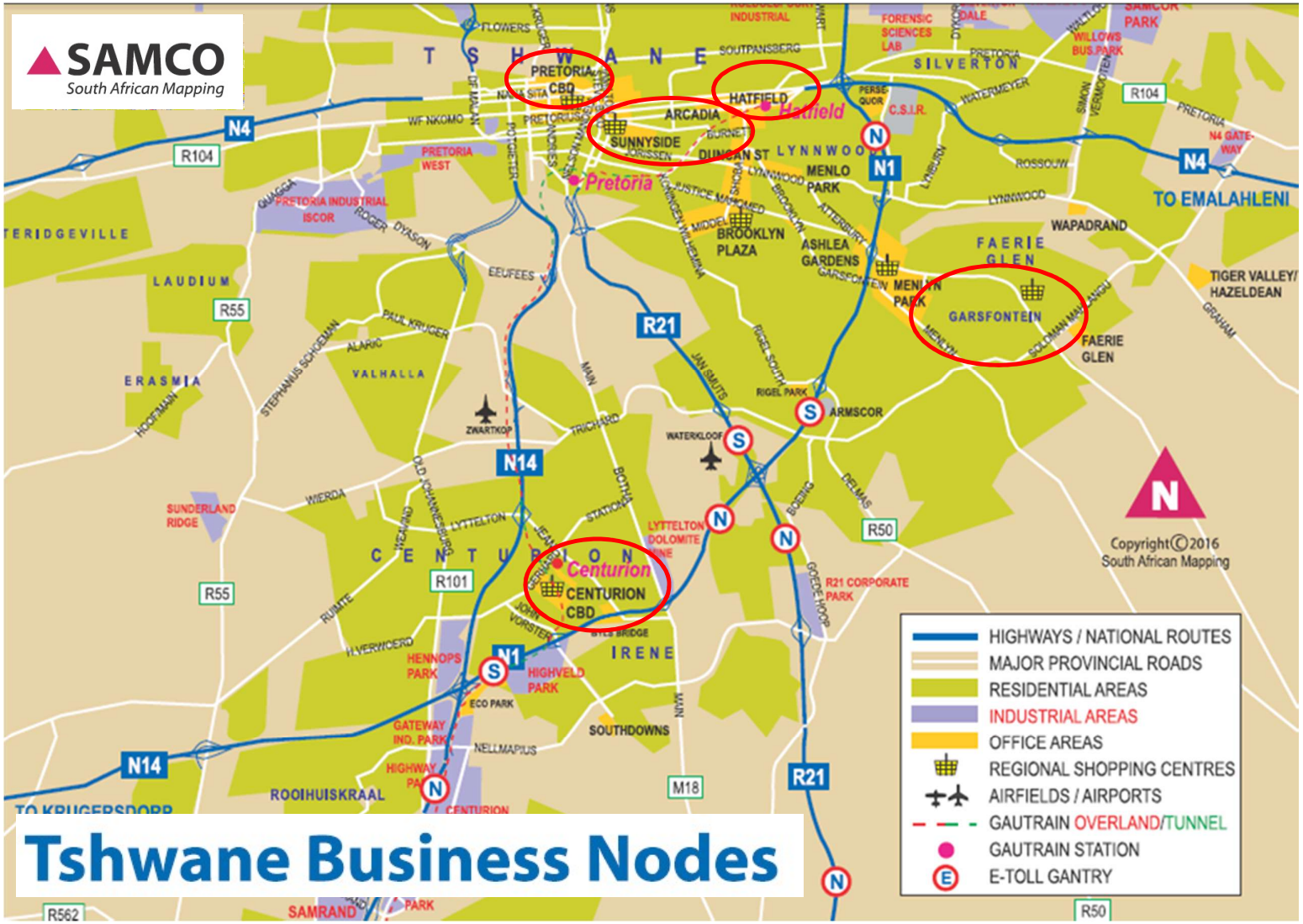
8) If yes to question 7, list the data.

9) Do you rely on any data from SAPOA to determine the best performing office nodes?

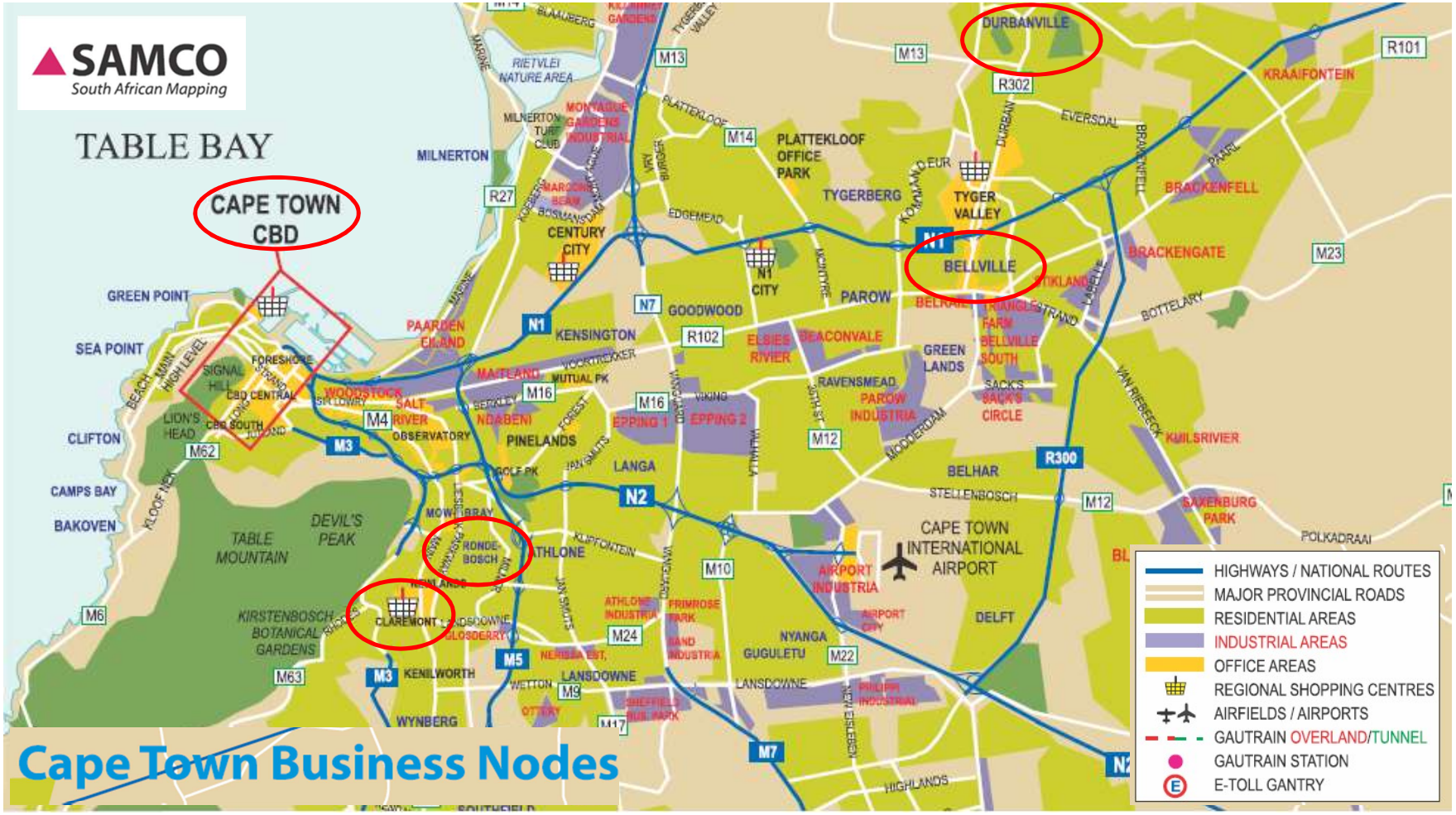
10) Which other sources do you consult to assist you in identifying the best performing office nodes.

