



[The Aura of Office Buildings]

Do prestige and image have an impact on financial performance of office building?

P4 Report: Graduation Thesis

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Preface

This report presents the research proposal of the graduation thesis titled the impact of image and prestige on financial performance; it represents the most important project of the master program. The master program followed is Real Estate and housing, the track is divided in four terms and has a total duration of two years. After a general introduction of the complete range of training courses, in MSc3 there is possibility to choose one out of four specializations.

My personal interest in corporations and office buildings lead me to select the MSc Laboratory of Real Estate Management (REM), and to combine the researcher with my background of architecture and design.

I would like to specially thanks my mentors Drs. P.W. Koppels and Drs. J.L. Heintz, whom throughout the given courses in the master 1 and 2 inspired me to elaborate on subjects that concern their area of research, and more importantly for critically helping me order my ideas to write this thesis.

¡Gracias!

No hay plazo que no se cumpla... Ni fecha que no se llegue.

- Mexican Proverb

Almost four years ago I started the journey to of becoming master degree student. Now it is over! I would like to thank all of those involved in the pre-process of arriving in The Netherlands, specially my mom and dad for always teaching there is no limit to my dreams and my dearest Lencho for believing in me and taking the risk to move across the world (literally) to start our life-journey together. My best confidant. Once in The Netherlands I would like to thank the Vermij family for always making me feel loved.

Furthermore I would like to thank CONACyT for funding my studies and trusting me into gaining knowledge, which I will return to my beloved Mexico.

I would also like to thank my graduation organization, Philip and John have provided with advice and orientation, critically reading my research and always appointing something worth writing about. Also many thanks to Armando de la Fuente from Alles Group for sharing valuable data without which this research could have not been possible.

Thanks to my fellow students for proving the necessary 'chocos de luxe' and distraction, especially Pam my only non-Dutch fellow student. Moreover all the family and friends visits we had in Rotterdam during these two years for bringing joy, love and food from home.

Last but not least I would like to thank all of those who directly or indirectly contributed to my thesis, either with a comment, an interview, a critical revision or just a day in Amsterdam or a beer to distract me!

Summary

Office buildings have been for longtime subject of analysis in real estate research. Valuation of office buildings depends on the difficult task of weighting the various characteristics that comprehend these heterogeneous goods.

The research main argument states that contrary to what most theory and common knowledge states it is not all about location, location and location. Little scientific relevance has been given to specific characteristics of the building.

The innovation of this research relays in the perspective or 'glasses' though which the building characteristics are analyzed. An adaptation of Klingmann's Brandscapes (2007) is utilized to understand buildings and its value generating characteristics. The conceptual model subdivided buildings as object of analysis in three different areas:

- 1) Hardware: physical or aesthetic characteristics of the building
'What the building has'
- 2) Software: programmatic configuration and amenities.
'What the building does'
- 3) Humanware: the design of the personal interaction and image.
'What the building makes you feel'

The hardware and software of the building occur on an object (tangible level) while the humanware occurs on an 'aura' level and is related to image and prestige, key terms in the research.

Architecture is analyzed as a profession doomed for failure if lacking to understand that its survival kit depends on the ability to build a relevant emotional experience at different contact points for the end-user. The contact points as mentioned earlier are physical, programmatic and even human (image and what we perceive).

Architecture and development need new critical frameworks that support the shifts in culture and economy that have revolutionized architecture in function and aesthetics. Branding and image are perhaps important means to transform how people perceive and experience the tangibility – and sometimes intangibility – of architecture.

The main objective of this research project is to investigate the dynamics behind financial performance of Monterrey's, Mexico office buildings within a context of a changing supply and demand framework, measured by achieved rents over 2003 – 2012 period. Addressing the economic fundamentals of driving value of 'branding and image'. Hence the main objective of the research is: **to test the ability of image and prestige to add value to office buildings in the city of Monterrey, through increased rents that should, in turn, be transmitted to increase capital value.**

After a first round of exploratory interviews local brokers and developers have contributed on how to value such key terms in order to add up to the qualitative part of the research.

On the other hand in order to identify Monterrey's stock of office buildings a more quantitative approach was selected and a database from local brokers and consulting agency (Alles Group) was obtained. To address the lack of transparency in real estate sector, an observation phase of the data will be conducted along with a hand-collected database of other sources.

A key problem with investigating the effects of building characteristics on value is it is a multi-dimensional concept, which can be approached from various perspectives. The intention of the theoretical part of the research is to define which variables have an impact on the value of office buildings. These variables will be mainly divided in the previously studied variables such as location, neighborhood, spatial and building characteristics and new variables that will measure branding and human factors. These variables will need be defined, but the mainly happen in three levels: 1) location level (control variables); 2) building level and, 2) image /prestige (aura) level.

According to Fuerts (2011) the nature of image and brands have become detached from the use value and are instead increasingly attached to the object's 'aura' expressing the culture and beliefs of the object itself. This shift has changed the role of designers and architects whom are now selling more than just the functionality of the space and the physical characteristics. This concept is fundamental for the current research, which intends to describe the economic value of precisely these variables that add value to the office buildings.

The hedonic pricing method is a method widely used for mass valuation of the housing markets, and has just recently started to be used for the office sector. In a nutshell the method allows us to isolate the variables that have an impact on the final value of a property, weighting the each attribute independently and analyzing its single influence on the prices. Regression will be specifically used to analyze the given database of 70 office buildings.

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I. Introduction

1.1 Motivation



Architecture and real estate are two professions that have the possibility of complementing each other, be alienated from each other or be enemies of each other. Nevertheless they have the same finite raw material to work with (land) and produce the same output (the built environment).

The core activities of real estate management are to plan, develop, acquire, sell and maintain properties. Properties are objects, specifically buildings, which though serving different purposes and hosting distinct activities have one characteristic in common: tangibility. This specific characteristic gives the architect a special position and sensitivity towards the real estate business, since architects have been educated to design and can easily think in spatial terms.

Having an architectural background and currently studying real estate provided the initial curiosity for the proposed research subject. Yet something was missing. Living in a rapidly changing world, witnessing transformation of cities at a never before seen pace, our generation of architects, designers and developers should make an effort to stop and digest what our buildings are adding to society. It suddenly became evident: **is not only about bricks and mortar!** There is something more to objects and buildings that make us prefer one to another (even if they are located right next to each other). The concept of an 'aura' came into mind. An 'aura' is said to be a field of subtle, luminous radiation surrounding a person or an object, usually indicating power or holiness. Buildings had somehow inexplicably an aura.

Nevertheless architecture is the only form of art that cannot be isolated from economics. Buildings require capital and returns over the investment and getting to know what adds value to our buildings is critical for our profession. Leading me to think that architecture and development need new critical frameworks that support the shifts in culture and economy that have revolutionized architecture in function and aesthetics.

Image and prestige are perhaps important means to transform how people perceive and experience the tangibility – and sometimes intangibility (aura) – of architecture. Research on the value and aura level could provide empirical evidence on how not only design pays! But also the level of importance current markets give (in terms of rent variation or rental premiums) to such variables, which are mostly un-thought of during development, processes. Having previous working experience as an analyst in the consulting department of a major real estate developer in Mexico it became a natural choice to select the market I had more insight on as the research area: corporate buildings in my hometown Monterrey.

1.2 The Mexican Office Market

Monterrey is located in Northeast Mexico, 140 miles from Laredo, Texas border crossing. It is the second largest city in Mexico, with a population of 4.6 million. It ranks second in Mexico's industrial production through well-developed communication systems, educated work force and proximity to the US. Due to its 100 years of industrial experience, Monterrey is known as the Sultan of the North, and is often compared with Chicago, USA.

Monterrey hosts a wide range of multinational corporations such as: LG, Whirlpool, Toyota, Carrier, Mattel and Panasonic. It also offers both domestic and foreign operations, a diverse supplier infrastructure and also the benefits of the city's high quality of life and low cost of workforce. Developers include local, regional and international with firms like: CPA, Prologis, Finsa, Acosta Verde and Intramerica. The office market experienced growth during 2011. Although according to NAI brokers vacancy rates will fall below 8% in 2012, rental rates have not risen. Current projects under construction range from 20,000 to 100,000 square feet buildings.

Local Characteristics of the Market

In spite of office markets behaving similarly throughout the world, the 'local' effect represents major differences, especially when comparing it to European cities. As the research was conducted in Mexico for a Dutch faculty some major differences are explained beforehand.

As any other real estate market, Monterrey is subdivided into submarkets or corridors (since they usually align to major roads). The data providers recognize four major markets in the city (Valle, Valle Oriente, Santa Maria and Centro), although for the study five submarkets will be taken into account arguing that one of the submarkets is too big (Valle) and market conditions change drastically, thus it was subdivided (Valle and Valle GRM).

Transport System:

Unlike most European cities, Monterrey (and many Mexican cities) does not have a proper and efficient public transport system. Trains and trams simply do not exist and the metro is limited with only 2 lines (in a 4.6 million people city!). Hence the most common transportation system is cars and traffic jams can make people take up to 2 hours to commute daily during peak hours. This has obliged developers and the office market to offer a lot of parking space; the market now demands almost 1 parking space for every 14 or 15 square meters of lettable office space. In contrast with 1 for every 30 square meters requested ten or fifteen years ago.

Security:

Due to the wave of insecurity that resulted from the governments declared war to drug cartels, the real estate markets have experienced a lot of change. Office space now more than ever has clustered, people do not want their employees to travel to the outer-skirts of the city and put them at risk. Companies are separating manufacturing functions and office operations, moving departments such as HR, management, accounting and payrolls, to 'safer' areas in corporate buildings. More than ever the users demand fenced office parks, security checks for cars, controlled access and private security to ensure people's safety.

Trends:

According to experts interviewed the booming and changing office market presents the following trends:

- World class architecture concepts are preferred, upcoming developments include master planning and building concepts from star-architects such as Cesar Pelli and Norman Foster.
- Green Initiatives are seen popping out in new buildings, concepts like terraces, green space to smoke or have outside meetings etc. Moreover using sustainability as a marketing tool: seeking to certify building with LEED (although no building has actually achieved this, they promote themselves to at least have accomplished some of the requirements).
- Mix-use developments are 'in'. The growing insecurity and the overwhelming traffic jams has made it a better choice to live and work in the same building or area.
- Increased amenities are now required within buildings. Services such as dry-cleaning your suit, flower services for the office, car wash, gym, coffee and specialized retail are growing trends within the office buildings. It is important to remember that office buildings are mainly stand-alones (you can literally walk nowhere from you building) so solutions like 7-elevens, OXXOs or taco shops are increasingly seen in sublet (usually wasted space) of parking areas.
- Emphasis in highly efficient floor plates is also growing, floor plates of above 1000 square meters are preferred by the market, where flexibility is high and it can easily be subdivided. BOMA certificates are continuously portrayed as the standards for the market.

1.3 Problem Analysis

'If one wants to solve a problem, one must generally know what the problem is. It can be said that a large part of the problem lies in knowing what one is trying to do.'

(Kerlinger 1986:17; in (Kumar, 2011)

According to (Dunse & Jones, 1988) an office is an example of a heterogeneous good. Its value depends upon many characteristics associated with the property. Examples of this are lettable floor area, age, materials, lease terms and a long list of quality attributes. Valuator's main activities are to identify, analyze and quantify all these characteristics in order to determine the property rental or sales value. However, as Dunse et al (2002) stresses, difficulties arise in weighting the influence of these characteristics on the final price. It is obvious that each attribute has an individual influence, but the impact in the total price is difficult to grasp at simple glance, moreover, the elasticity of prices affected by such variables is yet unknown in the current office market.

It has been observed that especially when markets are in accelerated growth, as in the case of Monterrey (CBRE, 2010) developers and investors tend to differentiate their products with unique amenities, higher quality materials and innovative designs in an effort to attract tenants over similar buildings in the area. In a hurry to do so, sometimes over spending in certain attributes can endanger overall performance of the building. Moreover, there are few cases of empirical evidence that can prove that by taking such measures the rental levels will increase.

The main objective of this research project is to investigate the dynamics behind financial performance of Monterrey's office buildings within a context of a changing supply and demand framework, measured by achieved rents over 2000 – 2012 period. Addressing the economic fundamentals of driving value on objects and 'object's aura' levels, with special interest in image and prestige.

To identify Monterrey's stock of office buildings a database from Alles Group was obtained. To address the lack of transparency in real estate sector, an observation phase of the data was conducted along with a hand-collected database of other sources. Finally, to collect data on subjective information and in order to avoid bias an online ranking system was designed so local experts could evaluate buildings through tables for variables such as: prestige, image and design quality.

A key problem with investigating the effects of building characteristics on value relies on it being a multi-dimensional concept, which can be approached from various perspectives. The intention of the theoretical part of the research is to define which variables have an impact on the value of office buildings. These variables will be mainly divided in the previously studied variables such as location, neighborhood, spatial and building characteristics and new variables that will measure image and 'humanware' factors. These variables will be defined in the latter sections, but the main idea is that they occur in two levels: 1) building level (object) and, 2) image level (aura).

According to (F. Fuerts, McAllister, & Murray, 2011) the nature of image and brands have become detached from the use value and are instead increasingly attached to the object's 'aura' expressing the culture and beliefs of the object itself. This shift has changed the role of designers and architects whom are now selling more than just the functionality of the space and the physical characteristics.

This concept is fundamental for the current research, which intends to describe the economic value of precisely these variables that add value to the office buildings and understand the importance of prestige in the office markets of Monterrey.

The hedonic pricing method is a method widely used for mass valuation of the housing markets, and has just recently started to be used for the office sector. In a nutshell the method allows us to isolate the variables that have an impact on the final value of a property, weighting the each attribute independently and analyzing its single influence on the prices.

1.5 Hypothesis

‘Building features at an ‘object’s aura level’ are of such importance to the asking rents that they need to be considered in the decision-making criteria for developers to build and brokers to accommodate tenants’.

1.4 Research Questions

The main objective of the research is to identify what are the building features on an object and object’s aura level that influence asking rents. An subsequently to test the ability of image and prestige (object’s aura interest variables) to add value to office buildings in the city of Monterrey, through increased rents that should, in turn, be transmitted to increase capital value.

Research Question:

What is the impact of prestige and image (building’s aura) on financial performance of office buildings in the city of Monterrey?

1.4.1 Sub Objectives

- Identify what criterion is currently considered to impact the willingness to pay for office buildings (theory and practice)
- Define building features on object and ‘aura’ level that influence willingness to pay in the local market.
- Explore the economic impact of ‘aura’ variables (prestige and image) on office buildings.
- Measure the impact of ‘aura’ variables (prestige and image) on financial performance of office buildings.
- Determine how should knowledge of building features be translated to practical advise for developers and brokers in the market.

1.5 Relevance

1.5.1 Scientific Relevance

The most important thing about real estate is typically associated with: location, location, and location. Little scientific attention has been given to specific characteristics of building that contribute to the overall value of the property. Let alone less has been analyzed on the characteristics of physical building appearances and non-physical (branding, image and prestige) that most certainly have a contribution. It is widely recognized that some buildings are more appealing than others, but few efforts have been done on demonstrating with empirical evidence that there could be a significant relationship. The limited body of knowledge provides a lot of grey areas on what is understood as quality, image and prestige and more importantly in how to operationalize such concepts in order to measure them scientifically.

Moreover there have been numerous studies that measure in obvious and unproblematic ways the design and/or architecture. Quantitative approaches have been done to measure costs, performance, energy labels, circulation, efficiency, structural efficiency, area efficiency as so forth. These studies are believed to measure engineering efficiency and are rarely related to the user as a social being that interacts with the building. The relevance that results of this research could yield to is the awareness of empirically proven benefits that architects and real estate investors can provide to the experience of the built environment.