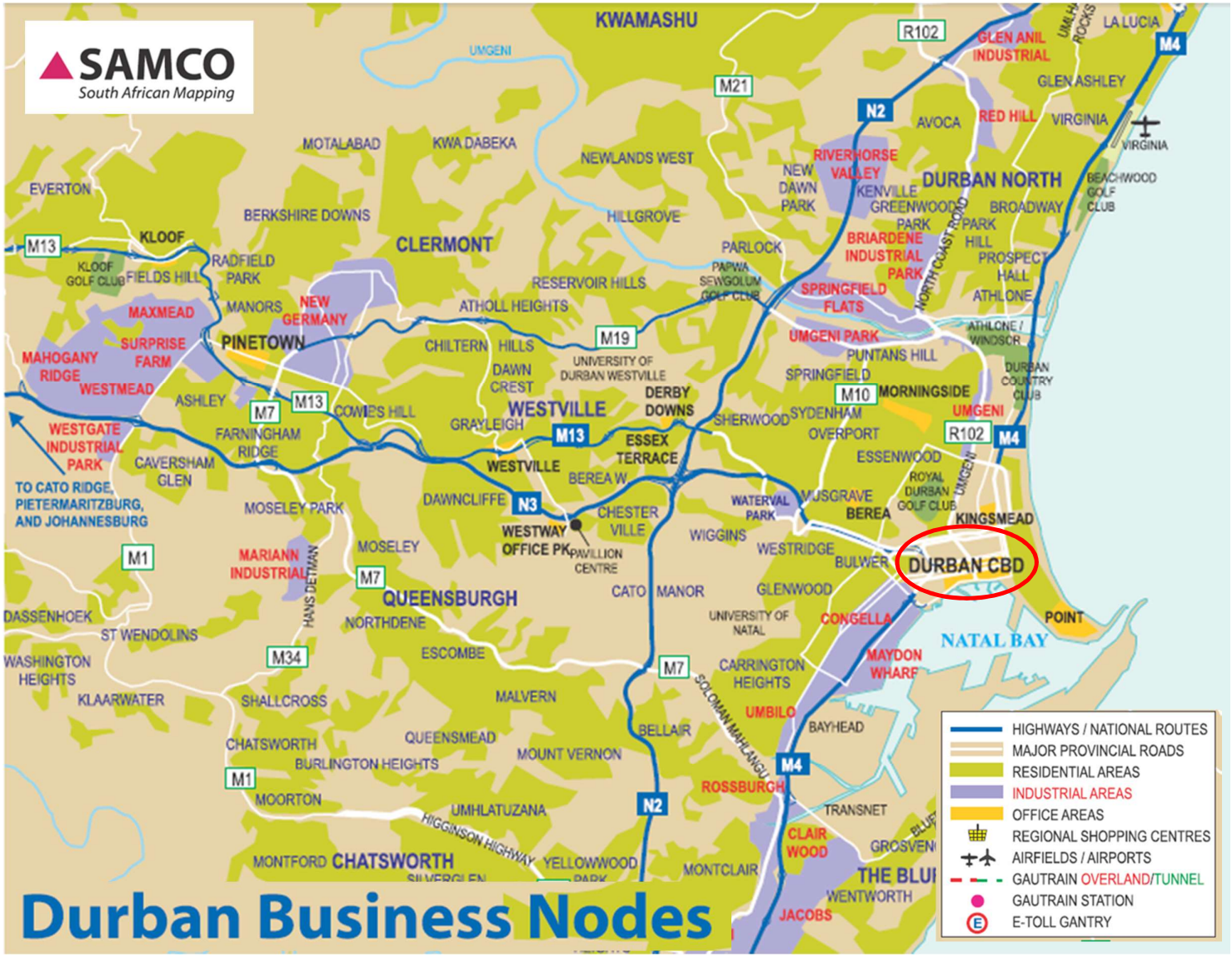
Annexure B – Maps of main cities with specific nodes





Tshwane Business Nodes


SAMCO
South African Mapping
TABLE BAY
CAPE TOWN CBD
DURBANVILLE
BELLVILLE
CLAREMONT
Cape Town Business Nodes
HIGHWAYS / NATIONAL ROUTES
MAJOR PROVINCIAL ROADS
RESIDENTIAL AREAS
INDUSTRIAL AREAS
OFFICE AREAS
REGIONAL SHOPPING CENTRES
AIRFIELDS / AIRPORTS
GAUTRAIN OVERLAND/TUNNEL
GAUTRAIN STATION
E-TOLL GANTRY


SAMCO
South African Mapping
KWAMASHU
UMGENI
M21
R102
GLEN ANIL INDUSTRIAL
LA LUCIA
M4
GLEN ASHLEY
N2
AVOCA
RED HILL
VIRGINIA
MOTALABAD
KWA DABEKA
NEWLANDS WEST
RIVERHORSE VALLEY
NEW DAWN PARK
DURBAN NORTH
BEACHWOOD GOLF CLUB
EVERTON
BERKSHIRE DOWNS
HILLGROVE
KENVILLE
GREENWOODS PARK
BROADWAY
PARK HILL
M13
KLOOF
CLERMONT
PARLOCK
BRIARDENE INDUSTRIAL PARK
PROSPECT HALL
KLOOF GOLF CLUB
FIELDS HILL
RADFIELD PARK
RESERVOIR HILLS
PAPWA SEWGOLUM GOLF CLUB
SPRINGFIELD FLATS
ATHLONE
MAXMEAD
MANORS
NEW GERMANY
ATHOLL HEIGHTS
ATHLONE / WINDSOR
SURPRISE FARM
PINETOWN
CHILTERN HILLS
M19
UMGENI PARK
PUNTANS HILL
MAHOGANY RIDGE
WESTMEAD
DAWN CREST
UNIVERSITY OF DURBAN WESTVILLE
SPRINGFIELD
DURBAN COUNTRY CLUB
M10
MORNINGSIDE
ASHLEY
M7
M13
COWIES HILL
WESTVILLE
DERBY DOWNS
SHERWOOD
SYDENHAM
UMGENI
GRAYLEIGH
M13
ESSEX TERRACE
OVERPORT
R102
M4
WESTGATE INDUSTRIAL PARK
FARNINGHAM RIDGE
ESSENWOOD
CAVERSHAM GLEN
WESTVILLE
BEREA W
ROYAL DURBAN GOLF CLUB
UMGENI
TO CATO RIDGE, PIETERMARITZBURG, AND JOHANNESBURG
DAWNCLIFFE
N3
WATERVAL PARK
VUSGRAVE
BEREA
KINGSMEAD
MOSELEY PARK
CHESTER VILLE
WIGGINS
WESTWAY OFFICE PK
PAVILLION CENTRE
WESTRIDGE
M1
MARIANN INDUSTRIAL
MOSELEY
M7
BULWER
DURBAN CBD
QUEENSBURGH
CATO MANOR
GLENWOOD
DASSENHOEK
NORTHDENE
UNIVERSITY OF NATAL
CONGELLA
POINT
ST WENDOLINS
NATAL BAY
M34
ESCOMBE
M7
CARRINGTON HEIGHTS
MAYDON WHARF
WASHINGTON HEIGHTS
KLAARWATER
SHALLCROSS
MALVERN
UMBILO
BAYHEAD
CHATSWORTH
QUEENSMEAD
BELLAIR
MOUNT VERNON
BURLINGTON HEIGHTS
M1
M4
ROSSBURGH
MOORTON
UMHLATUZANA
N2
TRANSNET
HIGGINSON HIGHWAY
CLAIR WOOD
MONTFORD
CHATSWORTH
YELLOWWOOD PARK
MONTCLAIR
THE BLUF
WENTWORTH
JACOBS
HIGHWAYS / NATIONAL ROUTES
MAJOR PROVINCIAL ROADS
RESIDENTIAL AREAS
INDUSTRIAL AREAS
OFFICE AREAS
REGIONAL SHOPPING CENTRES
AIRFIELDS / AIRPORTS
GAUTRAIN OVERLAND/TUNNEL
GAUTRAIN STATION
E-TOLL GANTRY
Durban Business Nodes

Annexure C – Definitions of the KPI'S

Definitions of the 10 KPIs

1. Vacancy rate

Vacancy rate reflects the current demand for offices in the specific nodes. The higher the vacancy rate, the lower the demand for office space in the node which in turn will negatively influence the rental rates.

According to IPD the definition of vacancy rate is the following:

2. Change in vacancy rate

Change in vacancy rate indicates the increase or decrease of demand over the given period. Through the change, it is more evident if the rental rates are on an upward curve or if they are decreasing.

3. Total return

Total return indicates the historical performance of the node in terms of yield and capital growth. Total return, when evaluating performance, is the return of an investment over a period of time. Total return includes the following items namely interest, dividends, capital gains and distributions. Total return is always shown as a percentage of the figures invested. Total return is a great performance measure when it comes to an investment.

According to IPD "Total Return is calculated as the change in capital value, less any capital expenditure incurred, plus net income, expressed as a percentage of capital employed over the period concerned. The sum of capital growth and income return for any single month."

$$\frac{\sum_i (CV_{it} - CV_{i(t-1)} - CExp_{it} + CRpt_{it} + NI_{it})}{\sum_i (CV_{i(t-1)} + CExp_{it})}$$

Where:

- TRt is the total return in month t;
- CVt is the capital value at the end of month t;
- Cexpt is the total capital expenditure during the month t (includes all purchase, development and other capital expenditure);
- Crect is the total capital receipts during the month t (includes all sale receipts and other capital receipts); and
- NIt is the day-dated rent receivable during the month, net of asset management costs, ground rent and other irrecoverable expenditure.

4. Rental yield

Rental yield is the income return on an investment, such as the rental from renting an office block. The yield is generally shown as a percentage based on the investments market value.

According to IPD rental yield is “the annualised base rent receivable as a percentage of the capital value at the same date. Base rent excludes recoveries.”

5. Rental growth

Rental growth indicates the increase or decrease in the demand over the given period.

According to IPD rental growth is “the increase in base rent receivable on properties held throughout the period expressed as a percentage of the base rent receivable from the previous period.”

6. Income return

Income return is the ratio of total return generated from the income of the investment.

According to IPD Income Return “is calculated as net income expressed as a percentage of capital employed over the period concerned.”

7. Capital growth

Capital growth is the change in value of an asset or investment over a certain period of time. Capital growth is determined by taking the current value of the investment in relation to the initial investment. Capital growth is a very important investment objective for investors.

According to IPD capital Growth “is calculated as the change in capital value, less any capital expenditure incurred, expressed as a percentage of capital employed over the period concerned.”

8. Size of the node

The importance of the nodal size is that it reflects the demand for offices over a sustained period. It also indicates that the node is growing when the nodal size is higher in relation to other nodes.

9. Gross rental achieved in this node

Gross rentals achieved in the node is a strong incitation of the demand for offices and specifically P- and A-Grade offices in the node. The higher the gross rentals, the lower the vacancies tend to be which indicates that it is a node with higher return on investment for the investor.

IPD states that Gross rentals are “the rent due from the tenants calculated on a daily basis, taking into account rent reviews, vacancies and rent-free periods but not arrears of payment.”

10. Change in gross rental

Change in gross rental indicates the increase or decrease of demand over the given period in terms of gross rentals. Through the change, it is more evident if the rental rates are on an upward curve or if they are decreasing.

Annexure D – Responses to the interview questions

Some of the responses as to why the companies use an investment decision-making tool and what elements the companies' tool consist of:

"Yes, because the company is focused on government as their main tenant, they normally look at the CBDs in the main metropolitan areas, decisions are based on where the government wants to be situated.";

"Yes. The company mainly looks at rental growth, vacancies, cost of occupiers, and stock availabilities.";

"Yes, the company makes use of different investment criteria and has an unformulated tool to do so.";

"Yes. We normally look at internal rate of return (IRR), gut feel, experience, and initial returns.";

"Yes, the company makes use of a decision-making model which incorporates different aspects of decision making, namely the executive committee (ExCo) meetings to get the experts opinion, as well as excel criteria with a rating mechanism. The company also looks at the data available in the market.";

"Yes, the company makes use of management report incorporated (MRI), a workplace solutions property software company, and we make use of practical experience as well as taking into consideration the IPD and SAPOA data with regression models.";

"Yes, we first ask ourselves why do we want to do it? Then we do a full assessment of the market place and try to create a lifestyle commitment. We try to create a brand around the real estate that people will want to buy into. It is all about the brand, and normally we only focus on the P-Grade tenants, and we create an experience that is different to the norm.";

"Yes. After years of experience we came to the conclusion that investment decisions need to be made more scientifically and as a result of this, we have formulated our own tool to guide us.";

"Yes, making use of IRR over a period and looking for approximately 15-20% return."

The companies that do not make use of a formulised model or tool responded as follows:

"No, we do not make use of a specific decision-making model or tool but the company builds up a picture of what it desires and makes sure that there are sound cash flow and growth. It also ensures that it is a tenant friendly node, a node that will attract new tenants when vacant, and makes use of brokers to bring you offers.";

"No, the company is situated in Cape Town and has specific boundaries. We do not invest in places outside the Waterfront so the company does not make use of any information regarding the best node.";

"No, the company does not make use of any decision-making model or tool but looks at cost of funding, the debt equity ratio, quality of the tenants, the rental achieved in the node, the cap rate, initial yield, and the developments in the node.";

"No, not really at the moment. We have Excel spreadsheets with some calculations but that is more for property management.";

"No, we do not have a specific tool but do thorough market research. This included looking at the data form IPD and SAPOA, the growth, the values of the land, the values of the properties, vacancy rates etc. The company's main investment portfolio is in retail and we typically invest in offices where the holder company is the predominant occupier. Therefore, the investment criteria are not the same as the conventional office sectors company.";

"No, not specifically. We use mathematical aspects to see the potential growth, income, and return on investment.";

"No, we do not make use of a formal model but we look at the market analysis, selling rate, letting rate per m^2, delivery date, and feasibility.";

"No, the company does not have a tool or model for office space but normally looks at the density of tenants in the node, the market rentals, forecasting to identify the new upcoming nodes, the road network in the area, the demographics, who owns land in the node, and the security in the node."

The 38% of respondents indicated that said they do use an investment tool to rank top performing nodes had the following reasons and explanations as to why:

"The company mainly makes use of brokers, but we also look at SAPOA, market research, and vacancies.";

"Yes, we make use of Dr. Dirk Prinsloo's tool and use our in-house tool to confirm the results.";

"Yes, we have a rating tool just to give us an idea of the nodes that do the best.";

"Yes, we look at the SAPOA data.";

"Yes, we formulated our own research tool which we are proud of and have identified some important KPIs and attached a weighting to each KPI. In terms of this tool, we are on an annual basis, ranking these nodes per city and use that as a guide to determine what the company's current exposure is and what the exposure should be going forward. We also then determine how much we are under or over exposed in a certain node."

The main reasons why 78% of the respondents value historical data:

"Yes, the reports give you insight into all the relevant vacancy- and rental rates, so that one can see which are market related.";

"Yes, it shows patterns. It is not always predicative and correct, but we need to also understand the history and provincial insights to try predict the future.";

"Yes, there is definitely value in historical data but you cannot use it in isolation. It will have to be in conjunction with experience and the opinion of the ExCo.";

"Yes, but it is also important to understand that we should not base our decisions mainly on historical data. We need to take the soft issues of the decisions as well as gut feeling into consideration.";

"Yes, there is value in IPD data and looking at the data from SAPOA.";

"Yes, it is very important. It will not give you the precise answer but the data will help you to get to the correct answer.";

"Yes, the historical data such as the rental escalations, total returns and vacancy rates gives you a good picture of the current state that the node is in, but to be accurate in using the data to predict the future would be a challenge.";

"Absolutely, because the historical data is giving you a scientific base to work from. It clearly indicates the performance of the nodes in the historical period, and unquestionably sets the node up for future performance. The only problem with historical data is that it is historical and therefore it cannot be used without further interpretation and extrapolation to determine the future performance of the nodes.";

"Yes, there is value in it but it mainly gives you underlying and basic information about the node."

Some reasons as to why you should not use historical data include:

"No, the problem with historical data is that it can change overnight. We do not use historical data.";

"No, because it is backward looking and not looking at the future. Historical data will not give you the accurate results you desire.";

"No, it is more important to look to the future than at historical data. Development decisions are based on the predicted future performance of the nodes."

The 82% of respondents that use IPD data mainly look at the following items:

"Yes, we make use of rental rates, escalation percentages, operating costs, and expenditures.";

"Yes, we look at performance of the fund. We also use it to determine what everybody spends on benchmarking costs, and are we getting market related rentals.";

"Yes, we make use of IPD data to compare apples with apples and to have a method to measure performance. We make use of rental rates, income, cap rates, trends, average rentals, and expense ratios.";

"Yes, we frequently make use of the data form IPD relating the rental rates, vacancy rates, and capital expenditure (CAPEX) spending in the node.";

"Yes, we look at the data available especially vacancies and rental rates.";

"Yes, we look at the vacancy rates, cap rates, income, and new developments in the node.";

"Yes, we make use of the vacancy rates and the rental rates achievable in the area. We also make use of the data to compare the company's assets against other assets in the area.";

"Yes, we heavily rely on IPD data together with SAPOA data. We look at the performance of the nodes, the total return for the node and we compare our buildings' total return against the IPD nodal performance."

Annexure E – Regression Model Road Maps

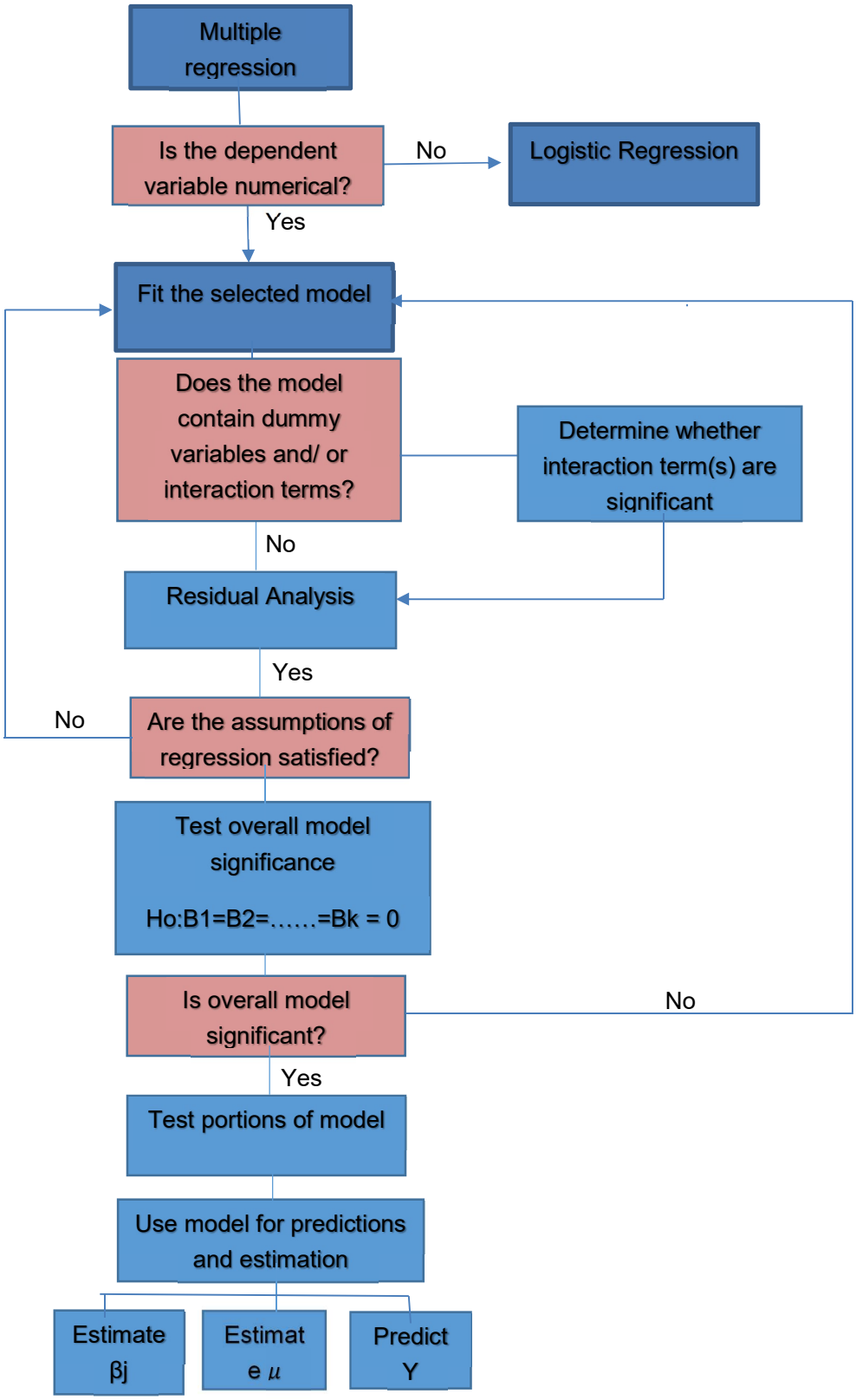


Figure 21: Multiple regression roadmap (Levine, Berenson & Krehbiel, 2008)