1.5.2 Societal Relevance

The external form of a building is generally neither rival nor excludable, and therefore can be considered a public good (Millhouse, 2005). Buildings are daily experienced not only by users (corporate employees, residents or shoppers) but also by society itself. The concept of architecture as a public good explains the importance of historic districts, government-imposed aesthetic requirements and regulations. Buildings have the possibility to impact the image of neighborhoods and even cities.

Though this research will not directly improve the built environment, it can provide to developers and brokers with vital information on importance and impact of new value adding criterion of office buildings that are not only related to location. This information could in time be transmitted to knowledge of better - financially - performing designs and strategies that will not only benefit investors and developers but user and the city as whole.

The research also intends to inspire architects to search for new opportunities and trends that transcend the current discourses of stylistic debates.

1.5.3 Utilization Potential

The research is relevant for real estate investors (private developers, funds, banks, REITS /Fibras) that have or plan on having part of their portfolio on office buildings, so they can have a better informed decision on the performance of office building based not only on location theory.

The results can also be of use by consulting agencies that give advice on accommodation strategies, leaseholds, rents and transactions. The information hereby provided could help brokers promote and differentiate better-defined attributes that add value to the leaseholders. These companies in Mexico include CBRE, Jones Land LaSalle, Colliers International, Cushman and Wakefield, etc.

Developers could also benefit from the elasticity analysis on how much could potentially be invested into certain attributes and if the markets are willing to pay for such rental premiums.

Furthermore architects that design office buildings and/or interiors of them can understand better the trends that are being tacitly required by the quickly changing market.

The research is also relevant to the general body of knowledge of valuing specific characteristics of office buildings through not typically employed valuation methods for office buildings, as is the hedonic pricing method.

Main target groups:

1) Developers:

- Understanding financial performance of adding value attributes not only associated with the object.
- Understanding how much to invest in specific attributes of buildings and the elasticity according to the type of building and target market.

2) Brokers:

- Gaining knowledge for better advice to matching accommodation strategies with specific features of buildings. Understanding the added value of specific characteristics and the impact on the willingness to pay.
- Obtain better and more satisfied occupants for buildings

1.5.4 End Product

The outcome of the study is of two natures: 1) descriptive of the past situation, so consulting companies and researchers have more theory to build up for the added value and importance of the attributes on an 'aura' level and 2) a prescriptive approach translated to a series of solid recommendations for the near future for decision makers in development of office buildings.

1.6 Research Design

Figure 1 shows the research outline that is based on the formulated research questions. The figure shows the steps in the process that will be taken to finally arrive at the answer of the main question and sub-questions followed by recommendations for real estate developers and brokerage firms. It provides an overview of the research techniques used, actions and sources or inputs of the information.

The first step was to create a theoretical framework in which two types of input were required. Context independent data - refers to theory from real estate and building economics. Followed by context dependent data – insight obtained from seven semi-structured interviews conducted in the research area of Mexico. The main reason to introduce context dependent data is based on the fact that random input of variables in a statistical analysis is hopeless without some filtering. In this particular case, dealing with the Mexican market (mostly unknown to Dutch researchers) required local input from developers and brokers whom could provide in a ‘natural setting’ understanding and intimate first-hand knowledge. Matching the literature review necessary for the theory building and the interviews provided the setting for selection of initial variables and features considered relevant for the research.

During the methodology phase data will be collected and analyzed. This iterative process allows the formulation and reformulate of the hedonic equation, exploratory analysis and estimation of the phases until the model is assed and considered fit for use. The inputs for this phase come from three sources: 1) databases, 2) observation and 3) ranking system. The methods were carefully selected in order to provide reliable information that could be considered valid and credible. More information on this can be found in the ‘justification of research model’ section.

The last step was to interpret the final model. The implications of the findings are discussed and a feedback is provided by relating the theoretical framework and opinions from real estate developers and brokers in current practice with the results. Finally this all sums up to provide recommendations for the local market in particular and in general for the building economics field.

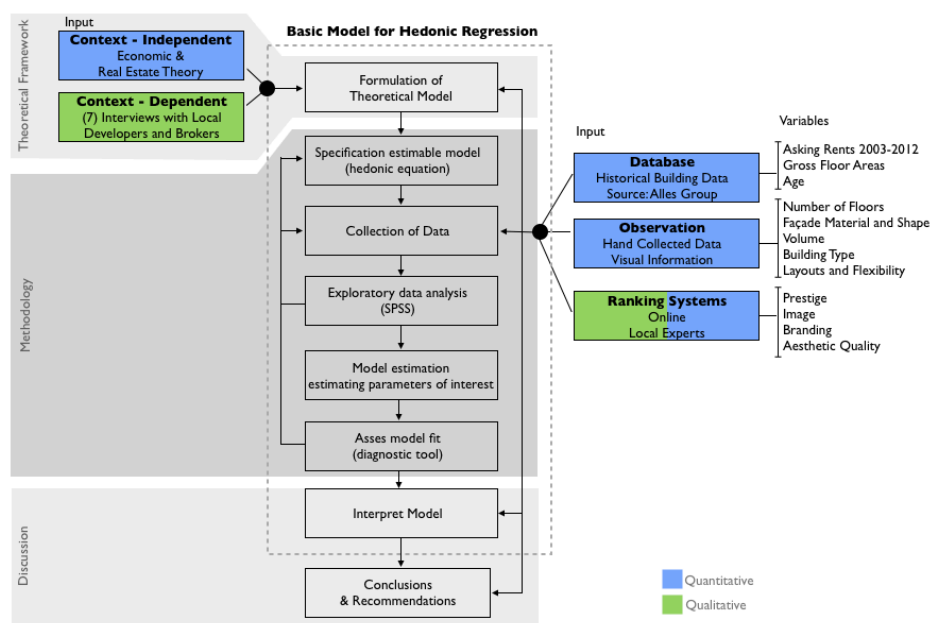


Fig. 1 Research Design

1.6.3 Justification of Research Design

Conducting real estate and urban economics research one cannot help to be intimately related to a physical area (built environment). In real estate every area, city and even neighborhood can provide very specific niche markets that differ greatly. The question of generalizability of the information in this type of investigation is always a limitation of the results. How replicable will the results be if the markets are so particular and so driven by local and sometimes even cultural characteristics? The possibility of further comparing results with research conducted on the same variables in other countries or markets could be considered as a further research analysis that could eventually help the results and knowledge to become more transferable.

When building the research design it was considered very important to include the local opinion in the building of the theoretical model. Providing local knowledge in a 'natural setting' gotten from first-hand interviews conducted in the country language provided an intimate understanding of the market. The main reason behind this choice was to first build a contextual rich model that can later be validated and interpreted through quantitative findings. The first part of the model (interviews and literature reviews) can also facilitate the identification of relevant and irrelevant variables in the context-specific market thus making the data collection more focused on relevant data.

For the methodology part of the research much has been discussed on the subjectivity of terms such as: image, quality and prestige. These concepts are on their own difficult to operationalize and interpretation becomes both an opportunity and threat. Possibility of proxies and bias information becomes a main concern for the researcher. I believe personally this is the main reason why so little research has been done in this particular field. In order to avoid this problematic a methodological decision was taken, to include a weighting or ranking system that would obtain its input from local experts previously contacted for the interviews based on theory of users preference and operational research. Their opinion on subjective matters could be scalable when each respondent ranks 10 buildings with upper and lower boundaries. In order to control throughout the research every building was sent to at least two respondents. This allowed the information to become more reliable and to deal with objectivity and credibility of the methods and results.

The hedonic pricing method also presents some threats of providing only 'snapshots' of the situation at a certain point in time, yielding to little deep knowledge of the underlying meaning. This relates to the saying commonly heard in financial modeling of 'garbage in – garbage out'. The model could potentially have this problem, where if the variables and data are not collected properly, the results will anyhow be reflected by the SPSS software, but will have little or no significance. On the other hand without this type of data and information the observers could only make guesses in their area of ignorance to reduce bias. The method thus contributes to the greater confidence in the generalizability of results.

II. Theoretical Framework

2.1 Introduction

This chapter will provide the framework for the study. Emphasis is given to previous studies and existing knowledge. The purpose is to explain the background theories for the main variables taken into consideration and the importance of the categories in which they are subdivided. The first section provides an overview of commercial real estate markets, their cyclical conditions and supply and demand behavior. The second part emphasizes in corporation and real estate, explaining theories behind real estate management and the importance of adding value through real estate. The main focus of this section goes around prestige and important aspects of corporate identity and branding in relation to real estate. The third provides the theory for the variables categories: location, hardware, software and humanware. Further on to reach a higher understanding per variable an analysis of previous research in hedonic models per variable is explained.

2.1.1 Commercial Real Estate

This sub-chapter aims to explain the basics of commercial real estate. First, the main interest relays in defining the office market. Moreover analyzing the dynamics of supply and demand that define the market conditions, which will in turn facilitate the understanding of the willingness-to-pay.

Office Markets

Markets are perhaps the most basic of all economic phenomena (Geltner & Miller, 2007). In essence a market is a mechanism in which goods are exchanged voluntarily from owners to buyers. In office markets, office space (or space for corporate purposes) is either leased or sold under certain circumstances and acquisition processes to satisfy consumer's needs.

Supply and Demand

As in any market, real estate markets have a cyclical nature. That is the process of slowdown and acceleration is normal and in some cases even predictable. Recognizing the patterns in cycles is vital for detecting opportunities in the real estate industry. Real estate and property markets have their own cycle affecting supply, demand and rental levels. A graphic representation of the real estate system has been developed by DiPasquale and Wheaton (1996) and latter adapted by Soeter and Koppels (2008), the model consists of a four-quadrant graph, as shown in Fig. 2 The model represents the linkage between space and asset markets, and construction and development market, and describes the equilibrium state. The long-run equilibrium involves allowing sufficient time for the supply of the built space to adjust to the demand (Geltner, 2007). The interesting thing about the model is that it shows that a single change in one of the quadrants influences all of the markets.

When translating the model to the current research, the focus lies mainly on the market affected by the rent developments, as rental levels are the main variable of analysis.

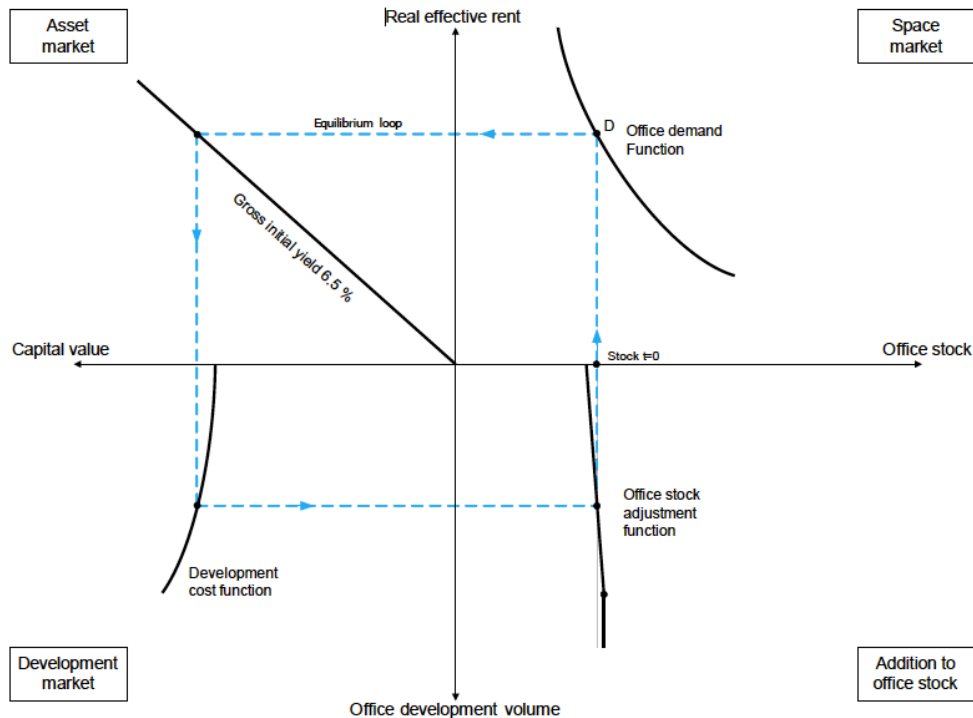


Fig. 2 Four-quadrant model of DiPasquale and Wheaton (1996), modified by Soeter and Koppels (2008)

Willingness to pay

The willingness-to-pay is the stated price someone is 'willing to pay' for a certain good. In other words it is the amount someone is willing to sacrifice in order to obtain something. In real estate transaction prices of properties located in certain areas reflect the 'willingness to pay' for certain location or property characteristics. This is precisely the main concept behind the dependent variable of the study (which due to the data obtained could not actually be represented by transaction prices but rather asking rents). The objective of the quantitative research is to analyze if prestige and image of office building in Monterrey lead to an increase in the willingness-to-pay. Numerous studies have analyzed the relationship between the willingness-to-pay and various independent variables.

Valuation

In order to properly achieve a leasing or selling transaction of office space, the first and most important thing is to have a proper market value of the property. Though it may sound like an obvious and easy task, defining the market value of real estate assets is a complete and complex profession: valuation.

Valuation theory according to (Lusht, 2012) has provided the following definition of market value. 'Market value is the most probable selling price which a specified interest in real property is likely to bring under all the following conditions:

1. Consummation of a sale as of a specified date.
2. Open and competitive market for the property interest appraised.
3. Buyer and seller each acting prudently and knowledgeably
4. Price not affected by undue stimulus
5. Buyer and seller typically motivated
6. Both parties acting in what they consider their best interest.
7. Adequate marketing efforts made and a reasonable time allowed for exposure to open market.

8. Payment made in cash or in terms of financial arrangements.
9. Price represents the normal consideration for the property sold, unaffected by special or creative financing or sale concessions granted by anyone associated with the sale.'

Nevertheless, when valuating (determining the market value) of office spaces, certain confusion arises because offices are an example of heterogeneous goods. In other words, the value of office space depends on many characteristics associated with the property. Dunse (2009) stresses that the main difficulty for valuers arises in weighting the influence of each characteristic on the final price. That is each attribute contributes to the value, but the extent or level of importance of each variable is difficult to grasp at simple glance.

There is also a question of ethics and transparency of the market when it comes to actual value of property, especially for selling – leasing purposes. The market situation can be either supply driven (where properties value is mainly determined by developers and brokers) or demand driven (where renter and leaseholders determine their upper and lower boundaries to pay for space). The dynamics between these drivers is highly important to determine specific value per building characteristics.

Local Perspective

Looking at the current Mexican situation as explained through interviews with local experts, the market is in accelerated growth where there is a high supply and demand, and apparently everything seems to be selling or leasing. It is during this phases that differentiation between buildings becomes relevant, since a lot of similar products are being put on the market (in relatively similar locations) it is up to small differentiators to become the critical decision-making criteria for renting. On this situation typically valuation of the current properties is higher. Still it is important to mention that when it comes to valuation and pricing strategies real estate is a far from perfect market.

2.2. Corporate Real Estate

Joroff et al. (1993) have termed corporate real estate as the '*5th resource*' for corporations after the traditional resources of: people, technology, information and capital.

Considering it as an under-recognized resource that is mainly managed passively and treated as a cost center since it constitutes the second highest cost for corporations just after salaries. The need to manage efficiently and effectively real estate is becoming more and more important for corporations no matter their size.

2.2.1 Corporate Real Estate Management

Corporate real estate management was originally focused on meeting the continuous need of accommodation (Krumm & De Jonge, 1998). Hence the profession was basically dominated by brokerage activity and 'transaction oriented attitudes'. Joroff et al. (1993) described the changing role of corporate real estate management in five evolutionary steps; each step also requires certain characteristics of the involved. The first step as mentioned earlier is the 'task managers' the positions are technical and its main objective is to supply corporations with physical space. The next step is the 'controllers' under this category skills required are more analytical since the main objective is to minimize costs. Moreover the third category is for the 'dealmakers' they solve problems and create financial value, standardizing building uses in order to get flexible deals that benefit the corporation. Next are the 'entrepreneurs' their main goal is to function as a proper real estate company within the corporation, matching the business plan with the market options on real estate. Finally the 'business strategist' plays more of a strategic role, trying to anticipate trends, monitoring and measuring their impact. It is in this specific role that corporate real estate managers have a more value adding position. Fisher (2009) added that corporate real estate manager risk being ignored or simply taken for granted unless they are perceived as adding value to evolving corporate strategies. Anyhow it is not an easy task, real estate plans take time to be planned and executed, and evolving strategies can change direction quickly.