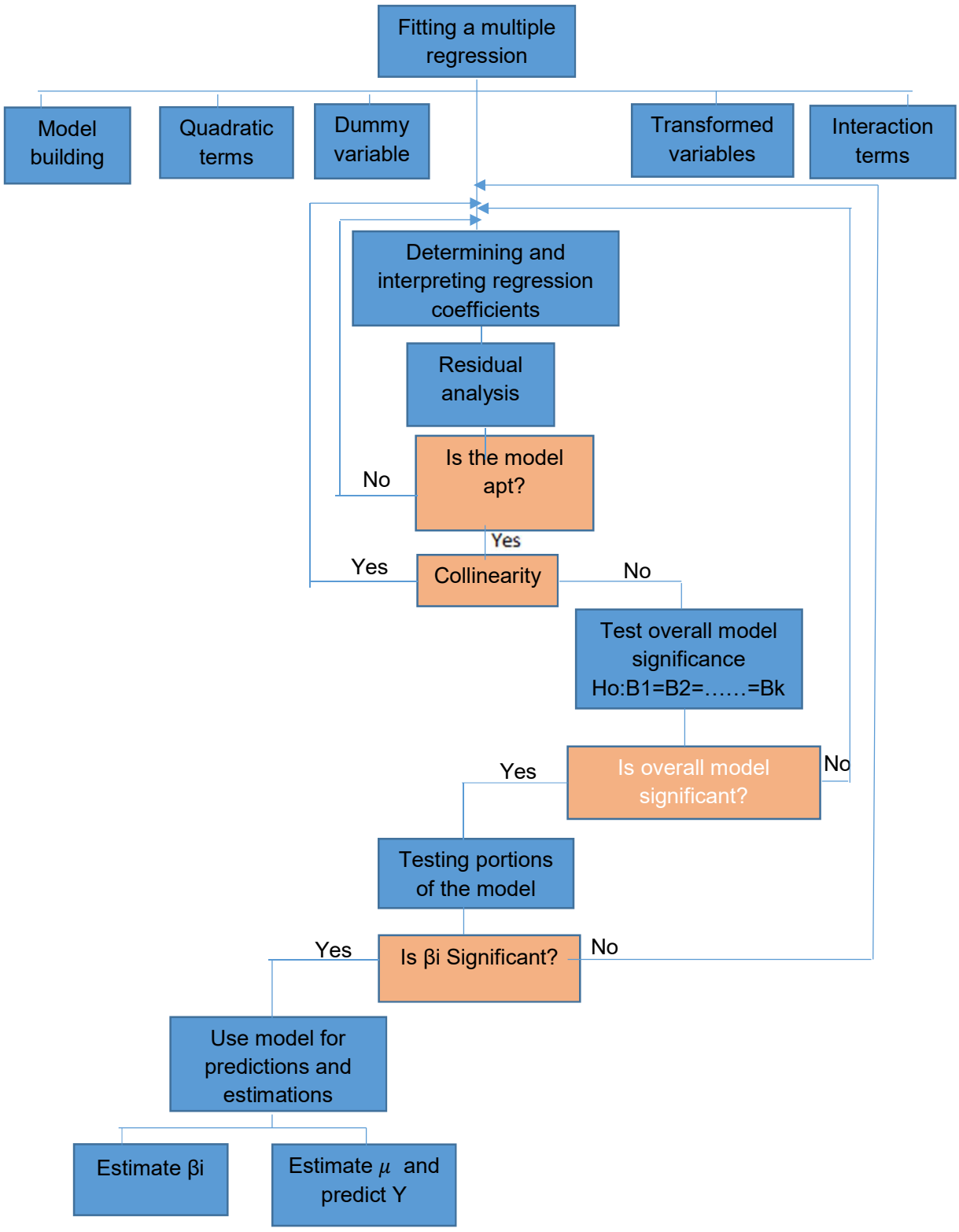


Figure 22: Fitting the multiple regression model (Levine, Berenson & Krehbiel, 2008)

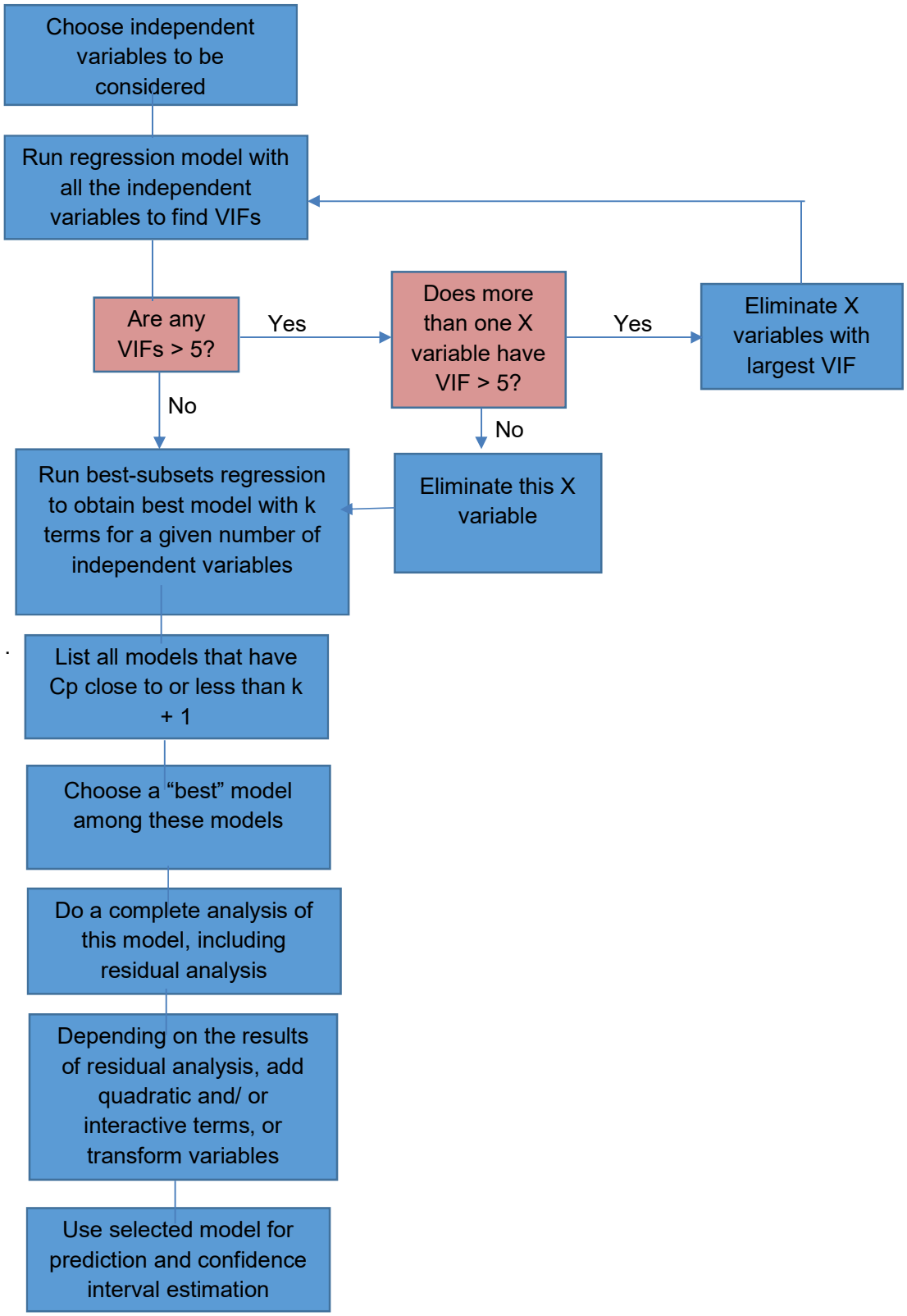


Figure 23: Roadmap used in this study for model building (Levine, Berenson & Krehbiel, 2008

Annexure F – Regression Models

Regression model 1

Table 39: Descriptive statistics- Regression model 1

Descriptive Statistics			
	Mean	10.190228	N
Total Return	16.3947747	10.190228	270
CV -1 year lag	0.14402635	1.00050884	270
CV – 2 year lag	0.1147271	0.7845971	270
CV – 3 year lag	0.17949664	1.03136772	270
CV – 4 year lag	0.2205984	1.05221353	270
CV – 5 year lag	0.24549907	1.24729443	270
CV – 6 year lag	0.27032368	1.23789453	270
CV- 7 year lag	0.23293533	1.23789453	270
CV – 8 year lag	0.3563605	1.67475627	270
CV– 9 year lag	0.38895554	1.75608911	270
CV– 10 year lag	0.40267231	1.71400307	270
CGR – 1 year lag	0.08549992	1.24729443	270
CGR – 2 year lag	0.0816853	0.12382014	270
CGR – 3 year lag	0.08542568	0.15532879	270
CGR – 4 year lag	0.08002333	0.15251627	270
CGR – 5 year lag	0.08309314	0.15186889	270
CGR – 6 year lag	0.08387328	0.15532879	270
CGR – 7 year lag	0.08731265	0.15270555	270
CGR – 8 year lag	0.08645004	0.15067268	270
CGR – 9 year lag	0.07890118	0.15076787	270
CGR – 10 year lag	0.07029227	0.14893602	270
CG – 1 year lag	6.50491844	9.26636924	270
CG – 2 year lag	6.26225448	9.45356537	270
CG – 3 year lag	5.59147274	10.0073219	270
CG – 4 year lag	5.131897	10.3305789	270
CG – 5 year lag	5.26307607	10.3523806	270
CG – 6 year lag	5.1129303	10.5208914	270
CG – 7 year lag	4.81000126	10.5566734	270
CG – 8 year lag	4.35567333	10.4190582	270
CG – 9 year lag	2.7248883	8.97607949	270
CG – 10 year lag	1.6353237	7.9167405	270
SoN – 1 year lag	178555.566	98798.7471	270
SoN – 2 year lag	174471.799	98757.6383	270
SoN – 3 year lag	169402.938	101131.242	270
SoN – 4 year lag	167439.059	111129.365	270
SoN – 5 year lag	166635.565	125115.131	270
SoN – 6 year lag	166790.915	139191.94	270
SoN – 7 year lag	165289.256	150625.983	270
SoN – 8 year lag	166064.585	161011.383	270
SoN – 9 year lag	164386.768	171131.394	270
SoN – 10 year lag	160646.642	177883.475	270

The first multiple regression model formulated consisted of all the KPIs (change in vacancy, change in gross rental, capital growth and size of node) measured against the dependent variable total return.

Table 40: Model summary - Regression model 1

Model Summary					
Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Durbin Watson
1	.691[a]	0.478	0.387	7.979770524	1.853

It is evident that in Table 40, the R-square is 47.8% and the adjusted R-square is 38.7%. This means that 38.7% of total return could be explained through the independent variables being the KPIs.

Table 41: ANOVA table - Regression model 1

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	13351.19	40	333.78	5.242	.000[b]
Residual	14581.97	229	63.677		
Total	27933.16	269			

Table 41 indicates the dependent variable is 38.7% explained through the independent variables. The F-value in this regression model is 5.242.

Table 4238: Coefficient table - Regression model 1

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	19.553	1.744		11.212	0		
CV -1 year lag	-0.143	0.557	-0.014	-0.256	0.798	0.762	1.313
CV - 2 year lag	-0.647	0.739	-0.05	-0.876	0.382	0.704	1.42
CV – 3 year lag	0.284	0.535	0.029	0.53	0.596	0.778	1.285
CV – 4 year lag	0.162	0.532	0.017	0.305	0.761	0.756	1.323
CV – 5 year lag	1.46	0.462	0.175	3.161	0.002	0.745	1.342
CV – 6 year lag	0.598	0.445	0.073	1.343	0.181	0.768	1.303
CV- 7 year lag	0.896	0.449	0.109	1.996	0.047	0.767	1.304
CV – 8 year lag	0.995	0.329	0.163	3.025	0.003	0.781	1.281

CV– 9 year lag	0.024	0.321	0.004	0.074	0.941	0.746	1.341
CV – 10 year lag	0.538	0.328	0.09	1.638	0.103	0.747	1.339
CGR – 1 year lag	-0.966	4.887	-0.011	-0.198	0.844	0.68	1.471
CGR – 2 year lag	-3.828	4.739	-0.047	-0.808	0.42	0.688	1.454
CGR – 3 year lag	0.548	3.727	0.008	0.147	0.883	0.771	1.297
CGR – 4 year lag	-7.269	3.615	-0.109	-2.011	0.046	0.779	1.284
CGR – 5 year lag	0.636	3.661	0.009	0.174	0.862	0.766	1.306
CGR – 6 year lag	-9.447	3.521	-0.144	-2.683	0.008	0.792	1.263
CGR – 7 year lag	-3.959	3.561	-0.059	-1.112	0.267	0.801	1.249
CGR – 8 year lag	-0.547	3.757	-0.008	-0.146	0.884	0.739	1.354
CGR – 9 year lag	-1.378	3.752	-0.02	-0.367	0.714	0.74	1.351
CGR – 10 year lag	-6.165	3.662	-0.09	-1.684	0.094	0.796	1.256
CG – 1 year lag	0.176	0.069	0.16	2.563	0.011	0.585	1.708
CG – 2 year lag	0.032	0.067	0.03	0.475	0.635	0.583	1.715
CG – 3 year lag	-0.142	0.065	-0.139	-2.196	0.029	0.567	1.763
CG – 4 year lag	-0.26	0.064	-0.263	-4.084	0	0.548	1.826
CG – 5 year lag	-0.12	0.063	-0.122	-1.913	0.057	0.561	1.784
CG – 6 year lag	0.017	0.064	0.018	0.266	0.79	0.527	1.898
CG – 7 year lag	0.026	0.065	0.027	0.405	0.686	0.505	1.979
CG – 8 year lag	-0.262	0.069	-0.268	-3.772	0	0.452	2.211
CG – 9 year lag	-0.229	0.08	-0.202	-2.855	0.005	0.456	2.194
CG – 10 year lag	0.137	0.083	0.107	1.648	0.101	0.545	1.835
SoN – 1 year lag	7.06E-06	0	0.068	0.474	0.636	0.11	9.128
SoN – 2 year lag	5.08E-06	0	0.049	0.246	0.806	0.057	17.578
SoN – 3 year lag	1.40E-05	0	0.139	0.708	0.479	0.059	16.887
SoN – 4 year lag	-8.31E-06	0	-0.091	-0.448	0.654	0.056	17.923
SoN – 5 year lag	-2.08E-05	0	-0.255	-1.114	0.267	0.043	23.047
SoN – 6 year lag	7.26E-06	0	0.099	0.373	0.71	0.032	31.083
SoN – 7 year lag	7.10E-06	0	0.105	0.349	0.727	0.025	39.63
SoN – 8 year lag	-8.54E-06	0	-0.135	-0.427	0.67	0.023	43.745
SoN – 9 year lag	-1.19E-06	0	-0.02	-0.061	0.952	0.021	47.802
SoN – 10 year lag	2.82E-06	0	0.049	0.227	0.821	0.048	20.691

The variables in the regression model with a high significance is: CV – 5 year lag; CV – 8 year lag; CGR - 4 year lag; CCR - 6-year lag; CG – 1 year lag; CG – 3 year lag; CG - 9 year lag

Regression model 2

After regression model 1, the researcher was interested to see what effect the size of node with different lags had on total return and if these variables carry any significance.

Table 43: Descriptive statistics- Regression model 2

Descriptive Statistics			
	Mean	Std. Deviation	N
Total Return	16.39477	10.19023	270
SoN - 1 year lag	178555.6	98798.75	270

SoN - 2 year lag	174471.8	98757.64	270
SoN - 3 year lag	169402.9	101131.2	270
SoN - 4 year lag	167439.1	111129.4	270
SoN – 5 year lag	166635.6	125115.1	270
SoN – 6 year lag	166790.9	139191.9	270
SoN - 7 year lag	165289.3	150626	270
SoN – 8 year lag	166064.6	161011.4	270
SoN - 9 year lag	164386.8	171131.4	270
SoN – 10 year lag	160646.6	177883.5	270

Table 44: Model summary- Regression model 2

Model Summary				
R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Durbin Watson
.211[a]	0.045	0.008	10.15053	1.355

Table 44 indicates that regression model 2 consists of a R-square value of 4.5% and an adjusted R-square value of 0.8%.

Table 45: ANOVA table - Regression model 2

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1247.551	10	124.755	1.211	.284[b]
Residual	26685.61	259	103.033		
Total	27933.16	269			

The ANOVA table (Table 45) indicates that the size of node could explain 0.8% of the dependent variable total return.

Table 46: Coefficient table - Regression model 2

Coefficients							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	16.241	1.307		12.428	0		
SoN -1 year lag	-1.96E-05	0	-0.19	-1.159	0.248	0.137	7.295
SoN - 2 year lag	1.67E-05	0	0.161	0.703	0.482	0.07	14.286
SoN - 3 year lag	1.06E-05	0	0.105	0.459	0.647	0.071	14.167

SoN - 4 year lag	-1.34E-06	0	-0.015	-0.062	0.95	0.067	14.921
SoN - 5 year lag	-2.94E-05	0	-0.361	-1.378	0.17	0.054	18.607
SoN - 6 year lag	2.64E-05	0	0.361	1.199	0.231	0.041	24.54
SoN - 7 year lag	2.31E-06	0	0.034	0.098	0.922	0.031	32.64
SoN - 8 year lag	8.53E-06	0	0.135	0.374	0.709	0.028	35.256
SoN - 9 year lag	1.13E-05	0	0.19	0.512	0.609	0.027	37.306
SoN - 10year lag	-2.48E-05	0	-0.433	-1.738	0.083	0.06	16.803

The coefficient table (Table 13) clearly indicates that SoN - 10 year lag (0.083) and SoN - 5 year lag (0.17) have a noteworthy higher significance than the other variables.

Regression model 3

In this regression model, the researcher included the SoN - 10 year lag and SoN - 5 year lag to investigate what effect these two variables will have on total return.

Table 39: Descripted statistics- Regression model 3

Descriptive Statistics			
	Mean	Std. Deviation	N
Total Return	16.39477	10.19023	270
SoN - 5 year lag	166635.6	125115.1	270
SoN - 10 year lag	160646.6	177883.5	270

Table 40: Model summary- Regression model 3

Model Summary					
Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Durbin Watson
1	.058[a]	0.003	-0.004	10.21099	1.316

This model has a R–square value of 0.3% and an adjusted R-square value of -0.4%.

Table 41: ANOVA table - Regression model 3

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Regression	94.603	2	47.301	0.454	.636[b]
Residual	27838.56	267	104.264		
Total	27933.16	269			

The F-value of this model is 0.454 (as seen in Table 49) and through this regression model - 0.4% of the dependent variable could be explained through the independent variables, with a 36% confidence.

Table 42: Coefficient table - Regression model 3

Coefficients							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	16.148	1.042		15.503	0		
SoN - 5 year lag	6.35E-06	0	0.078	0.828	0.409	0.421	2.377
SoN - 10 year lag	-5.05E-06	0	-0.088	-0.936	0.35	0.421	2.377

Table 50 indicates that none of these two variables have a high significance in terms of explaining the dependent variable.