Since corporations are changing at a fast pace, real estate cannot be seen just as a static resource. Companies smart enough to keep up with new trends in technology and communications have escalated real estate in their agendas. Important changes in how corporations manage their office space can be seen throughout the years. Take the Hewlett Packard example; they had different types of factories, the ones outside the country where labor is cheap (source factory) and regional factories that serve particular areas. Their main interest is to reduce costs. Other companies are more focused on increasing productivity of employees. We nowadays observe more offices like Google or Facebook, where their facilities are meant to increase not only productivity and reduce costs but boost creativity by allowing different configuration of spaces to interact in leisure areas, bars, cafeterias and even places to rest and sleep. Other companies like Microsoft in Lisbon are using their offices to create an 'experience' for users and visitors, having the building become more than just offices but rather a unique selling and communicating point.

2.2.2 Added Value of Real Estate

When real estate manages to contribute to the organizations objectives it is said that real estate adds value to the corporation. Several authors have classified the adding value activities in different ways. Since the main interest of the thesis relies in how innovative attributes such as image and prestige contribute to the overall economic variation of rental premiums, two frameworks were selected as theory foundation. First, De Vries (2007) innovates by including the objective of distinctiveness, adding to the typically used

objectives: productivity and profitability. On the other hand Lindholm (2006) approach uses the term ‘Marketing and PR’ as an objective real estate can contribute to.

The first approach is based on De Vries (De Vries, De Jonge, & Van Der Voort, 2008), he identified ten ways in which real estate adds value, these are divided into subcategories (objective): 1) productivity (output/input), 2) profitability (revenues – costs) and 3) distinctiveness. The table 1 demonstrates that contrary to what most authors suggest it is not only about productivity and profitability. The new category of distinctiveness provides hints to relevant issues such as: image, employee satisfaction, competitive advantage and culture improvement. One of the limitations of this research it that up today there is no standard list of key performance indicators (KPIs) and hence it difficult to compare between companies on what they consider adds value or not.

	Productivity	Profitability	Distinctiveness
Increase productivity			X
Supporting image			X
Enhancing flexibility		X	
Improving culture			X
Stimulating innovation	X		
Increasing satisfaction	X		
Enhancing energy	X		
Reducing costs		X	
Controlling risk		X	
Expanding funding possibilities		X	

Table 1: Ways of contributing to realizing the objectives (De Vries 2002)

The second approach is based on Lindholm (Lindholm & Gibler, 2006) who mentions that corporate real estate added value to promote corporate sales and marketing activities focused on the shareholder wealth and revenue growth.

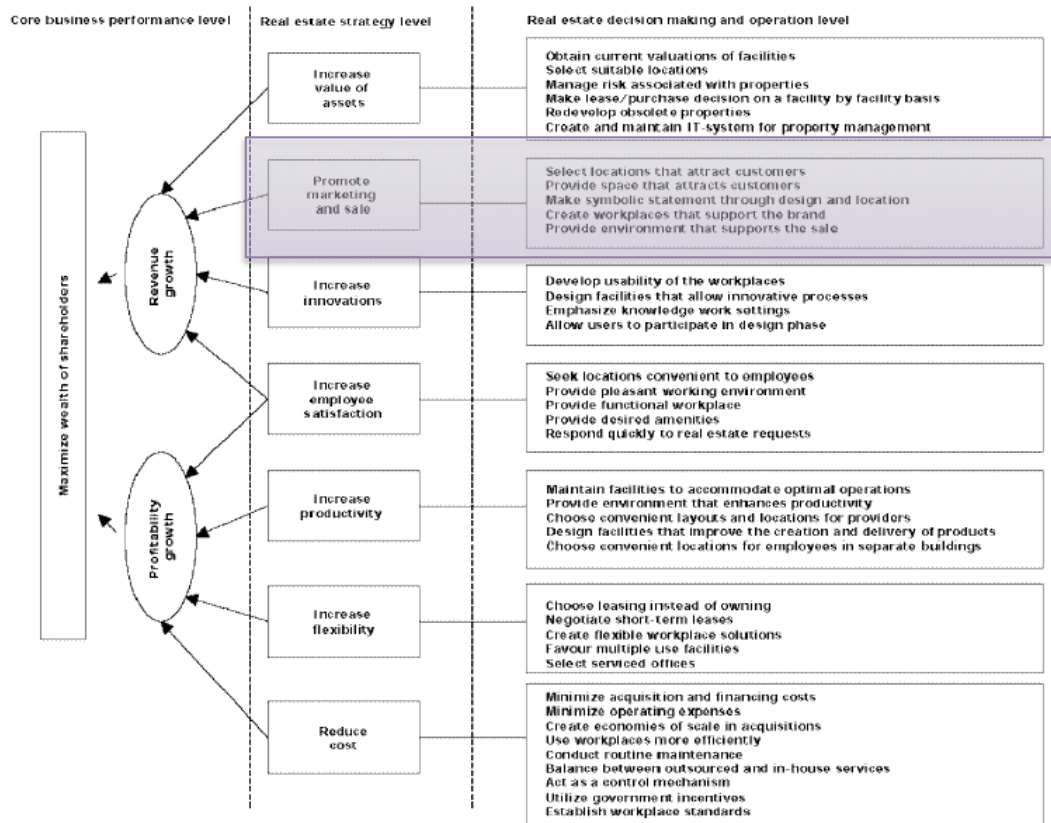


Fig. 3 Adding value through real estate (Lindholm, 2006)

The model basically mentions objectives of the corporation ‘core business performance levels’ and strategies on a real estate level to achieve them. The one relevant to the current research is the second category shown in Fig. 3, which refers ‘promotion, marketing and sales’. Real estate can act as mean to attain such objective in different levels: macro (location), meso (building) and micro (workplace) (Khanna, 2011). Emphasis in brand attributes such as innovation, creativity and sustainability create an exclusive character of the organization both externally to potential consumers and internally to the workforce. The attributes are further discussed below.

Location:

The importance of the ‘right address’ goes beyond basic site selection. It is not only about accessibility and connectivity. Many leading corporations want to be seen in the correct address, giving image to potential customers and stakeholders. This is one of the reasons why corporations tend to cluster. Take The Silicon Valley; it is about belonging in the right place for major IT and new technologies. Yes, a lot of factors influence this like availability of skilled workers and potential interaction with competition, but it is also about being there, having your company name and building seen. Strategic location plays an influential role in communicating corporate brand.

Many corporations take the opportunity to relocate and change corporate identity, locating their headquarters in central business districts or major city hubs. The location, the building and the corporate identity then become intrinsic and it is hard to imagine one without the other. The image becomes an important aspect for office users and they are willing to pay more in rents (Remoy, Koppels, & De Jong, 2009).

Choosing prime locations usually involves paying higher rents, but it acts as a benefit in attracting working force and can reduce communication costs in advertising campaigns (Heywood & Kenley, 2008).

High end surroundings also have the benefits of economies of scales, where there is more facilities, proximity to shopping areas, sometimes better landscapes and parks and higher quality of urbanization elements (such as pavement, illumination and accessibility).

Although not yet present in Mexico, growing sustainability trends in location enhance the usage of public transportations, bicycles and lead to eliminating cars and visual pollution they can cause.

Building

Just as it is important to be in the right address, it is important to be in the right building. Physical image of a building can attract attention and certainly denote prestige. Materials can represent historic periods, and sometimes buildings with certain finishes are associated with being old, inefficient or unattractive. Gat (1998) made an attempt to identify the value of architectural quality and got to the conclusion that for every one additional architectural point added over 5% rental increases. Building height also plays a major role; the never-ending race to have the highest building in the world in Middle Eastern Countries denotes that it is important to be seen. A certain level of prestige is associated with having offices in higher levels and typically price escalades as you go up in building floors.

Workplace

Not only does the physical appearance of the building matters, but also its layout or internal configuration can transmit values or aspirations. Older strategies tended to have everything segmented; managers typically had closed office cubicles, indicating strict hierarchy in the workplace. This strategies still highly utilized in Asian office space, where cultural values of respect and seniority are difficult to change. Newer strategies involve the so-called 'new ways of working' where: open-space is meant to increase communication and promotes face-to-face interaction. Even more innovative approaches are going into completely open strategies, where offices are designed more like a campus where interior and exterior merges to create working space and leisure space, reflecting the values of the company. Google offices in Silicon Valley are an example of this innovative campus approach.

The interior of the office building is not only just a place to work, it has become a unique image creator for consumers, suppliers, stakeholders and investors and it represent a unique way of adding value to a firm.

Potential Indicators

Various indicators influence the real estate strategy which objective is to enhance marketing and public relations. The location of the building itself can reinforce a marketing message through context image and the 'right address'. In order to build a brand Lindholm (2006) provided the following potential measures.

RE Strategy	Potential Indicators	Potential Measure
Promote PR and Marketing	Location relative to customers and transportation	Employer brand ranking questionnaires
	Image	
	Branding	Brand value awareness surveys
	Rating of employer brand	
	Culture and vision alignment	Employee brand association surveys.
	Employee satisfaction	
	Environmental and sustainability of the building	

Table 2. Real estate potential indicators of real estate strategy Marketing and PR (Lindholm and Gilber, 2006)

It is important to note that Lindholm suggests the usage of ranking systems and surveys, this will be addressed in detail in the methodology section, where the researcher will use similar methods to measure image and prestige. Other ways to measure the environmental sustainability of the building is through the previously mentioned LEED and BREAM certifications that are growing in popularity especially in American commercial real estate. In order to measure the employee satisfaction another measure could be ‘great places to work’ certificates, this certificates provides a framework obtained through interviews with employees about the level of satisfaction. Recently gaining popularity in Mexico it is a magnet for creative and talented workforce.

Conclusions:

De Vries (2007) and Lindholm (2006) provide theoretical foundation that ‘distinctiveness’ and ‘marketing and PR’ are objectives that can be achieved through real estate and that contribute to the overall strategy of adding value for corporation. Such characteristics can be translated easily to physical attributes such as location features, building features and workplace features. Some hints on how to measure such attributes suggest that a qualitative approach of surveys and ranking systems is required. Although it is clear at this point that image, culture, prestige and brands have the potential of adding value in theory, the terms are vague and need to be discussed in-depth to understand how exactly they can add value.

2.2.3 Image and Prestige – The object’s aura!

The conceptual framework discussed in section 2.3 includes the categories mentioned previously but is keen in adding a fourth important area which refers to what objects ‘aura’ can contribute on adding value for real estate. This section will first describe how image and prestige are understood throughout the research. Furthermore previous attempts to measure such attributes are described in order to provide a framework of what has been done and how. Finally some conclusions are drawn mainly around the difficulty encountered to prove such attributes as significant in empirical research and how it is reflected in variations in the willingness to pay by consumers.

Defining the concepts

The image a building reflects (its aesthetics, architecture, forms and materials) is available to all regardless of payment. Some tenants have registered their preference for certain typologies whilst other fails to understand the adding value of it. Some may argue physical appearance does not really matter and when it comes to decision-making process of accommodation in office space efficiency of floor plans and rent levels are the only relevant aspects.

During interviews with local experts the question if physical appearance and branding of an office building played an important role in decision-making processes was asked. Most interviewees mentioned it was something considered important but not really relevant. Mentioning that issues of area, layout and number of parking spaces were considered far more important.

However if physical image and aesthetics played no role in the process how could one explain the existence of organizations and committees dedicated to award and recognize 'landmark' buildings. Organizations like historical preservation offices, internationally recognizing outstanding architecture (Pritzker), national awards for buildings (CEMEX award), or even green certificates (LEED, BREAM). Their mere existence denotes the market is interested and tends to classify buildings according to their appearances and levels of achievements.

Nevertheless awards are not the only cause for buildings being considered prestigious or having a positive image. Sometimes buildings gain public acceptance even though no award has been won or no renowned architect provided services. Buildings receive nicknames and are accepted by the community under a more subjective approach. When subjective values come in as attributes it is difficult to measure their impact and to understand how they create economic value. Hough (1983) 'When evaluating if 'good' architecture could meet the market test' mentioned: human nature determines that subjective value, sooner or later, becomes money value; and the lack of it, sooner or later, money loss. The subjective value is far the higher, by far the permanent; but money value is inseparable from the affairs of life, to ignore it would be moonshine'. Architecture is a form of art that requires economics. Failing to understand the power of subjective values in economic performance of commercial real estate can lead to money loss and unsuccessful projects on the long run. Buildings can seem apparently feasible in spreadsheets and pro-formas but when delivered to the market 'likeability' of the buildings by possible tenants plays an important role. In this line Fuerts (2009) argues that more and more the values of objects has increasingly become detached from the use value and has increasingly been attached to the objects 'aura' expressing cultural values and beliefs.

Defining the Aura Concepts: Prestige and Image

The Oxford dictionary defines prestige as the widespread respect or admiration for something on the basis of perception of their achievements or quality. Image is defined as the general impression presented to the public.

Several authors have attempted to measure the impact on willingness to pay or financial performance of similar attributes. Hough (1983) conducted research in the specific market of Chicago his results demonstrated that a considerable rental premium is paid for 'good' architecture of new buildings but not for 'good' old architecture. Dorion et al (1992) conducted a similar research based in amenities, specifically atrium space, and how this passed through tenants in the form of higher rents. The economic effect of landscapes and trees in office rental rates was explored by Geideman (2003) and Carmona et al (2002). Other attributes that are constantly associated with improvement of image or prestige have been also investigated: number of floors (Shilton & Zaccaria, 1994), relationship between floors area and space (Clapp, 1980) the impact of age (Bollinger, Ihlanfeldt and Bowes, 1998).

Interesting attributes regarding this research have also been previously investigated. Riccardo et al. (2012) conducted an online visual experiment to identify to what extent are tenants willing to pay higher for redesigned façades and aesthetics as a value of the building. More into the office market Remoy (2009) studied the impact of image on financial performance using attributes such as the presence of a logo on the façade. Ho et al (2005) reported that services and management of facilities are important when assessing the quality of a building. Moreover the most interesting related research so far has been conducted by Fuerts (2007, 2011) in his first research he identified office rent determinants including: building age, number of stories, area, access to commercial centers, amenities and in-house services. Furthermore the research conducted in 2009 evaluated the economic value of hiring signature architects for office buildings. ‘Star-architects’ confirmed a rental premium of approximately 7%. In his latest paper (2011) he investigated if LEED and Energy Star offices obtain multiple rental premiums, shockingly reaching the conclusion that an occupancy premium could not be confirmed for LEED labeled offices.

Interestingly enough Bjerke et al (2007) created a new framework to demonstrate the impact of aesthetics in terms of the so-called artifacts (architecture, artwork and culture) in financial performance of offices. Their results yielded to categorizing organizations according to their affinity or interest in artifacts. The categories created are: aesthetics minimizers, aesthetically aware, corporate aesthetic philistines and corporate aesthetic narcissists. In a nutshell the higher the investment in aesthetics and the investment on employee involvement in processes yield to strengthening employee performance drivers. In other words aesthetics (architecture and artwork) can potentially influence the level of performance per employee.

The role the architect

The observed shift of interest from the object into the objects ‘aura’ (values and image) suggests that the role of design has also changed and designers are expected to provide ‘brand equity’ for their products or buildings (Foster, 2002). Architecture is no longer a rigid imposition of what the architect decides is aesthetic or beautiful. Now-a-days people find satisfaction in engaging with the environment and the values objects reflect. In some office markets the ‘branded’, landmark or iconic buildings can make significant impact. Architects can ‘raise the bar’ creating a new language and pallet of material to the city (Bligh Voller, 1998). High quality architects could make a difference by lubricating planning-processes (when the city is interested in iconic – landmark buildings), they also bring their proven successful ‘know-how’ (which comes with a high fee!) and through buildings are able to introduce brand enhancement and communication of the firms (tenants) status and prestige in relation to the market. Developers need to decide whether investing money in a premium design product is worth the risk (McNeill, 2007). In addition bringing in a ‘star-architect’ can also help creating marketing and PR for the development, according to local interviewees it creates ‘word of mouth’ that is difficult to quantify in economic terms but that certainly gives recognition in the initial phases, although there is lack of evidence if this continues throughout the years or is simply forgotten in later phases of the projects. A local example includes One Developments mix-use building Sofia. The project architect is internationally renowned Cesar Pelli. The building though in construction is apparently 95% sold, has gained positive recognition and is considered a success. The building belongs to a larger development area named ‘Arboleda’ none of which has been built or designed by Pelli, yet the whole complex is associated with the architect and hence has a positive status and high levels of prestige.

Difficulties in pricing strategies

In the attempt of relating prestige and image enhancing attributes and the willingness to pay pricing plays a vital role. When investor's acquirer high quality commercial buildings (or developers plan high quality commercial buildings) they are gaining the rights for future incomes on the property and an extra: a 'work of art'. Income is easy to price since it is based on economic fundamentals (construction costs, demand, etc.) while the 'work of art' has no basis to estimate or create a system to determine its value. Quality of design tends to lead to better image, which affects the pricing of the product. On the other hand the pricing can also be a determinant of the quality of design.

Since real estate is a far from perfect market a lot of questions have been raised on which criteria to use when pricing highly prestigious buildings. According to conducted interviews there is a lack of criteria even to classify buildings according to typical classification methods such as A+, A, B and C. This basically gives pricing freedom to developers whom seem to raise premiums based more on what fits a financial model or a benchmark, that what the actual attributes are valued for. This can be considered a limitation of the research as will be discussed in latter phases when some of the variation in prices appears to be illogical and the only explanation thought of is that some markets pricing strategies are more dependent on the supply side than on the demand.

Conclusions

Previous research proves that image and the prestige or quality achievements are important attributes with the potential of influencing the willingness to pay for office buildings and that architecture and its physical appearance play an important role for building corporate branding and even improvement of employee satisfaction. Furthermore the pricing of such attributes is considered difficult and there is no universal indicators what corporations consider adds or not value.

Trends: Green Strategies

Within commercial real estate a blend between compulsory and voluntary environmental labels is evolving (Fuerts, 2011). More and more local authorities are demanding to cope with sustainable measures, and more and more developers are using green initiatives as a marketing tool to promote corporate social responsibility. Labels provide information to consumers about the performance of the building, energy savings and productivity enhancement measures. Although recent research has proven that LEED buildings have not necessarily obtain rental premiums (Fuerts, 2010) much has to be still investigated in the subject. Fuerts mainly concluded that this is because most LEED buildings have been launched to the market during economic crisis where rental premiums are not being paid by the market. Still it is unarguable that green labeling is being used as a marketing tool to increase value through real estate for corporations, it is almost as if the label is a star on the companies profile, that can be used promote the company as being sustainable. As if sustainability was only that!

2.2.4 Corporate Identity and Branding

Corporations are most likely to have a strategy that guides the organization and differentiates it from its competitors. It is in the interest of the organization to have a plan that holds the different units together. Several marketing tools provide the company with means to maintain a coherent strategy throughout different levels. Corporate identity and branding are tools that enhance image and productivity of a company. When used correctly they can become core values and something intrinsic to the ways of working, thinking and even selling of the company.

At its most basic, corporate branding is a composite of all the experiences, encounters and perceptions internal and external stakeholders have about the company (Khanna, 2011). A brand is an external manifestation of what the company is, it can be presented in the form of a logo, tag-line, an image or even a color that is immediately associated with a organization. Think about the 'just do it' from Nike or 'eat fresh' from Subway.

Corporate brands become part of the corporate identity. The corporate identity is no longer what a company promises or says about who they are, but it is what they actually are. In other words the attributes that define a company.

Internal and external stakeholders need to be aware about the bundles of brand values associated with a product. This help the corporation gain credibility and trust, to have returning customers and high prestige or recognition. It is in the interest of corporations to promote such values.

Linking corporate brand and identity to the previous section on adding value through real estate we could argue real estate (commercial, offices and retail) is a window of opportunity for corporations to demonstrate in physical space (tangible) their core values: brand and identity.

2.3 Decision Making Criteria

2.3.1 Conceptual Framework

The conceptual framework is based on the hypothesis that contrary to what most theory and common knowledge states it is not all about location, location and location. Little scientific relevance has been given to specific characteristics of the building. The innovation of the current thesis research relays in the perspective or 'glasses' through which the building characteristics are analyzed. An adaptation of Klingmann's Brandscapes (2007) is utilized to understand buildings and its value generating characteristics. The conceptual model in Fig. 4 has subdivided buildings as object of analysis in three different areas:

- 4) Hardware: physical or aesthetic characteristics of the building
'What the building has'
- 5) Software: programmatic configuration and amenities.
'What the building does'
- 6) Humanware: the design of the desired image and perception of the building.
'What the building makes you feel'

The hardware and software of the building occur on an object (tangible level) while the humanware occurs on an aura level and are related to branding concepts discussed previously.

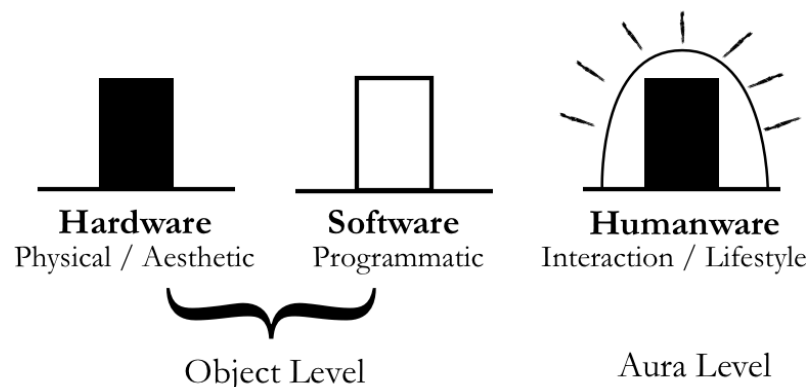


Fig. 4 Conceptual Framework

1) Hardware: The physical characteristics of the buildings that deal with the cladding and standard of the exterior and structure. These concepts add to the image and subsequently to repairs and maintenance expenditure. Major influence for this is the age of the buildings, number of floors and materials. If buildings have been refurbished is also a key issue.

2) Software: Programmatic characteristics of the building that deal with features such as:

- 1) Capacity, the floor area of the building that can be influenced by constraints design, layouts etc. Modern offices typically are designed as flexible spaces that can be adaptable according to the tenants needs.
- 2) Internal Accessibility, especially in high-rise; location of the lifts can determine the efficiency of the floor space and the lettable floor area. The existence of a lobby is also considered an attractive feature that sums to the charisma of the building.
- 3) Amenities, different common areas add value to a certain degree. Cooking areas, resting areas, toilets, washing facilities etc. According to the British Council of Office (1994) if the correct configuration of amenities is set on a building the occupier is likely to pay a rental premium.

3) Humanware: is the innovative area of research of the thesis it relates to brandism™ a term by Klingmann (2007), which refers to the strategy for architecture to gain significance as a marketing tool for the production of symbolic capital. This term attaches partially to the fame of the architect and partially to the consumer's rising desire to live or work in a uniquely designed building. As a result a new wave of profit-driven 'design buildings' are the common trend worldwide. Humanware represent an opportunity for developers to target specific demographics and an opportunity for architects to serve as vehicles of self-expression and personal identity.

Decision Making Criteria

The decision-making criteria for renting office space are well researched and documented in numerous empirical studies. Literature covers a number of relevant factors that explain the variation in office rental rates. The following section will review previous research done per attribute.

2.3.2 Location

There is no real estate without a geographical location. Commercial real estate markets, are characterized by spatial constraints, there are extensive product differentiations and this produces fragmented markets. The attributes discussed in the location section include: submarkets and agglomeration. Other attributes that are regularly relevant but due to local conditions do not apply in the studied market, such as proximity to public transport, are also discussed.

- Submarkets

Functional characteristics and physical boundaries (mountains, rivers or roads) may give rise to fragmented markets, which reflect different patterns of organization. The typical example includes: front offices, back offices and industrial clusters (Shilton & Stanley, 1999), (Schwartz, 1992), (Hanink, 1997). If markets are fragmented identical properties yield to different rents if located in different submarkets.

Grouping office buildings in submarkets can also help to correct for numerous conditions. For instance, submarkets usually contain a certain number of amenities (restaurants, shopping centers, parks, etc.) office buildings located within a submarket are assumed to share such characteristics. In other words if two buildings belong to the same submarkets they have proximity or access to the same amenities located within the area. Doing this avoids proxies of information.

- Agglomerations

Agglomerations refer to the location relation to municipal divisions (different cities, municipalities or villages). This method of grouping buildings is similar to submarkets, correcting for certain characteristics, which are considered continuous within the agglomeration. In Mexico this is mainly done to correct for relevant statistical information, since it is mostly offered per municipality. Data such as population rates and employment is easier to collect per municipality or city than per submarket.

- Local Specifications

When analyzing specific markets it is important to mention local characteristics that stand out. Numerous authors have included in similar studies the importance of proximity to public transportation. For instance (Graff et al. (2007) in Gijssels, 2010) found out that in the Netherlands proximity to a NS station (train) could represent an

increase of 16% to office real estate value. This specifically in the case of Monterrey, Mexico has no relevance whatsoever. Public transportation is very limited, our metro system has only 2 lines, bus systems are chaotic and no tram or train exists.

2.3.3 Market

The market conditions are intrinsically related to time. The moment in time when transactions occur can demonstrate patterns of changing prices that reflect economic situation. One could go more in detail and attach to time vacancy rates (Clapp 1980), (Mills, 1992). Although sometimes when markets are not well documented over time (as it is the case of offices in Monterrey) it is difficult to obtain such data for longer periods of time. By only attaching time, through variables of 'transaction year' or different observations over a certain period of time the researcher can correct for the economic trends.

2.3.3 Hardware

The physical aspect of a building contains a lot of information that generates variation in the rent levels. The different characteristics that provide an insight on the physical aspect include the age of the building, the gross floor area, number of floors etc. Some other characteristics more into the esthetics of the building include its material, shape, volume or type. All these variables contribute in different levels to the overall rental level of the building.

- Building age

The age of the building can tell a lot about the building itself. This variable contains data that relates to technologies employed (if its new or old), probable maintenance costs and in some cases trends in construction (materials employed, style) that were typical of a certain period. It is usually considered a proxy for technologies of infrastructure or internal layout. As a variable in empirical studies it has shown up as significant in office market studies, as important rent determinants (Slade, 2010),(Dunse & Jones, 1988), usually with a negative effect.

- GFA

GFA refers to the gross floor area of a building. It gives us information of how large or small a building is. The size can potentially increase interaction and face-to-face contacts (F. Fuerts, et al., 2011). Face-to-face contact has ben proven as a value for management decision (Clapp, 1980). The size of the building can also be a proxy for number of amenities within the building. If a building has a larger GFA there is a larger possibility of obtaining services such as lobby, shared facilities (waiting areas, conference rooms, washrooms, etc.) than if the building had a smaller GFA. Typically smaller-size building has less room (spatially and financially) to include such services.

- No. Floors

The number of floors represents several characteristics. One could expect sophisticated elevator systems in tall buildings, availability of panoramic views and potential landmark status of the building (F. Fuerts, 2007). The benefits agglomeration economies have in taller buildings are higher than in smaller buildings. Ozus (2009) found this variable as the most significant. While Clapp (1980) reported that number is floors is significant however the influence of this variable might be subject to different perceptions in different office markets. When conducting local interviews in Monterrey, one of the developers stated their preference on developing several buildings from 7-9 floors

instead of one building of 30 floors. Adding that this strategy allowed more companies to obtain the highest floor and hence pay a premium for it.

- Number of Parking Spaces

Increasing number of cars generates a problem, especially in markets where local public transportation is limited and everyone is practically required to arrive with a car. The quality and existence of such internal service for cars have proven to add value (Fisher and Roberts, 1994). Local interviews mentioned this as an important decision-making criterion. The expected ratio for new buildings is 1 parking space for every 14 square meters of lettable floor space. The ratio has increased almost 50% since 10 years ago buildings were typically constructed with a 1/30 ratio.

- Parking Type

As mentioned above parking is considered relevant, but the way in which parking lots are designed and presented can potentially present a premium for the rents. In general office buildings with ground or open parking areas are considered less significant (and in some cases even with negative connotation) to office rents. This can be potentially related to security and to having your car parked for long hours on the sun.

- Façade Material

The albedo of a material depends on color, geometrical characteristics (e.g. surface making) and temporal variations (e.g. weathering and wear)(Riccardo et al, 2012). The material on a façade is a proxy for maintenance and cleaning efforts. Typically glass buildings are preferred and although they need to be continuously cleaned it is considered more feasible to clean glass than potentially cleaning a stained concrete or granite. However some materials denote prestige and sometimes are even trademark of certain architects. Think of the new architecture center Roberto Garza Sada from Tadao Ando in Monterrey, concrete is treated so elegant that is considered luxurious while a regular concrete construction is most of the time associated with an unfinished building.

- Façade Shape

The shape of a façade affects the aesthetic judgment of the building. If the encounter between surfaces and the articulation of the geometry is perceived as non-chaotically it could be attributed to adding value. Curved façades are usually more attractive to the eye although in buildings they are sometimes considered non efficient since they can potentially have a negative relation with the interior layout.

- Footprint

The shape of the footprint of the building is associated with the form and potential flexibility of the internal layout. Square or rectangular footprints are related with efficient layouts. Circular or triangular footprints have presented negative relation to the increase in rental premium. This could be attributed to the difficulty of accommodating office furniture and the amount of potential unused space in corners or rounded ends.

- Type

How building cluster provides with potential information on premium rentals. Especially in the case of Mexico where security is a big concern, office parks seem to be gaining interest. Office parks are usually fenced and have control access not only to the buildings but also to the complex as a whole, cars are checked. Shared visitors parking spaces along with more green and landscapes area are other features that can add value to such typologies. On the other hand 'stand alone' office buildings are directly on the street.

2.3.4 Software

- Average Floor Area and Flexibility

Directly related to flexibility is the average floor plate. Several studies demonstrate that tenants are willing to pay a rent premium for sizable units of continuous office space (10,000 square feet and above). If the average size of the floor plate is considered flexible it enables internal operations to run smoothly instead of several scattered locations with columns or walls in between. Bollinger, Ihlanfeldt and Bowes (1998) find significance in these variables while determining rents for the Atlanta office market.

- User type

User type refers to the usage of the building in terms of tenants. In other words if the building has only one user or multiple- This variable can determine the level of 'sharing' within facilities and parking areas. Also it reflects a certain level of exclusivity and freedom of internal usage if the building only belongs to a single tenant. However, research from Gijssels (2010) found it none significant for rental levels.

- Hybrid

As mix-use buildings are an increasing trend it is a potential proxy for in-house amenities. Ho et al. (2005) reported overall amenities are the order of importance in assessing the quality of buildings. When buildings mix uses generally they could include retail areas, banks, fitness clubs, medical facilities, mailing etc. This usually includes an onsite facility management, which ensures quality of areas. It is expected that tenants pay a premium for this type of services. It is also important to note that only the correct mix of number and type of amenities according to markets targets are considered as successful for rental raise. As not all amenities and mix uses are considered relevant or significant for office users.