Regression model 4

The researcher further examines the effect that only SoN - 5 year lag will have on total return.

Table 43: Descriptive statistics - Regression model 4

Descriptive Statistics			
	Mean	Std. Deviation	N
Total Return	14.71812	10.13880146	390
SoN - 5 year lag	163197.9	155367.6635	390

Table 44: Model summary - Regression model 4

Model Summary					
Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Durbin Watson
1	.038[a]	0.001	-0.001	10.14439	1.151

The R-square value in this regression model is 0.1% and adjusted R-square value is -0.1%.

Table 45: ANOVA table - Regression model 4

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	58.793	1	58.793	0.571	.450[b]
Residual	39928.58	388	102.909		
Total	39987.37	389			

The F-value is 0.571 and with 55% of certainty SoN - 5 year lag can explain -0.1% of the dependent variable.

Regression model 5

The researcher further built on the model by keeping SoN - 5 year lag and by adding change in vacancy rate and change in gross rental in the regression model.

Table 46: Descriptive statistics - Regression model 5

Descriptive Statistics			
	Mean	Std. Deviation	N
Total Return	14.52195	9.92165277	362
SoN - 5 year lag	155765.8	145161.717	362
Change in Vacancy	0.251836	1.2207538	362
Change in Gross Rental	0.081959	0.14492151	362

Table 47: Model summary - Regression model 5

Model Summary				
R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Durbin Watson
.249[a]	0.062	0.054	9.650353	1.226

As shown in Table 55, it is evident that the R-square value is 6.2% and the adjusted R-square value is 5.4%.

Table 48: NOVA table - Regression model 5

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2196.257	3	732.086	7.861	.000[b]
Residual	33340.29	358	93.129		
Total	35536.55	361			

Table 56 indicates that 5.4% of total return can be explained through the three variables used in this multiple regression. The F-value in this regression model is 7.861.

Table 49: Coefficient table - Regression model 5

Coefficients							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	14.287	0.815		17.534	0		
SoN – 5 year lag	-5.01E-06	0	-0.073	-1.423	0.155	0.988	1.012
Change in Vacancy	-0.691	0.427	-0.085	-1.618	0.107	0.949	1.053
Change in Gross Rental	14.514	3.588	0.212	4.046	0	0.954	1.048

All variables in this regression model had high significance in explaining the dependent variable, with change in gross rental being the variable that best described total return.

In the multiple regression model, it is clear that the tolerance values of the three variables are all above 0.1. The VIF values are all below 2.5.

Regression model 6

The researcher further built on the model by looking at change in vacancy and change in gross rental together with all the size of nodes year lags as independent variables.

Table 50: Descriptive statistics - Regression model 6

Descriptive Statistics			
	Mean	Std. Deviation	N
Total Return	15.93445	9.927286	252
Change in Vacancy	0.183187	1.033895	252
Change in Gross Rental	0.084488	0.120596	252
SoN - 1 year lag	178508.6	97945.28	252
SoN - 2 year lag	174063.6	97757.52	252
SoN - 3 year lag	167748.2	99270.09	252
SoN - 4 year lag	164963.3	108939	252
SoN - 5 year lag	162788.1	120766.1	252
SoN - 6 year lag	160597.4	131617.1	252
SoN - 7 year lag	157382.2	140914	252
SoN - 8 year lag	156533	148769.5	252
SoN - 9 year lag	153958.4	158546.3	252
SoN - 10 year lag	149315.1	164588.8	252

Table 51: Model summary - Regression model 6

Model Summary					
Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Durbin Watson
1	.346[a]	0.12	0.076	9.543952	1.412

In this regression model, it is evident that the independent variables produce a R-square value of 12% and an adjusted R-square value of 7.6%.

Table 52: ANOVA Table - Regression model 6

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2966.506	12	247.209	2.714	.002[b]
Residual	21769.8	239	91.087		
Total	24736.3	251			

The ANOVA table (Table 60) stipulates that with a 99.8% level of certainty these variables can explain 7.6% of total return. The F-value in this regression model is 2.714.

Table 53: Coefficient table - Regression model 6

Coefficients							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	14.187	1.361		10.424	0		
Change in Vacancy	-0.765	0.604	-0.08	-1.266	0.207	0.93	1.076
Change in Gross Rental	17.169	5.203	0.209	3.3	0.001	0.922	1.085
SoN - 1 year lag	-2.03E-05	0	-0.201	-1.158	0.248	0.123	8.157
SoN - 2 year lag	2.65E-05	0	0.261	1.051	0.295	0.06	16.709
SoN - 3 year lag	7.76E-06	0	0.078	0.319	0.75	0.062	16.06
SoN - 4 year lag	-1.24E-06	0	-0.014	-0.055	0.956	0.061	16.347
SoN - 5 year lag	-2.80E-05	0	-0.34	-1.284	0.2	0.052	19.059
SoN - 6 year lag	2.49E-05	0	0.33	1.103	0.271	0.041	24.329
SoN - 7 year lag	7.60E-06	0	0.108	0.318	0.751	0.032	31.305
SoN - 8 year lag	1.83E-06	0	0.027	0.077	0.939	0.029	34.199
SoN - 9 year lag	9.40E-06	0	0.15	0.416	0.678	0.028	35.422
SoN - 10 year lag	-2.69E-05	0	-0.445	-1.851	0.065	0.064	15.708

The coefficient table for the multiple regression clearly highlights that SoN - 10 year lag (0.065) and SoN - 5 year lag (0.2) have a high significance in explaining total return, although the variable that has the highest significance is the change in gross rentals (0.001).

Regression model 7

In the following multiple regression model, the researcher further built on the model by eliminating all the different variables that did not have a high significance in regression model 1 where all the variables were included in the regression. The researcher also included all the different size of nodes lag years in this multiple regression model.

Table 54: Descriptive statistics - Regression model 7

Descriptive Statistics			
	Mean	Std. Deviation	N
Total Return	16.39477	10.19023	270
CV - 5 year lag	0.245499	1.220622	270
CV - 7 year lag	0.232935	1.237895	270
CV - 8 year lag	0.35636	1.674756	270
CGR - 4 year lag	0.080023	0.152516	270
CGR - 6 year lag	0.083873	0.155329	270
CGR - 10 year lag	0.070292	0.148936	270
CG - 1 year lag	6.504918	9.266369	270
CG - 4 year lag	5.131897	10.33058	270
CG - 5 year lag	5.263076	10.35238	270
CG - 8 year lag	4.355673	10.41906	270
CG - 9 year lag	2.724888	8.976079	270
CG - 10 year lag	1.635324	7.916741	270
SoN - 1 year lag	178555.6	98798.75	270
SoN - 2 year lag	174471.8	98757.64	270
SoN - 3 year lag	169402.9	101131.2	270
SoN - 4 year lag	167439.1	111129.4	270
SoN - 5 year lag	166635.6	125115.1	270
SoN - 6 year lag	166790.9	139191.9	270
SoN - 7 year lag	165289.3	150626	270
SoN - 8 year lag	166064.6	161011.4	270
SoN - 9 year lag	164386.8	171131.4	270
SoN - 10 year lag	160646.6	177883.5	270

Table 55: Model summary - Regression model 7

Model Summary				
R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Durbin Watson
.669[a]	0.447	0.398	7.904645	1.943

In this multiple regression model (Table 63), the R-square value is 44.7% and the adjusted R-square value is 39.8% indicating that dependent variables are able to explain 39.8% of total return.

Table 56: ANOVA table - Regression model 7

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	12499.76	22	568.171	9.093	.000[b]
Residual	15433.4	247	62.483		
Total	27933.16	269			

It is evident (as seen in Table 64) that this regression model has a F-value of 9.093 and that 39.8% of the dependent variables could be explained.

Table 57: Coefficient table - Regression model 7

Coefficients							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	19.388	1.392		13.93	0		
CV - 5 year lag	1.341	0.422	0.161	3.178	0.002	0.876	1.142
CV - 7 year lag	0.869	0.413	0.106	2.105	0.036	0.889	1.125
CV - 8 year lag	0.807	0.303	0.133	2.664	0.008	0.901	1.11
CGR - 4 year lag	-6.672	3.433	-0.1	-1.943	0.053	0.847	1.18
CGR - 6 year lag	-10.048	3.308	-0.153	-3.037	0.003	0.88	1.137
CGR - 10 year lag	-7.286	3.414	-0.106	-2.134	0.034	0.899	1.113
CG - 1 year lag	0.176	0.06	0.16	2.931	0.004	0.746	1.34
CG - 4 year lag	-0.325	0.056	-0.33	-5.769	0	0.685	1.459
CG - 5 year lag	-0.123	0.058	-0.125	-2.129	0.034	0.651	1.535
CG - 8 year lag	-0.226	0.061	-0.231	-3.7	0	0.576	1.737
CG - 9 year lag	-0.257	0.075	-0.227	-3.448	0.001	0.518	1.93
CG - 10 year lag	0.158	0.077	0.123	2.038	0.043	0.618	1.619
SoN - 1 year lag	8.70E-07	0	0.008	0.063	0.95	0.126	7.92
SoN - 2 year lag	1.54E-05	0	0.149	0.806	0.421	0.065	15.303
SoN - 3 year lag	8.92E-06	0	0.089	0.483	0.629	0.067	14.979

SoN - 4 year lag	-1.19E-05	0	-0.13	-0.684	0.494	0.062	16.138
SoN - 5 year lag	-1.67E-05	0	-0.205	-0.965	0.335	0.05	20.163
SoN - 6 year lag	3.52E-06	0	0.048	0.192	0.848	0.036	27.954
SoN - 7 year lag	1.20E-05	0	0.177	0.631	0.529	0.028	35.27
SoN - 8 year lag	-6.45E-06	0	-0.102	-0.357	0.722	0.027	36.505
SoN - 9 year lag	-3.63E-06	0	-0.061	-0.205	0.838	0.025	39.362
SoN - 10 year lag	1.21E-06	0	0.021	0.105	0.917	0.054	18.36

Regression model 8

In this multiple regression model, all the highest significant variables were used as well as SoN - 5 year lag. This regression was used to determine whether total return would be better explained when using all the different years SoN or only by using SoN - 5 year lag which had the highest significance in relation to the other SoNs.