2.3.5 Humanware – Aura Level

- Logo

The logos on the façade of buildings denote efforts in marketing and communication. Previous research on the economic value of image conducted by Remoy (2009) used the presence of a logo as an attribute to add to the image of a building. Logos on façades can be company logos, building logos and even promotional ads, and are associated with incrementing identity and association of the building with certain brand or status.

- Nickname

Although rarely introduced in hedonic models the fact that a building has a generally known nickname denotes the certain level of recognition and status of the building itself and the companies in it. Buildings can have positive and negative connotations through nicknames thus explaining the general opinion of the public about the building. It is a variable difficult to collect but in some cases impossible to ignore, think about the twin towers whose actual name the World Trade Center. In the Mexican context 'El pantalón' in Mexico city is a perfect example, it is a building from Architect Teodoro Gonzalez de Leon whose actual name is Torre Arcos Bosques I but resembles to a pair of pants and hence the nickname 'The pants'.

- Security

Security is considered a basic public rights. Though in some countries the lack of it is more relevant than in other the attribute has been mainly associates with location features. Some mono-functional locations especially in USA and UK have reported that busy business districts tend to be abandoned and insecure by night and during the weekends. Ho et al. (2005) also reported security systems as relevant but considered them in-house amenities rather than a variable on its own.

Especially in Mexican markets security has become a major public concern. Buildings have registered not only controlled access for people, but also for cars. Other measures include: special CCTV security systems, hiring private security to wander around office parks and inclusion of technology that recognizes fingerprints and personalized badges to move around buildings.

- Class Type

Brokers and market analyst typically employ an A, B, and C scale to classify buildings according to their ‘quality’. A building represents the highest quality real estate in terms of construction, infrastructure and location. B buildings are generally a little less desirable and C buildings are the lowest classification, considered old and in need of renovation. There is a general belief that A buildings transact at higher prices than B and C. Dermisi and McDonald (2010) reported that for the Chicago market class A buildings have up to 44% higher selling prices than B buildings. Other interesting finding included the fact that building age effect was more pronounced on class A buildings, in other words old buildings of class A overcame the negative effect of age by selling at 90% higher prices than old B buildings. On class B buildings and interesting fact was also concluded, occupancy rates are highly important for the success of B buildings, if low occupancy rates are reported the perception of the buildings as of ‘lower quality’ increase.

- Local Note on Classification

It is important to note that A, B, C classification in Mexico is highly subjective and even is divided into A+, A and B. Brokers and developers have no standardized attributes or KPIs to determine if a building fits into one category or another. In reality everyone can name their building A+, premium or gold if this fits their marketing and promotion purposes.

2.4 Conclusions

Table (3) comprehends a summary of the most important criteria obtained from literature reviews and local interviews conducted in Mexico.

Author	Literature	Interviews
Clapp (1980)	Size, Building Age, No. Floors, Distance to major roads.	Parking Spaces Average Floor Plate Security
Hough and Kratz (1983)	Building Awards	Class (A+, A, B, C)
Dorion (1992)	Atriums	Size
Gat (2000)	Services	Services / Amenities
Laverne, Winson-Geideman (2003)	Trees and Landscape	Maintenance
Ho et al (2005)	Services	HVAC Systems
Koppels (2008)	Image, Logo	Elevators Speed / Privacy
Ozus (2009)	Floors, Banks in vicinity, accessibility	Other tenants Accessibility
Fuerts (2010)	Star-Architects	
Fuerts (2011)	LEED Certificates	

Table 3. Summary of Important Criterion based on Literature and Interviews

III. Methodology

3.1 Introduction

This section empathizes the statistical procedure and analysis of the research. The main objective is to justify and explain the main choices made during the data collection and processing. The research is mainly based in general linear regression analysis and multilevel linear regression hence a brief introduction in the subject is provided. Afterwards the data sources and collection methods are explained thoroughly. Finally a step-by-step process analysis of the decisions made concerning the building of the model is defined.

3.2 Regression Analysis

According to Andy Field (2005) the essence to regression analysis is fitting a model to the data and uses it to predict values of a dependent variable from one or more independent variables. If the analysis predicting the outcome variable comes from only one predictor variable a simple regression is employed. If the outcome variables come from several predictor variables a multiple regression analysis is employed. The simple idea of predicting data can be summarized in the following model:

$$\text{outcome}_i = (\text{model}) + \text{error}_i$$

The formula basically means that a model plus some kind of error (residual) can predict an outcome (Gijsselaar, 2010). In regression the model to be fitted is linear and the data is summarized with a straight line. The mathematical technique called *method of the least squares* is used to establish the line that best describes the data collected. Generally a straight line is defined by two things: (1) the slope or gradient of the line (b_1); and (2) the point at which the line crosses the vertical axis, known as the intercept (b_0). These parameters b_1 and b_0 are known as regression coefficients. The following equation summarizes the a simple regression:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

When more predictors are added, the number of regression coefficients will increase creating a multiple regression analysis. The following equation summarizes a multiple regression:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni} + \varepsilon_i$$

Where X can be any predictor variable we consider in the model. For example if we were trying to predict the total value of a building from multiple predictor variables the equation could take the following form:

$$\text{Total Building Value}_i = \beta_0 + \beta_1 \text{Age}_i + \beta_2 \text{vacancy rates}_i + \varepsilon_i$$

In theory the number of predictor variables is infinite, but adding a lot of variables sometimes only makes the process more complex and creates unwanted noise from variables that could be clustered or eliminated.

Ordinary Least Squares (OLS)

The method used will be the statistics OLS or linear least squares. The method estimates the unknown parameters in a linear regression model. It basically minimizes the sum of squared vertical distances between the observed data and the predicted ones. It is a relatively simple method for identifying the unknown variation.

Justification of Method (Limitations of Time)

The OLS method is usually considered as a basic type of analysis the justification for the selection of OLS is based on the required number of observations per variable and the number of variables used on the present research. According to the statistics rule of thumb for every variable introduced in the model a total of 8 observations should be registered. The base model consists of 13 variables (5 submarkets and 9 years of transaction). According to the rule of thumb 104 observations should be registered. The dataset received presents a total of 304 observations (correcting for missing data). The total number of extra independent variables that could potentially be added to the model without losing the degree of freedom in a OLS approach is of 25 $((304-104)/8)$.

Due to the fact that 25 variables are more than the total variables of data collected, it is possible to justify the use of an Ordinary Least of Square method to estimate the unknown parameters in a linear regression model.

3.3 Software

SPSS (Statistical Package for the Social Sciences) is a predictive analytic software. It allows in a 'user-friendly' way to assemble data, create variables and attribute listing. The program allows many ways to visualize descriptive statistics, as well as analyzing correlations, linear regressions and multi-level modeling.

3.4 Data Collection

Data Source

The research focuses on office buildings in the city of Monterrey hence databases were required. Since we can never have access to the entire population there is a need to collect smaller samples. From the behavior of the sample we could infer things about the whole population. The bigger the sample the better since it will most likely reflect the whole population.

The real estate business has never shined for transparency, the lack of correct information due to confidentiality, incentives, free rent periods and in general the culture of brokerage, makes it difficult to access information. During the preliminary interviews conducted with local experts, one of the objectives was to obtain access to a reliable dataset. The brokerage company Alles Group provided the historical asking rents for a total of 165 buildings in a 10-year period. Ideally asking rents are not preferred for analysis, since they do not reflect the actual rental price (which according to interviewed experts asking rents could vary in no more than 5%). Nevertheless the data was sufficiently robust to be considered credible and Alles Group satisfied these demands.

Aller Group is a brokerage firm established in Monterrey and Mexico City since 1997. They offer creative and integral solution to maximize the economic benefits to users, developers and investors in corporate real estate. They currently manage leases for the

most prominent projects in the city and are pioneering in office classification methods with other industry leaders.

The timeframe set for this study is of 10 years, from 2003 until 2012. All office space leased during this period of time was targeted to enter the dataset. A constraint was that minimum one transaction per building had to occur between the timeframe to be considered in the study. Out of the 165 buildings provided by Altes Group only 107 had transactions occurring during this 10 years. Another constraint was the access to information on building level - there is no governmental database or homologation of information between brokers, hence some buildings due to their age or the ownership are impossible to obtain data of their gross floor space, number of parking lots or average floor space, due to this another chunk of buildings had to be eliminated from the sample. Finally a filtered dataset of 70 buildings was taken into account.

The dataset comprises buildings that range between 503 m² and 36,000 m² gross floor space. The rent levels go from as low as \$3.97 USD/m²/month and as high as \$30.00 USD/m²/month.

Correcting for the market conditions (exchange rates)

It is important to note, that due to Monterrey's proximity to the United States of America, the currency for office transactions (and many other high end products) is US Dollars. The US Dollar has had an important fluctuation in relation to the Mexican Peso throughout the years of study and especially after 1996 economic depression and devaluation of the Mexican currency. Hence what 20 USD was worth in 2003 is not worth the same as what it is now. A correction for the economic trend is done based on the annual average exchange rate published by 'Banxico'. This measure allows for transactions to be reflected in pesos at the time the observation took place.

3.5 Variables

3.5.1 Dependent Variable

The dependent variable is defined as: financial performance, it is a measure of how the asset contributes to the return on investment. The performance is defined by the rent level (*Ask_Rent*) or (*Ask_Rent_Peso*). The faster the building is rented out, and the more expensive it closes a lease deal is associated to a higher contribution to the IRR (internal rate of return) for the investors.

Weaknesses of dependent variable:

The asking rent is sometimes considered an unrealistic measure for financial performance due to the lack of transparency in the real estate sector. Usually incentives, rent-free periods or discounts are given, and tend to lower the asking rent to the actual rent. When interviewing local experts they commented that in corporate real estate rent-free periods are only months (from 1 to 3 months) this is generally granted for refurbishment of the office sector. Unlike in Netherlands where due to the market situation rent-free periods can extend to months even sometimes years. Interviewees also shared that discounts on rent are usually related to amount of square meters, but generally are low discounts from 1% – 3%.

Strength of dependent variable:

Asking rents are easy to find, usually a historical data of rents is kept by brokers and developers. The availability of data over a 10-year period of time is good for the analysis.

3.5.2 Independent Variables

As mentioned in the section 2.3 the conceptual framework allows buildings to be analyzed from a hardware, software and humanware perspective. Thus this section is subdivided into these three areas. The main objective is to describe what each variable measures, how it was collected and what exactly does it indicate.

3.5.2.1 Location of the Buildings

The Monterrey office stock is primarily divided into several submarkets. According to JLL (2012) there are 5 major submarkets. While Colliers International (2012) and CBRE (2012) present 7 submarkets. The database obtained was subdivided the sample in 4 major submarkets: Valle, Valle Oriente, Santa Maria and Centro. The submarket of Valle was subdivided into two areas: Valle and Valle G (Valle G comprises roads: Gomez Morin and Ricardo Margain), the main reason behind this was that the market conditions change drastically in economic terms in these two major roads and a significant raise in prices and quality is observed.



Fig 5 Submarket Location

Agglomeration

The city of Monterrey is a conurbation of 12 municipalities that are considered the Metropolitan Area, which houses a population of approximately 4.5 million people. The population is considered young according to INEGI where 62% are between the age of 15 and 59 ages. The most important municipalities in terms of office space availability are Monterrey and San Pedro Garza García. Monterrey is the historical city center and host major governmental activities. It is also the area where one could actually use the 2 lines metro system. It has a population of 1.5 million people. The municipality of San Pedro houses approximately 150,000 people but has a high traffic of people coming to work in the municipality. It is considered the safest area to live and only the wealthiest can afford to live in the area. It contains high quality amenities and beautiful mountain views. It is a municipality recognized for high quality of life standards throughout Latin America.

Submarkets:

- Valle (Valle)

Located in the municipality of San Pedro, it is associated with housing the wealthiest families in the city. The area however is dominated with residential areas and restriction on land use and density are high. Land prices are also very high and hence not feasible to use for high-rise buildings. However the area does present office stock primarily around the main streets Vasconcelos, Calzada del Valle and Calzada San

Pedro. The submarket has a low inventory with relatively low vacancy rates of 2.5% (CBRE, 2012) and rents on average of \$16.00 USD/m²/month.

- **Gomez Morin – Ricardo Margáin (Valle_G)**

The area of Ricardo Margáin and Gomez Morin was also until recently been considered only a residential area. Land use however permits higher density and hence the most prestigious buildings are currently being erected in the area. Its closeness to high status amenities like the 'Campestre Golf Club' and 'Palacio de Hierro' makes the area more interesting, it is also highly accessible to major roads that link the area to different municipalities. It is considered a very green area and major companies like CEMEX and Vitro used to own huge land banks, which are now being subdivided into numerous projects. Buildings from Cesar Pelli and Norman Foster are planned for the area. The submarket according to CBRE (2012) presents the lowest vacancy rate 1.1% and the highest asking price \$30.00 USD/m²/month.

- **Valle Oriente (VO)**

Valle Oriente is in the limits of San Pedro municipality and Monterrey. It is a rapidly growing area that was detonated by a no high-height restriction policy from the municipality, which was interested in verticalizing the city and avoiding further urban sprawl. The area houses the tallest and most iconic buildings in the city. It accounts for 43% of the office stock with approximately 324,144 m² (CBRE, 2012). It also presents high vacancy rates of 30% (JLL, 2012) but this can be explained through the numerous ongoing constructions in the area. It hosts the most intelligent buildings in the city and contains numerous amenities related to offices such as a shopping mall with a big food court, restaurants and eating areas, high parking rates and is highly accessible by car. It is a highly demanded submarket and accounts for 58% of the transacted space (CBRE, 2012). The average asking rent is of \$21.55 USD/m²/month.

- **Centro (Cen):**

Centro means city center, it is the oldest submarket and hence the office buildings in the area in its majority were built during the 50s and 70s. The area typically presents the low prices and high vacancy rates. Efforts in reactivating the city center are ongoing and currently the submarket has experienced a relevant increase in stock, with 24,000 m² under construction (JLL, 2012). It presents a bulk of government offices and official activities. The closeness of the city to the USA has influenced greatly how it is designed, major highways are an example. Unlike many cities in Europe the city center is not 'the place to be'. It is greatly affected by the so-called 'doughnut effect' very common in the USA. Where major roads are built to communicate with different suburbs and the center is forgotten, often abandoned during the night and associated with being dangerous. The wave of insecurity the city goes through has also impacted negatively the image of the city center. Moreover, the center suffers from parking problems.

- **Santa Maria (SM)**

The Santa Maria corridor is in the municipality of Monterrey. Detonated at the start during the 90s with iconic projects for the city it nowadays accounts for 11% of the total office stock. It is mainly associated as presenting highly efficient buildings (interesting for back offices). The area though, is geographically constrained by a river and mountains and is a difficult area to grow in terms of increase in square

meters. It is considered the third most expensive submarket in the city with an average \$19.70 USD/m²/month (CBRE, 2012).

3.5.2.2 Hardware

Building age ($\text{Build_Age} = \text{Age} - \text{Transaction Year}$)

Building age describes the age according to its technical life. It is a measure for depreciation over time. It is calculated as the year of construction or renovation minus the year when the transaction occurs. Giving the exact age of the building at the moment of transaction. Since building age is a variable over time it is interpreted as a repeated measure.

Gross Floor Area (GFA)

GFA was obtained by official reports from various brokerage firms and real estate market research specialized agents. It describes in square meters the spatial dimensions of the building.

Number of floors (Floor_N)

The number of floors per building was obtained through official reports and double-checked by observation. It denotes the 'icon' or 'landmark' status of a building. It is important to note that the total number of floors per building is considered and not the total floors of office space, this means that if a building has mix uses and half of the building is office space and the other residential the total number is considered. The measure is relevant for reflecting potential improvement in image and status through height. It also indicates advanced technology in elevators.

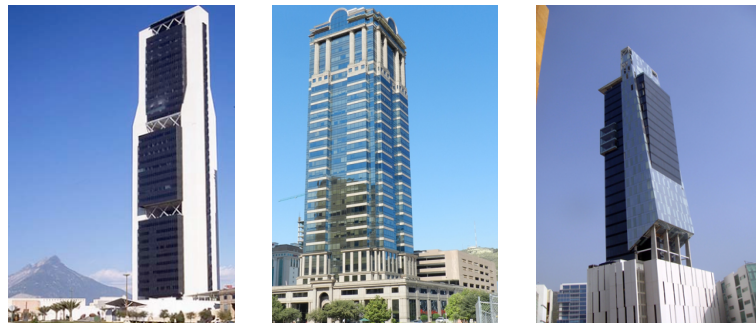


Fig. 6 Examples of high-rise buildings in the sample.

Number of parking spaces ($\text{Park_Ratio} = \text{Number of parking spaces} / \text{GFA}$)

The number of parking spaces was obtained through brokerage firms and technical specifications obtained per building. It was then transformed into a ratio that provides information of number of parking spaces per square meter of construction. It indicates efficiency in accessibility to the building, but more importantly a degree of comfort and status to have an assured parking spot in the building for employees and visitors.

Parking type (Park_Typ)

The parking type is a nominal variable that contains the following categories: ground parking, structural parking, underground parking and mix. It was obtained through observation and technical specification obtained from brokers. It indicates efficiency in accessibility and denotes aesthetic appearance of the building. It also provides information on configuration of space on a master plan level.



Fig. 7 Examples parking types: structural (left) and ground (right).

Façade material (Fac_Mat)

The material on façade is a nominal variable that contains the following categories: stone, steel, glass, concrete and mix. Materials contain information about the charisma of the building and also the levels of maintenance required. The criteria for subdivision consisted on the most dominant material per façade. A material was considered dominant if through observation 60% or more of the façade was made with one given material. If any of the categories failed to represent 5% of the sample it was recoded to fit into another category. Such was the case of buildings made from steel (accounting only for 3.9% of the sample), which was eventually incorporated into the mix category.

Façade shape (Fac_Shap)

The façade shape is a variable used to describe the shape of the exterior. Most buildings are straightforward with rectangular shapes, while others use other elements such as acute or round shapes. This variable is a considered nominal with the following values: round and rectangular.



Fig. 8 Examples of round (left) and rectangular (right) shape façade of the sample

Volume (Vol)

The variable volume party depends on the shape of the footprint (Gijselaar, 2011). It provides information about accessibility and communication of the layout. Regular box or rectangular footprints are considered more efficient. The variable was subdivided in the following categories designed by Gijselaar (2011): box, ltx, multiple rectangles and others. This variable was collected through Google Earth and Maps applications.

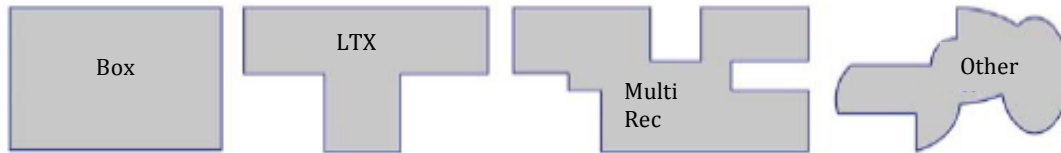


Fig. 9 Examples of types of volumes by Gijsselaar (2011)

Type (Type)

The type variable explains the cluster type of the buildings. If two or more buildings are constructed as part of a complex sharing facilities, green areas and security it is considered to be an office park location. Regular office buildings, which do not belong to a larger complex, are considered stand alones. This variable is nominal with two categories: office park (OP) and stand alone (SA); and was collected through observation. It indicates levels of security, fenced complexes and an increase in landscape and recreational area.



Fig. 10 Examples of types: office park (left) and stand-alone (right).

3.5.2.3 Software

Average floor space (Floor_Avg)

The average floor plate per building was obtained through brokers and technical specifications of buildings. It demonstrates in square meters the spatial dimensions of the building. It indicates flexibility and divisibility of floor space. It also relates to the number of potential users or companies that could fit into a single level.

Flexibility (Flex)

The flexibility determines the possibility of how a building can be used. It is a nominal variable subdivided into: very flexible, medium flexible and not flexible. Very flexible means the office units are adjusted on demand and capability of having multiple tenants. Medium flexible means the unit can be subdivided by demand with some efforts. Not flexible means the building is barely adjusted to the demands of future tenants. Flexibility also indicates location of circulation clusters. Typically very flexible floor plates have a cluster of elevators in the center allowing subdivision in multiple ways.

User (User)

The number of users in a building determines the level of exclusivity upon building rights and the degree of freedom to move around or establish organizational culture. It is considered a nominal variable with two categories: single-users and multi-user. A single tenant considers a building single-user if it is occupied in more than 85%. An example is the 'offices in the green' project, which hosts Total Home, the building currently offers 500 m² of space of office space to rent, but it is considered single tenant since approx..

95% of the building is occupied by Total Home. The variable was collected through observation and brokers quarterly reports.

Hybrid (Hybrid)

Hybrid refers to the mix of uses within a building. It is a growing trend and new buildings are adopting the: live, work and play strategy for buildings. The variable is nominal with two categories: mono functional and mix uses. The mix use category indicates a potential increase in amenities, landscape, parking space and overall improvement of common areas. It also reflects closeness to leisure and retail areas. The variable was collected through observation of usage.

3.5.2.4 Humanware

The 'humanware' variables are denominated as the interest variables of the study and were subdivided into hard and soft measures. Hard measures comprehend variables that required observation and logic to be collected. They are considered quantitative measures. Soft measures required expert's opinion are considered qualitative and are associated with subjectivity. Soft measures were collected according to preference measurement theory, which will be explained in the following section.

Hard Measures:

Logo (Logo)

The logo on façade is considered a dummy variable. Where two categories exist: yes and no logo on façade. The variable was easily collected through observation of building façades. It indicates marketing efforts, improvement of image and prestige for corporations. It also refers to brand awareness and visibility of the companies.

Type of Logo (T_Logo)

The type of logo is a branch variable from the logo variable. It indicates if the logo on the façade is from the company, the building or an advertisement. A local characteristics of the market is the usage of branding for the building, they name the building and sometimes use that logo for the façade instead of the regular company logo. Another interesting observation is the usage of façade space to promote products that are not related to the tenants, these are considered advertisements. The variable indicates image, visibility and prestige of the company, building and/or products.



Fig 11 Examples of Types of Logo: building name (left) and company logo (right).

Nickname (Nick)

The nickname variable is a dummy variable that required local insight of the market. Buildings with a nickname indicate higher degree of recognition and are associated with an improvement in image and visibility than those that do not have a nickname.

Security (Sec)

The security issues in the city are regarded as of high priority. The variable indicates improvement in technology (cameras, CCTV, etc.), privacy and controlled access (personal or for cars). It is a nominal variable with three categories: high, medium and low. The variable was collected through technical specifications of buildings obtained by brokers or promotion offices. High security buildings include controlled access for cars and people, the complex as a whole is secured. Medium security buildings are those what control for people once entering the building. Low security basically indicates freedom of entrance to the building elevator core.

Class (Class_Alles)

The classification variable is taken from the dataset received by Alles Group. It is a nominal variable with three categories: A+, A, B. They are indicators of higher overall quality and improvement in design and aesthetics. The variable recognized to be highly subjective since it depends basically only on the opinion of one brokerage agency. In the results section (5) the most likely elimination of the variable is analyzed.

Soft Measures:

An online expert ranking system was designed in order to obtain the opinion of locals in terms of: image, prestige and quality of the buildings in the sample. A total of 14 experts were contacted (most of them also previously interviewed) a surprising 65% positive response rate was obtained (normally only 50% of the contacted experts replies). The system was based in theory of preference measurement explained below.

Preference Measurement Theory

Preference measurement theory underpins economic theory, the theory of games and decision theory (Barendse, Binnekamp, De Graaf, Van Gunsteren, & Van Loon, 2012). The theory explains the mathematical operations of non-physical variables, such as preference, which describes psychological or subjective properties.

In order to understand such theory according to Barzilai (2006) some terminology is required:

E = a set of operations that reflect empirical operations in E as well as the order in E when E is ordered

M = Mathematical Model

s = scale is a mapping of the objects in E into the objects in M that reflect the structure of E into M

The idea behind the theory is basic. Think about freezing points and boiling points as the boundaries of temperature and a proper scale measurement to indicate how cold or warm temperature actually is, this measurement now completely standardized and known are Celsius and Kelvins. What the theory suggests is that if respondents indicate at top and bottom of the scale then all the value in between can easily be measured and compared.

The ranking system

The variables that will be measured on a humanware level include: image, prestige and design quality. These variables, as explained before are highly subjective and thus could lead to unreliable data. In order to avoid these problems a ranking system was designed along with experts from operational research departments. By using this methodology the research intends to determine a scale for information in order to be able to statistically analyze and cross check the ranking of the different buildings with the specific building characteristics.

The design for ranking system of soft variables was done in a user-friendly way that would take no more than 10 min to answer. Each respondent received two documents with 10 buildings to rank. One document contained the name, image and location of the buildings. The other document included a set of three tables to fill in with the scores.

The instructions were to:

- Fill in the tables giving a score to the 10 received buildings.
- It was mandatory to include a building with the value 100 and another with the value 0. Thus setting the top and lower boundaries of the scale
- The values for the remaining buildings were left to fill in freely. Thus no regular distribution of the values was required, this allows indicating if they believe all buildings are relatively high or low and does not force to a hierarchy in the data.
- If any of received buildings were not thought to deserve the 100 or 0 then the respondent could indicate the building he/she believed deserved that position.
- A restriction for the previous statement was that the proposed building had to be constructed and in operation in the city of Monterrey. Avoiding buildings that are planned for and usually due to branding purposes and rendering promise more than the actual image and quality delivered.

The three tables included the following titles:

- Which building has best image. Asking: Could you rank the following buildings according to the level of positive image they reflect?
- Which building is considered most prestigious? Asking: Could you rank the following office buildings according their level of prestige?
- Which buildings have the best design quality? Asking: Could you rank the following buildings according to their design quality?

Expert 06: Alfonso Cavazos- CBRE





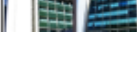
ID	Nombre	Dirección	Foto
6	Parque Corporativo Torre 1	Av. Anq. Pedro Ramirez Viquez No.200-6 Condom: Valle Oriente	
13	VAO	David Alfaro Siqueiros No.104 Condom: Valle Oriente	
26	Marsel 1	Calle Enrique Heera No.2307 Condom: Valle Oriente	
27	109.28 Koinon Valle	Av. Alfonso Reyes No.2615 Condom: Valle Oriente	
34	Plaza Empresarial Sur	Boulevard Diaz Ochoa No.123 Condom: Santa Maria	

Tabla 1: Ranking de Prestigio - ¿Qué tan prestigiosos consideras los edificios?

Edificio (nombre o ID indicado en el doc)	Calificación
	100
	0

Tabla 2: Ranking de Imagen - ¿Qué edificios proyecta la mejor/peor imagen?

Edificio (nombre o ID indicado en el doc)	Calificación
	100

Fig 12 Excerpt of the sent documents to rank buildings.

The results were computed and introduced in a general linear regression analysis. The procedure and outcome will be further discussed in section IV and V.

V. Procedure

4.1 Introduction

This section will emphasize in the chronological sequence steps taken in the statistical analysis. It explains in detail the path taken to predict and describe the effect of the independent variables previously discussed in the asking rents. The procedure consists of three major steps: exploration, pre-selection and final model. During the exploration phase the data is explored per variable (frequencies or descriptives) and correlations between variables are graphed. Singular effects per variables are analyzed in the pre-selection phase; the process of elimination of insignificant variables is done. Finally try-out models lead to the final version.

Phase	Description	Type of Analysis
Exploration	Exploration of Data	Recoding of Variables Descriptive Statistics Frequencies Analysis
Pre-Selection	Singular variable analysis Selection of the variables for the Model	General Linear Regression Evaluation
Final model	OLS Method	Multiple Linear Regression

Table 4. Procedure

4.2 Exploration

The first phase of the procedure consists of recoding of variables (into dummies of logarithmical) and exploratory analysis done through descriptive statistics. The main objective during this phase is to: 1) code variables in the correct format for analysis and; 2) understand means, medians, standard deviations, confidence intervals and frequencies. The idea is to provide a panorama of average performance of variables in relation to other factors. Important descriptive statistics of certain building characteristics are presented in the following categories: hardware, software and humanware variables are summarized below.

Level	ID	Continuous	Categorical	Source
Time	Trans_Yr	X	10	Alles
Time	Age	X		Market Research
Location	Agglo		2	Alles
Location	Sub		5	Alles
Hardware	GFA	X		Market Research
Hardware	Floor_N	X		Fieldwork
Hardware	Park_N	X		Market Research
Hardware	Park_Typ		4	Fieldwork
Hardware	Fac_Mat		5	Fieldwork
Hardware	Fac_Shap		3	Fieldwork
Hardware	Vol		4	Fieldwork
Hardware	Type		2	Fieldwork
Software	Flex		3	Fieldwork
Software	User		2	Fieldwork
Software	Hybrid		2	Fieldwork
Software	Floor_Avg	X		Market Research
Humanware	Nick		2	Fieldwork
Humanware	Logo		2	Fieldwork
Humanware	T_Logo		4	Fieldwork
Humanware	Class_Alles		3	Alles
Humanware	Security		3	Fieldwork
Interest Variable	Prestige	X		UPM
Interest Variable	Image	X		UPM
Interest Variable	Design Quality	X		UPM

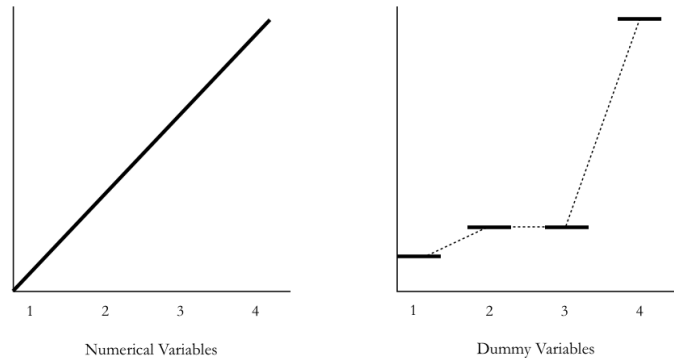
Table 5. Summary of Independent Variables

4.2.1 Recoding

Transformation of variables and recoding of data is important in order to understand clearly the effects and relations between dependent and independent variables. Two types of recoding used in the statistical analysis are discussed in this section: 1) dummy variables and 2) logarithmical function.

- Dummy Variables

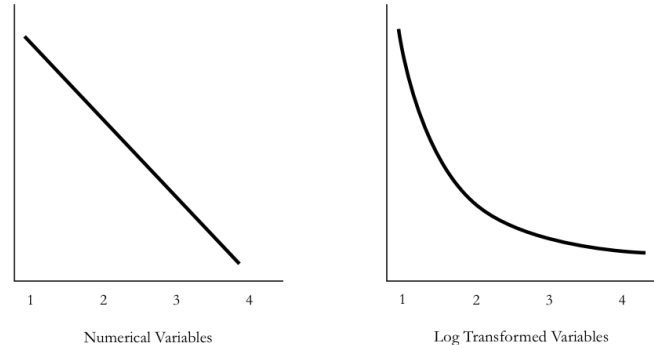
Dummy variables are artificial variables created to represent an attribute with two or more distinct categories (Skrivanek, 2009). Regression analysis treats all independent variables in the analysis as numerical. Numerical values are understood as for example in 1,2,3,4 that number 4 is twice as much as 2. However when this number



represent categories for instance: 1 = very, 2 = med, 3 = no, and 4 = not responded, we could not assume that not responding (4) is twice as much as thinking something is med (2). The dummy variable in some way is created to trick the regression algorithm into correctly analyzing attribute variables. The difference when graphically representing both numerical values and dummy variables show that basically the straight line is transformed into a loose line, where difference between one category and another can vary greatly.