Table 58: Descriptive statistics - Regression model 8

Descriptive Statistics			
	Mean	Std. Deviation	N
Total Return	16.39477	10.19023	270
CV - 5 year lag	0.245499	1.220622	270
CV - 7 year lag	0.232935	1.237895	270
CV - 8 year lag	0.35636	1.674756	270
CGR - 4 year lag	0.080023	0.152516	270
CGR - 6 year lag	0.083873	0.155329	270
CGR - 10 year lag	0.070292	0.148936	270
CG - 1 year lag	6.504918	9.266369	270
CG - 4 year lag	5.131897	10.33058	270
CG - 5 year lag	5.263076	10.35238	270
CG - 8 year lag	4.355673	10.41906	270
CG - 9 year lag	2.724888	8.976079	270
CG - 10 year lag	1.635324	7.916741	270
SoN - 5 year lag	166635.6	125115.1	270

Table 59: Model summary - Regression model 8

Model Summary				
R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Durbin Watson
.656[a]	0.431	0.402	7.881554	1.919

The R-square in this regression model is 43.1% and adjusted R-square value is 40.2%.

Table 60: ANOVA table - Regression model 8

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	12030.72	13	925.44	14.898	.000[b]
Residual	15902.44	256	62.119		
Total	27933.16	269			

The F-value in the regression model is 14.898 and 40.2% of total return could be explained by the independent variables.

Table 61: Coefficient table - Regression model 8

Coefficients							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	20.542	1.237		16.603	0		
CV - 5 year lag	1.38	0.415	0.165	3.328	0.001	0.901	1.11
CV – 7 year lag	0.769	0.407	0.093	1.887	0.06	0.908	1.101
CV - 8 year lag	0.719	0.298	0.118	2.411	0.017	0.926	1.08
CGR – 4 year lag	-6.578	3.277	-0.098	-2.007	0.046	0.924	1.082
CGR - 6 year lag	-9.463	3.144	-0.144	-3.009	0.003	0.968	1.033
CGR – 10 year lag	-6.209	3.331	-0.091	-1.864	0.063	0.938	1.066
CG – 1 year lag	0.18	0.059	0.164	3.048	0.003	0.773	1.294

CG - 4 year lag	-0.332	0.054	-0.337	-6.133	0	0.737	1.357
CG - 5 year lag	-0.108	0.057	-0.11	-1.916	0.056	0.675	1.483
CG – 8 year lag	-0.209	0.059	-0.213	-3.559	0	0.62	1.614
CG - 9 year lag	-0.271	0.072	-0.238	-3.75	0	0.55	1.818
CG – 10 year lag	0.157	0.073	0.122	2.146	0.033	0.691	1.448
SoN – 5 year lag	-4.02E-06	0	-0.049	-0.992	0.322	0.899	1.112

Through Table 69, it is evident that the independent variables that had the highest significance and could best explain total return are the following: CGR - 6 year lag (0.003), CG - 1 year lag (0.003), CV - 8 year lag (0.017), CG - 10 year lag (0.033), CGR - 4 year lag (0.046), CG - 5 year lag (0.056), CV - 7 year lag (0.06), CGR - 10 year lag (0.063).

Regression model 9

The researcher further examined if the significance of the regression model would increase if one would eliminate all the SoN of all the years.

Table 62: Descriptive statistics - Regression model 9

Descriptive Statistics			
	Mean	Std. Deviation	N
Total Return	16.39477	10.19023	270
CV - 5 year lag	0.245499	1.220622	270
CV - 7 year lag	0.232935	1.237895	270
CV - 8 year lag	0.35636	1.674756	270
CGR - 4 year lag	0.080023	0.152516	270
CGR - 6 year lag	0.083873	0.155329	270
CGR - 10 year lag	0.070292	0.148936	270
CG - 1 year lag	6.504918	9.266369	270
CG - 4 year lag	5.131897	10.33058	270
CG - 5 year lag	5.263076	10.35238	270
CG - 8 year lag	4.355673	10.41906	270
CG - 9 year lag	2.724888	8.976079	270
CG - 10 year lag	1.635324	7.916741	270

Table 63: Model summary - Regression model 9

Model Summary

R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Durbin-Watson
.655[a]	0.429	0.402	7.881311	1.935

The R-square value in this regression model is 42.9% and the adjusted R-square value is 40.2%.

Table 64: ANOVA table - Regression model 9

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	11969.59	12	997.466	16.058	.000[b]
Residual	15963.57	257	62.115		
Total	27933.16	269			

The regression model has a F-value of 16.058 and 40.2% of the dependent variable could be explained by the independent variable.

Table 65: Coefficient table - Regression model 9

Coefficients							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	19.713	0.912		21.616	0		
CV – 5 year lag	1.416	0.413	0.17	3.428	0.001	0.908	1.101
CV - 7 year lag	0.795	0.406	0.097	1.955	0.052	0.912	1.096
CV – 8 year lag	0.725	0.298	0.119	2.432	0.016	0.926	1.08
CGR - 4 year lag	-6.724	3.274	-0.101	-2.054	0.041	0.926	1.08
CGR – 6 year lag	-9.442	3.144	-0.144	-3.003	0.003	0.968	1.033
CGR - 10 year lag	-6.514	3.317	-0.095	-1.964	0.051	0.946	1.057
CG - 1 year lag	0.187	0.059	0.17	3.201	0.002	0.785	1.273
CG - 4 year lag	-0.328	0.054	-0.332	-6.07	0	0.743	1.346
CG – 5 year lag	-0.098	0.056	-0.1	-1.764	0.079	0.698	1.433
CG – 8 year lag	-0.203	0.058	-0.208	-3.486	0.001	0.624	1.602
CG – 9 year lag	-0.265	0.072	-0.233	-3.681	0	0.554	1.806
CG – 10 year lag	0.162	0.073	0.126	2.23	0.027	0.695	1.439

In Table 73, it is evident that all the variables have fairly high significant values but the variables that have a notably higher significance is CV - 5 year lag (0.001), CG - 8 year lag (0.001), CG - 1 year lag (0.002), CGR - 6 year lag (0.003), CV - 8 year lag (0.016), CG - 10 year lag (0.027).

Regression model 10

This multiple regression model takes into account all the previous high significance variables including only SoN - 3 year lag, SoN - 4 year lag and SoN - 7 year lag to see if the significance of the model will increase by adding just the high significant SoNs.

Table 66: Descriptive Statistics - Regression model 10

Descriptive Statistics			
	Mean	Std. Deviation	N
Total Return	16.19137	10.14503	262
CV - 5 year lag	0.253263	1.23762	262
CV - 7 year lag	0.240048	1.256041	262
CV - 8 year lag	0.367242	1.699049	262
CGR - 4 year lag	0.081861	0.154366	262
CGR - 6 year lag	0.086434	0.156985	262
CGR - 10 year lag	0.072439	0.150684	262
CG - 1 year lag	6.491971	9.382877	262
CG - 4 year lag	5.196661	10.4427	262
CG - 5 year lag	5.350655	10.4709	262
CG - 8 year lag	4.488671	10.54917	262
CG - 9 year lag	2.808091	9.099728	262
CG - 10 year lag	1.685257	8.031897	262
SoN - 3 year lag	172299.4	100642.7	262
SoN - 4 year lag	170621.5	110637	262
SoN - 7 year lag	170336.3	150068.7	262

Table 67: Model summary - Regression model 10

Model Summary					
Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Durbin Watson
1	.669[a]	0.447	0.413	7.770661	1.945

The R-square value in the regression model is 44.7% and the adjusted R-square value is 41.3%.

Table 68: ANOVA table - Regression model 10

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	12008.26	15	800.551	13.258	.000[b]
Residual	14854.26	246	60.383		
Total	26862.53	261			

Table 76 indicates that 41.3% of the dependent variables can be explained through the independent variables. The F-value in this regression model is 13.258.

Table 69: Coefficient table - Regression model 10

Coefficients							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	19.242	1.365		14.094	0		
CV - 5 year lag	1.345	0.41	0.164	3.279	0.001	0.898	1.114
CV - 7 year lag	0.86	0.403	0.107	2.135	0.034	0.903	1.108
CV - 8 year lag	0.811	0.297	0.136	2.733	0.007	0.909	1.1
CGR - 4 year lag	-7.591	3.298	-0.115	-2.302	0.022	0.893	1.12
CGR - 6 year lag	-9.579	3.122	-0.148	-3.068	0.002	0.963	1.038
CGR - 10 year lag	-6.983	3.317	-0.104	-2.105	0.036	0.926	1.08
CG - 1 year lag	0.191	0.059	0.177	3.247	0.001	0.76	1.315
CG - 4 year lag	-0.308	0.054	-0.317	-5.681	0	0.723	1.384
CG - 5 year lag	-0.115	0.057	-0.118	-2.026	0.044	0.66	1.515
CG - 8 year lag	-0.212	0.059	-0.221	-3.611	0	0.601	1.664
CG - 9 year lag	-0.257	0.072	-0.231	-3.552	0	0.534	1.873
CG - 10 year lag	0.17	0.073	0.135	2.325	0.021	0.668	1.497
SoN - 3 year lag	3.07E-05	0	0.305	2.501	0.013	0.151	6.603
SoN - 4 year lag	-3.10E-05	0	-0.337	-2.389	0.018	0.113	8.878
SoN - 7 year lag	2.40E-06	0	0.035	0.388	0.698	0.269	3.719

It is clear that in Table 77, the variable that has by far the lowest significance is SoN - 7 year lag (0.698).