- Logarithmical Function

The objective of logarithmic transformation of a variable is to have it normally distributed. It is a good way to reduce positive skew and unequal variances (Field, 2009). Standard interpretation of the log-transformed data in a regression analysis means a one-unit change in the independent variable results in the respective coefficient change in the



dependent variable. The interpretation is hence in terms of percentages (%). The goal of transforming the data into a LN (logarithmic) is not to make it just more symmetrical and good-looking, it is to make the relationship between variables more linear.

Table 6 summarizes the recoding of variables. It is important to note that some other variables were transformed to represent the data in a more coherent way. Some of these transformations include: building age and parking ration. Other important changes include the elimination of categories that fail to represent at least 5% of the data (see variables marked with ***); such is the case of steel (in Fac_Mat), mix (in Fac_Shap) and advertisement (in Logo_T).

	ID	Type	Categories	Transformation	Recode
Dependent					
	Ask_Rent	Scale		Log	LNAsk_Rent
Independent					
Economic Trend	Trans_Yr	Scale / Cat	10	Dummy	Dtrans_yr04 Dtrans_yr25 Dtrans_yr12
Location	Agglo	Categorical	San Pedro Monterrey	Dummy	DAgglo_SP
	Sub	Categorical	CEN VO VALLE VALLE_G SM	Dummy	DSub_VO DSub_Valle DSub_ValleG DSub_SM
Hardware	Age	Scale		Age-Trans_Yr	Build_Age
	GFA	Scale			
	Floor_N	Scale			
	Floor_Avg	Scale			
	Park_N	Scale			
	Park_Typ	Categorical	Ground Underground Structural Mix	Dummy	DPark_Tunder DPark_Tstruc DPark_Tmix
	Fac_Mat	Categorical	Glass Steel*** Concrete Stone Mix	Dummy	DFac_MConcrete DFac_MStone DFac_MMix
	Fac_Shap	Categorical	Rec Round Mix***	Dummy	DFac_SRound
Software	Vol	Categorical	Box Multirec Ltx Round	Dummy	DVol_Multirec DVol_Ltx DVol_Round
	Type	Categorical	SA OP	Dummy	DType_OP
	Flex	Categorical	Very Med No	Dummy	DFlex_Very DFlex_Med
Humanware	User	Categorical	One Multi	Dummy	DUser_Multi
	Hybrid	Categorical	Mono Hybrid	Dummy	DHybrid_Hy
Humanware	Nick	Categorical	Yes No	Dummy	DNick_Yes
	Logo	Categorical	Yes No	Dummy	DLogo_Yes
	T_Logo	Categorical	Company Brand AD*** No	Dummy	DT_LogoCo DT_LogoBra
	Class_Alles	Categorical	A+ A B	Dummy	DClass_A+ DClass_A
	Security	Categorical	High Med Low	Dummy	DSecu_High DSecu_Med

Table 6.Variable Transformation

4.2.2 Descriptives

Descriptive statistics for continuous variables

A continuous variable is one that gives us a score for each observation and can take any value on the measurement scale that is in use. In SPSS continuous variables are referred to as scale variables. These are usually numeric and hence analysis on means, medians, modes, standard deviations, upper and lower boundaries, minimums, maximums and ranges are very helpful to explain each variable.

4.2.3 Frequencies

Frequencies analysis for categorical variables

A categorical variable is made out of categories. Categories can be either binary (yes or no) or nominal (when two things are equivalent in some sense but are given different name.). The correct analysis for nominal data is to consider frequencies in order to understand the number of times an event/level occurred. A known rule of thumb is that the categories within a nominal variable should at least represent 5% of the sample in order to be considered relevant.

4.3 Pre-Selection:

4.3.1 Singular variable analysis: general linear regression

Once all the variables have been recoded, the process of analyzing each variable alone with the dependent variable is relevant. Through a general linear regression one could predict the outcome variable (dependent) from one predictor variable (independent). As a general rule if the observed significance is less than 0.050, then scientist assume that b is significantly different from 0; put on another way, the predictor makes a significant contribution to the predicting outcome (Field, 2005).

4.3.2 Pre-Selection of Variables

The process of selecting variables is based on significance levels. The procedure starts by building a base model. Afterwards an iterative process is done to add and eliminate variables until the model is fit.

- Model building strategy:

When lacking theory to determine the model section and having large amount of possible explanatory data an iterative construction of a base model can be chosen. This is called a stepwise strategy, which basically means the addition of predictive variables by a continuous procedure. The first step is to add to the base model the variables per level and observe the change in significance, then re-test the model with the selected variables with a stricter confidence interval. In the end the variables, which yield to higher significance effects, are kept. It is important to observe during this step for adjusted sum of square (power of explanation), beta (effect size) and the standard error.

- Initial base model

The objective of the base model is to correct for the economic trends and subject effect (location). Transaction Year is meant to correct and explain for the economic trend. Three types of variables are considered: Transaction Year (Trans_Yr), Submarket (Sub) and Agglomeration (Agglo).

After the base model proves to be significant other variables are included in the model, the variables are presented in blocks: hardware, software and humanware. Since every

variable has an impact and every other one an iterative process takes place. Significance levels are raised to $P < 0.300$, which is relatively high, but this degree of freedom allows to run the model and analyze impact and effect of variables without eliminating variables too early in the process.

The process of elimination of non-significant variables reduces variables that create noise or are correlated with other ones. Some variables are also recoded again to better explain the data. To determine the behavior of each variable to be added or eliminated the unstandardized residuals are graphed. Sometimes what the model does not explain ends up being more interesting.

4.4 Final Model: OLS Method

In statistics the usage of a linear regression in order to estimate the unknown parameters is known as ordinary least squares (OLS). The method minimizes the sum of R-squared distances between the observed dataset and the prediction of the linear regression.

In order to finalize the model all the non-significant variables are eliminated and all the remaining ones must prove to be significant at $P < 0.095$. During this phase usually few variables remain. Since the research is interested in the impact of certain variables, they can be added for analysis in a: model + 1 strategy. What basically happens is that an interest variable is added to the final model, the effects are recorded and then it is eliminated from the model, and again another interest variable is added. This strategy allows recording the broader impact and significance of the model with extra variables.

4.5 Conclusions

The data collection in this research as described in the current section, was based on theory and personal experience and knowledge of the market. The theory is matched with location independent factors and practical knowledge is based on interviews conducted to local experts (brokers and developers). As a result of this match, improvements could be done to the preparations preceding the statistical analysis. This allowed targeting specific features based more on the conceptual framework of hardware, software and humanware. An extension of such improvements was translated into the pre-selection phase in the next section. The objective was to have a better preparation and understanding of the variables, which eventually will lead to a better-fit model. A fit model gives a better interpretation of the data.

Importance of Target Markets

To understand the market better from a local perspective the following target markets were drawn after conducting local interviews:

- 1) International Corporations: Front offices (usually medium to low density, used for continuous client management and vendors, typically central offices), international firms with operations in the city or country. Usually require: excellent location, positioning attributes, closeness to main avenues, high parking ratios (1/20 to 1/25 places per sqmt.) usually require 300 – 600 sqmt.
- 2) National Corporation: Front offices (usually medium to low density, used for continuous client management and vendors, typically central offices), Mexican firms with operations in the city. Usually require: excellent location, positioning attributes, closeness to main avenues high parking ratios (1/20-25) 300-600 sqmt.

Continuation...

- 3) Business Executives: lawyers, architects and professionals that require smaller GFA but value highly differentiators such as services, luxury, high parking ratios, closeness to home, and security. Typically have very low density (rather big offices 100 – 300 sqmt. For 5-10 employees). Adaption of old houses in central locations or high-end buildings are preferred.
- 4) Business Starters: freelancers, young executives, start-ups and PyMES. Small companies no more than 30 employees, creative entrepreneurs. Requirements include locations that allow initial saving, shared services, security. Value positioning attributes: good image and entrance charisma.
- 5) Back Office: Big companies with more than 250 employees, usually looking for high performance and density, very flexible and open space. Requirements include lower parking ratios, closeness to major streets and public transport, big floor plates (800-1500 sqmt.) and low maintenance fees.

V. Results

This section will elaborate on the finding of the statistical analysis. Following the major three areas: exploration, pre-selection and final model. Special attention is paid to the interest variables obtained through users preference methods. Conclusion will be drawn of the outcome of the analysis.

5.1 Exploration

Descriptives:

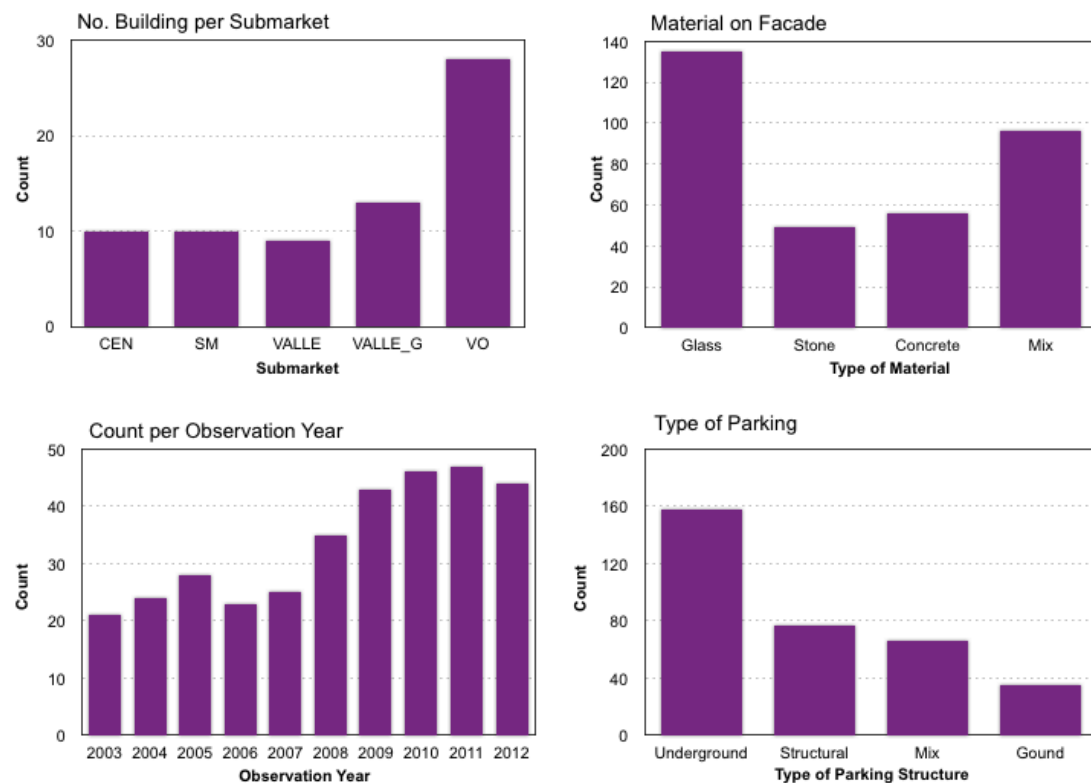
Table 7 shows the average, minimum, maximum and standard deviations of the continuous independent variables, determining the rent. The dataset includes 336 observations to test the variables.

	N	Range	Min	Max	Mean	Std. Dev.	Variance
Age	325	53	0	53	9.2585	10.2274	104.600
GFA	319	35497	503	36000	10599.24	8079.485	65278081.047
Floor_N	336	32	2	34	11.63	8.088	65.421
Floor_Avg	319	5768	232	6000	1229.81	1114.995	1243212.979
Park_N	312	980	20	1000	399.56	277.010	76734.697
Parking Ratio	309	145.27	13.23	158.50	33.1187	27.60189	761.865
<i>Valid N (listwise)</i>	304						

Table 7. Descriptive Statistics.

Frequencies:

Location factors and rent levels are presented in the following box-plot. In the graphs we can observe that VO has most buildings of the dataset. Also the most observations are taken from 2009 – 2012. In graph 3 we can observe that the most used material on office buildings is glass followed by a mix of glass, stone and concrete. Finally graph 4 shows the type of parking most frequently used are either underground or structural parking.



Graphs 1-4 Frequencies

5.2 Pre-Selection:

Table 5.2 summarizes a singular regression per variable. Results are shown in ascending order for the significance; all variables with 0.000 significance values are taken directly into account for building the model (dark purple). Variables with significance value higher than 0.000 but lower than 0.050 will be also added to the model with careful observation (light purple color). Values higher than 0.050 will not be added to the model (white color). Table 8 also shows the adjusted R-square value, this value gives us a hint of those variables that have higher impact on the total variance. As you can observe building age and parking ratio have high effects on the asking rents.

Variable	Level of Significance	Adj. R-Sq.
Classification ***	0.000	0.436
Building Age	0.000	0.367
Parking Ratio	0.000	0.346
Submarket	0.000	0.332
Flexibility	0.000	0.303
Prestige	0.000	0.270
Security	0.000	0.259
Quality	0.000	0.224
Parking Type	0.000	0.165
Agglomeration	0.000	0.162
Image	0.000	0.148
Floor Plate Average	0.000	0.066
Nickname	0.000	0.040
GFA	0.018	0.014
Type	0.025	0.012
Facade Shape	0.026	0.012
Type of Logo	0.037	0.014
Volume	0.056	0.011
Logo	0.070	0.007
Hybrid	0.173	0.003
Facade Material	0.250	0.003
User	0.513	-0.002
Floor Number	0.750	-0.003
Transaction Yr. ***	0.682	-0.007

Table 8. Single Variable Regression Analyses

It is important to observe that classification ranks the highest value on R-Square, in other words with a high impact on the variance. The method in which this variable was obtained is considered subjective, because there are no local indicators of what exactly classifies as A, A+ or B buildings, this variable is considered merely an opinion from a brokerage house and hence is not considered for the model building. The year of transaction although highly insignificant is believed to correct for the economic trend and hence is included in the case model.

Base Model (b)

As stated in section 4.3.2 the base model is designed to correct for location (submarkets) and economic trend (transaction year). A third variable was used in a try-error model; this variable is agglomeration, which basically contains information of the municipality in which the buildings are located. The variable presented high levels of correlation with the

submarket variable, adding little to no power of explanation. Thus agglomeration variable is eliminated.

A summary of the base model is presented in table 9. We can observe the base model alone explain for 36.1% of the variance and is highly significant.

	R Sq.	Adj. R-Sq.	Std. Error	Sig.
Base Model	0.386	0.361	0.23950	0.000

Table 9. Summary Base Model

In detail when we observe the Beta value per variable (impact of the effect) the transaction year indicates the economic trend, which is coherent to what happened during that period of time according to local insight and news. We observe that during 2009 (the most significant observed year) local newspaper indicate an office 'boom', whereas in 2003 and 2010 local news report the stock of offices was vast and vacancy rates high. It is interesting to observe the economic crisis (USA financial crisis) that stopped multiple projects in 2007.