Regression model 11

The researcher eliminates SoN - 7 year lag in this regression model in order to determine if the significance of the model will increase if only the highest significant SoN is included.

Table 70: Descriptive statistics - Regression model 11

Descriptive Statistics			
	Mean	Std. Deviation	N
Total Return	16.33076	10.252325	266
CV - 5 year lag	0.249191	1.2294241	266
CV - 7 year lag	0.236438	1.2468688	266
CV - 8 year lag	0.361719	1.6867719	266
CGR - 4 year lag	0.081227	0.1533434	266
CGR - 6 year lag	0.085135	0.156152	266
CGR - 10 year lag	0.071349	0.1498034	266
CG - 1 year lag	6.497242	9.321951	266
CG - 4 year lag	5.209068	10.388851	266
CG - 5 year lag	5.34222	10.409854	266
CG - 8 year lag	4.421172	10.483544	266
CG - 9 year lag	2.765864	9.037278	266
CG - 10 year lag	1.659915	7.9736968	266
SoN - 3 year lag	171718.1	100039.66	266
SoN - 4 year lag	169956.9	110030	266

Table 71: Model summary - Regression model 11

Model Summary					
Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Durbin Watson
1	.663[a]	0.44	0.408	7.885557	1.937

The model summary indicates that the R-square value is 44% and the adjusted R-square value is 40.8%.

Table 72: ANOVA table - Regression model 11

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	12246.51	14	874.751	14.068	.000[b]
Residual	15607.68	251	62.182		
Total	27854.2	265			

The F-value in the regression model is 14.068. The ANOVA table further indicates that 40.8% of the dependent variables can be through the independent variables.

Table 73: Coefficient table - Regression model 11

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	19.842	1.367		14.517	0		
CV - 5 year lag	1.365	0.416	0.164	3.281	0.001	0.897	1.114
CV - 7 year lag	0.841	0.409	0.102	2.057	0.041	0.903	1.108
CV - 8 year lag	0.794	0.301	0.131	2.637	0.009	0.91	1.099
CGR - 4 year lag	-7.596	3.302	-0.114	-2.3	0.022	0.915	1.092
CGR - 6 year lag	-9.856	3.157	-0.15	-3.122	0.002	0.966	1.035
CGR - 10year lag	-7.247	3.356	-0.106	-2.159	0.032	0.928	1.077
CG - 1 year lag	0.177	0.059	0.161	2.992	0.003	0.774	1.293
CG - 4 year lag	-0.321	0.055	-0.325	-5.886	0	0.731	1.368
CG - 5 year lag	-0.12	0.057	-0.122	-2.104	0.036	0.666	1.502
CG - 8 year lag	-0.221	0.059	-0.226	-3.745	0	0.615	1.625
CG - 9 year lag	-0.266	0.072	-0.235	-3.693	0	0.552	1.813
CG - 10 year lag	0.162	0.073	0.126	2.218	0.027	0.691	1.448
SoN - 3 year lag	2.74E-05	0	0.267	2.225	0.027	0.155	6.45
SoN - 4 year lag	-2.62E-05	0	-0.281	-2.333	0.02	0.154	6.511

Regression model 12

In this regression model, the researcher included all the lags of change in size of node in order to determine which lags have the highest significance and how the significance of the model will change by adding all the change in SoNs. Change in size of node was used in this regression model due to the size of node that had a high level of collinearity.

Table 74: Descriptive statistics - Regression model 12

Variables Entered/Removed			
Model	Variables Entered	Variables Removed	Method
1	CV - 5 year lag CV - 7 year lag CV - 8 year lag CGR - 4 year lag CGR - 6 year lag CGR - 10 year lag CG - 1 year lag CG - 4 year lag CG - 5 year lag CG - 8 year lag CG - 9 year lag CG - 10 year lag CSoN - 1 year lag		Enter

	CSoN - 2 year lag CSoN - 3 year lag CSoN - 4 year lag CSoN - 5 year lag CSoN - 6 year lag CSoN - 7 year lag CSoN - 8 year lag CSoN - 9 year lag CSoN - 10 year lag		

Table 75: Model summary - Regression model 12

Model Summary					
Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Durbin Watson
1	.600[a]	0.36	0.289	7.902662	1.929

The regression model has a R-square value of 36% and an adjusted R-square value of 28.9%.

Table 76: ANOVA table - Regression model 12

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	6961.663	22	316.439	5.067	.000[b]
Residual	12365.51	198	62.452		
Total	19327.17	220			

The F–value in the regression model is 5.067 and 29.8% of the independent variables could be explained by the dependent variables.

Table 77: Coefficient table - Regression model 11

Coefficients					
Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	Collinearity Statistics

	B	Std. Error	Beta			Tolerance	VIF
(Constant)	18.162	1.175		15.457	0		
CV - 5 year lag	0.985	0.719	0.084	1.37	0.172	0.866	1.155
CV - 7 year lag	0.72	0.431	0.1	1.671	0.096	0.897	1.115
CV - 8 year lag	0.569	0.425	0.08	1.338	0.182	0.909	1.1
CGR - 4 year lag	-5.297	3.646	-0.089	-1.453	0.148	0.864	1.157
CGR - 6 year lag	-11.344	3.547	-0.198	-3.198	0.002	0.846	1.182
CGR - 10year lag	-3.083	3.638	-0.053	-0.847	0.398	0.831	1.203
CG - 1 year lag	0.179	0.068	0.174	2.618	0.01	0.733	1.365
CG - 4 year lag	-0.247	0.065	-0.271	-3.787	0	0.632	1.581
CG - 5 year lag	-0.106	0.063	-0.123	-1.685	0.094	0.604	1.655
CG - 8 year lag	-0.186	0.065	-0.222	-2.88	0.004	0.546	1.831
CG - 9 year lag	-0.231	0.077	-0.24	-3.003	0.003	0.505	1.98
CG - 10 year lag	0.159	0.08	0.145	1.994	0.048	0.613	1.631
CSoN - 1 year lag	9.10E-06	0	0.037	0.595	0.553	0.83	1.205
CSoN - 2 year lag	-2.33E-06	0	-0.009	-0.151	0.88	0.837	1.195
CSoN - 3 year lag	2.77E-05	0	0.117	1.879	0.062	0.834	1.198
CSoN - 4 year lag	3.89E-06	0	0.02	0.307	0.759	0.774	1.292
CSoN - 5 year lag	-1.00E-05	0	-0.053	-0.83	0.408	0.783	1.276
CSoN - 6 year lag	-1.21E-05	0	-0.062	-0.911	0.364	0.688	1.453
CSoN - 7 year lag	4.90E-06	0	0.024	0.379	0.705	0.811	1.233
CSoN - 8 year lag	-1.19E-06	0	-0.006	-0.091	0.928	0.813	1.23
CSoN - 9 year lag	-5.93E-06	0	-0.029	-0.454	0.65	0.782	1.279
CSoN - 10 year lag	7.49E-06	0	0.039	0.59	0.556	0.758	1.319

Table 85 indicates that the change in SoN with the highest significance is CSoN - 3 year lag. All the other change in SoN variables have a very low significance value. The VIF and tolerance values are also significantly better and do not correlate as highly with each other.

Regression model 13

In this regression model, all the variables that have a high significance are included as well as the year that change in SoN had the highest significance being CSoN - 3 year lag.

Table 78: Descriptive statistics - Regression model 13

Variables Entered/Removed			
Model	Variables Entered	Variables Removed	Method
1	CV - 5 year lag CV - 7 year lag CV - 8 year lag CGR - 4 year lag CGR - 6 year lag CGR - 10 year lag CG - 1 year lag CG - 4 year lag CG - 5 year lag CG - 8 year lag CG - 9 year lag CG - 10 year lag CSoN - 3 year lag		Enter

Table 79: Model summary - Regression model 13

Model Summary					
Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Durbin Watson
1	.663[a]	0.44	0.411	7.870703	1.933

The R-square value of this regression model is 44% and the adjusted R-square value is 41.1%.

Table 80: ANOVA table - Regression model 13

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	12243.31	13	941.793	15.203	.000[b]
Residual	15610.89	252	61.948		
Total	27854.2	265			

The F-value of the regression model is 15.203 and 41.1% of the dependent variable could be explained through the independent variables.

Table 81: Coefficient table - Regression model 13

Coefficients							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	20.067	0.938		21.402	0		
CV - 5 year lag	1.356	0.413	0.163	3.28	0.001	0.905	1.106
CV - 7 year lag	0.832	0.406	0.101	2.048	0.042	0.91	1.098
CV - 8 year lag	0.787	0.299	0.13	2.632	0.009	0.918	1.089
CGR - 4 year lag	-7.595	3.296	-0.114	-2.305	0.022	0.915	1.092
CGR - 6 year lag	-9.864	3.151	-0.15	-3.131	0.002	0.966	1.035
CGR - 10 year lag	-7.161	3.329	-0.105	-2.151	0.032	0.94	1.064
CG - 1 year lag	0.176	0.059	0.16	2.989	0.003	0.778	1.286
CG - 4 year lag	-0.322	0.054	-0.327	-5.971	0	0.743	1.347
CG - 5 year lag	-0.122	0.056	-0.123	-2.153	0.032	0.676	1.479
CG - 8 year lag	-0.22	0.059	-0.225	-3.748	0	0.616	1.624
CG - 9 year lag	-0.268	0.072	-0.236	-3.723	0	0.554	1.805
CG - 10 year lag	0.161	0.073	0.125	2.211	0.028	0.695	1.439
CSoN - 3 year lag	2.62E-05	0	0.116	2.339	0.02	0.911	1.098