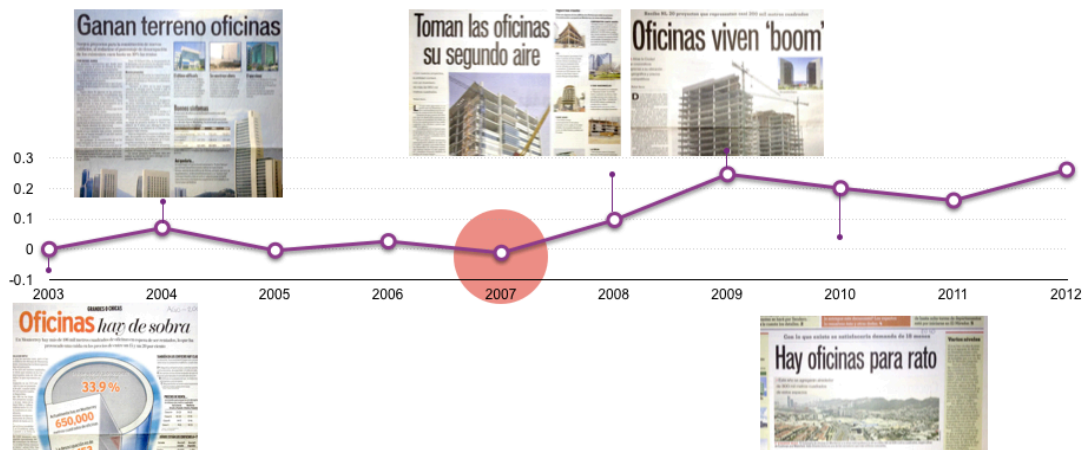
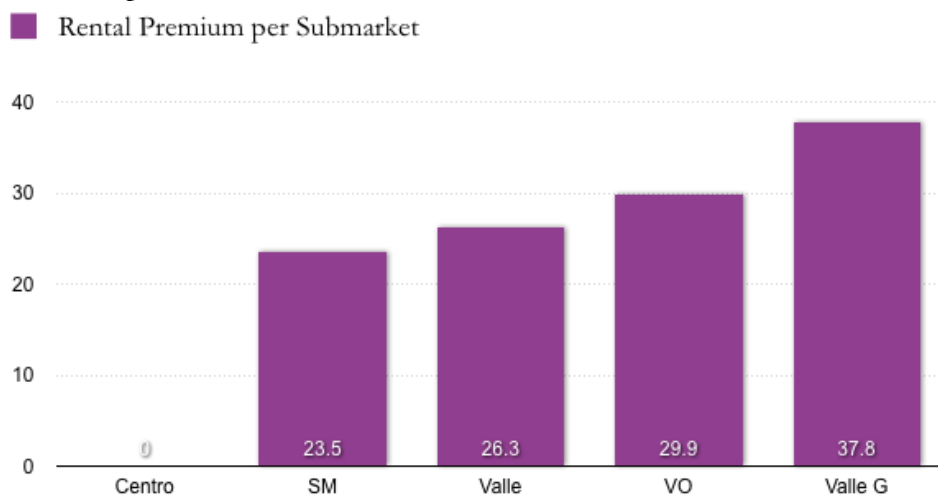


Fig. 13 Economic Trend

The beta also value already explains which submarkets have highest impact on rents, hence are more expensive. Submarket CEN (city center) is considered as a base. We observe that VO adds almost 30% to the rental premium and Valle_G is the most expensive with a rental premium of almost 40%. This information is coherent with observed rental prices in the area.



Graph 5. Submarket Rental Premium

Base Model + Blocks

The three main blocks are added to the base model. In this section we will add all variables considered significant in the single regression analysis.

Adding the variables on hardware to the model is the next step. The variable with most impact is building age. Which if added to the base model alone can explain for almost 19.6% of the variance with a negative coefficient. This means for every year the building is older there is a 1.3% decrease on the rent.

	B	R Sq.	Adj. R-Sq.	Std. Error	Sig.
+ Building Age	-0.013	0.536	0.515	0.21066	0.000
+ Hardware variables	NA	0.663	0.637	0.15506	0.000
+ Software variables	NA	0.751	0.730	0.13384	0.000
+ Humanware variables	NA	0.786	0.761	0.12585	0.000

Table 10. Summary Blocks

Humanware variables account a 12.2% increase of the variance. Where the only variable that seems to create noise is Volume (with a negative significance level). When adding software variables the variance increases by 9.3%, although during this block addition more variables seem to loose significance (Type, Medium Flexibility and SM submarket). When finally adding the humanware variables the variance increases little by only 2.9% we observe the model start to loose fitness since many variables considered highly significant at the star loose significance including: two important submarkets (VO and SM), parking structure and flexibility. Although the model seems to perform best explaining for more than 70% of the change in asking rent, it contains a lot of noise and error that should be eliminated.

Eliminating Variables

After adding blocks of variables at simple glance we observe several variables, which end up not being significant and adding noise to the model. The strategy to eliminate the variables is divided in three types: variables that prove to be highly insignificant, variable which have strong correlation, interest variables selected to be added once the model is fit.

The elimination process:

- Volume

Volume variable offers information of the shape of footprint of the building. It is subdivided into: box, multi-rectangular and LTX shapes. The variable is a proxy for efficiency in layout and flexibility. Since we have also included such variables in the model building it proves to be insignificant with .448 sig. values for multi-rec footprints and with .177 sig. for LTX shapes. The variable is hence removed from the hardware block.

- Choosing between Flexibility and Avg. Floor Plate

Software variables on flexibility and average floor plate area offer almost the same type of information. It is general knowledge that larger floor plates are considered more flexible. Hence the decision to chose one over the other is necessary. When modeling only with flexibility (eliminating the floor plate) only high flexible buildings seem significant causing a variance of 2.6%. Whilst when including floor plate average (eliminating flexibility) it proves to be highly significant (0.000) but present a strange

pattern of a negative B value. In other words for every square meter incremented to the average floor plate the rental price goes down by 7.1%, which is odd. The floor plate average variable is preferred to be added to the model but some adjustments will have to be done, results are shown in recoding section (X).

- Choosing between Floor Number and GFA

The correlation between GFA and Number of floors is obvious. If a building has more floors it must have more square meters. Since the height is considered relevant for the study as a variable that contains information of prestige and status of the building, the floor number variable was selected.

- Choosing between Parking Structure and Parking Ratio

Parking ratio has also a correlation with the structure of the parking. The more parking places a building have the more need for a structural parking (either underground or high-rise) is required. Interestingly enough when trying to identify which parking type has more significance results showed structural parking (without relevant distinction of the type) add value to the rent as opposed to ground parking, which is regularly associated with less parking spots, uncomfortable parking (sun and rain hit the cars) and are considered unsafe. Since parking ratio is considered highly significant to the market (according to interviews and local insight) this variable is chosen.

- Choosing between Image and Prestige

The variables collected through 'users preference methods' yielded to very similar results. When formulating the questions for participants, doubt was drawn if image and prestige meant the same thing. Sending the participants a question for both image and prestige functioned as an experiment, but results yielded to similar results. Since the model behaves best with the prestige variable, hence it was better understood by the participants, this variable is kept for further analysis.

- Choosing between Security and Office Parks (Type)

Office parks are associated with high degrees of security, usually including vehicle control as well as personal access. It was proved to be strongly related to the security variables and since due to the current wave of insecurity experienced in the city the market values security. The security variable was kept for the model.

- Selecting interest variables for independent analysis

After doing the pre-selection phases and noticing that some variables on created noise when add altogether to the model a selection of interest variables was conducted. The main selection criterion was based on humanware level, variables that theoretically added to the research of impact of image on financial performance. A model+1 strategy was selected for the following variables: Logo, Nickname and Quality. The objective is to understand how these variables perform, if they have an impact on rent level and to what extent. Since adding them all together unbalanced the model by doing it one by one we could analyze in detail the impact of such variables in other ones.

Conclusions

Table (11) presents the summary of the variables that are kept and eliminated from the model at this stage. The kept variables are analyzed and recoded in the following section.

Variable	
Volume	Eliminate
Parking Structure	Eliminate
Parking Ratio	Keep
Flexibility	Eliminate
Avg. Floor Plate	Keep
GFA	Eliminate
Number of Floors	Keep
Security	Keep
Office Park	Eliminate
Image	Eliminate
Prestige	Keep
Logo	Model + 1
Nickname	Model + 1
Quality	Model + 1

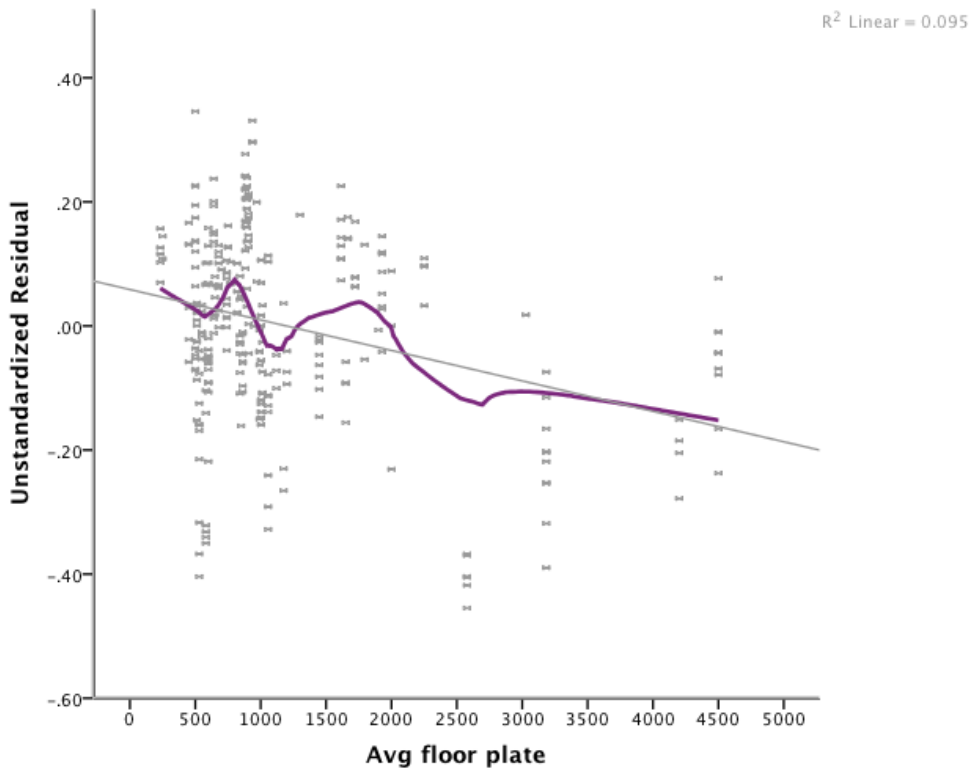
Table 11. Summary Eliminated Variables

Recoding Variables

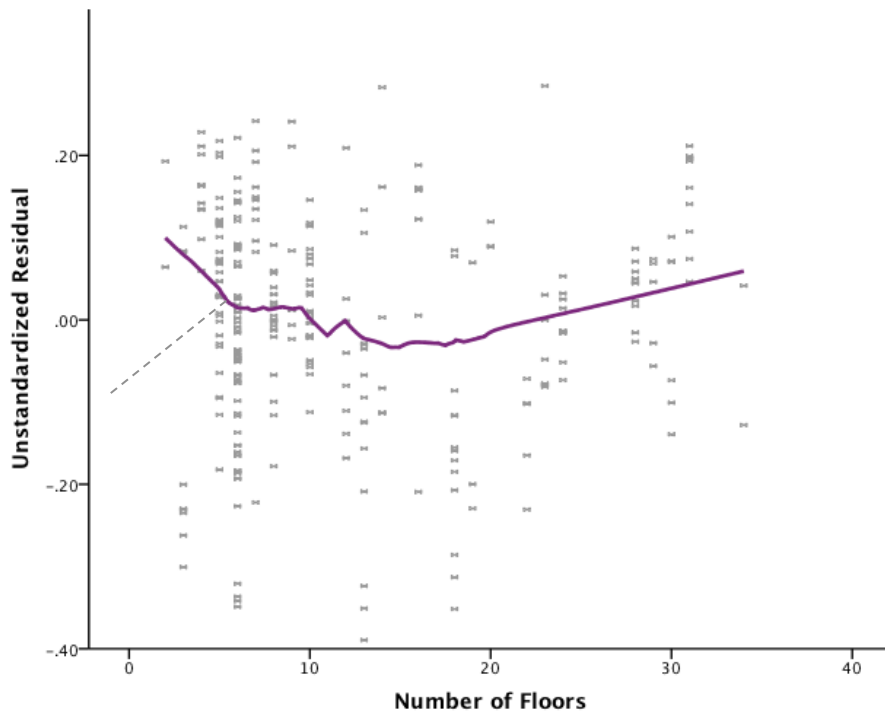
The variables that passed the test of correlation and proxies were: number of floors, average floor plate, security, parking ratio and prestige. When running another try-out model some of these variables behaved strangely and hence needed to be recoded to show coherent results. The method utilized for analyzing the effect of the variable you want to add to a model is based on graphing the unstandardized residual. It is surprising how sometimes what the model does not explain is far more interesting than what it does.

Unstandardized Residual vs. Average Floor Plate

Since the average floor plate presented a negative B value, which is rare since it basically explains that for every sqmt added to the floor plate there is decrease in rent. The residuals were analyzed. The results are presented in graph (6). What we observe is that although the linear fit line indicates the rental value decreases with increase in floor plate area (perhaps because of the few observations of above 2500sqmt), there are certain point specifically between 500-800 sqmt and 1000 – 2250 sqmt where there is a relevant increase. The decrease between 800 and 1000 can be achievable to older obsolete building. This problem of data can be easily fixed by creating a categorical variable where only buildings between certain values are considered. Hence some exploratory analyses are conducted to analyze the effects of different categories. In the end, the most significant variable was Floor Plate from 0 – 2000 sqmt which at this stage of the modeling has a sig. 0.000 and a B value of 23.3% (very high impact).



Graph 6. Average Floor Plate Analysis



Graph 7. Number of Floors Analysis

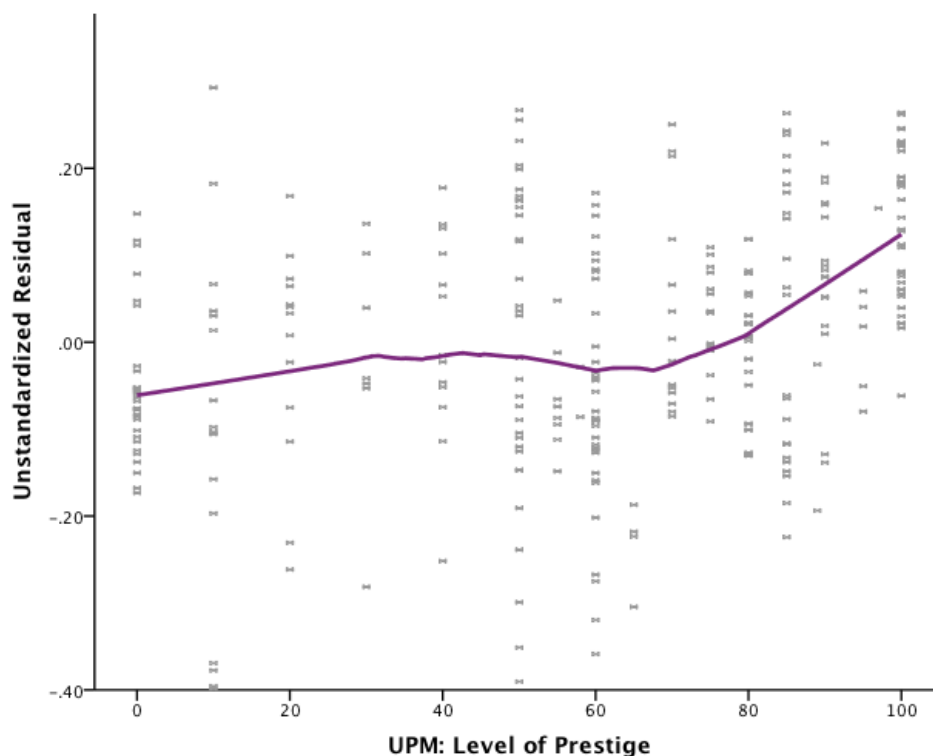
- Unstandardized Residual vs. Floor Number

The variable number of floors has been theoretically proven to add value (Gijssels, 2010). In other words for every level you add to building it increases its rent. Conversely adding the variable to the model it showed a negative B value, which means that for every level added 1.8% of the rent decreased. Since the results are odd graphing the

unstandardized residual was conducted. Graph (7) reveals that at a certain point adding levels from 1 – 4 decreases rent, this could be attributed to offices in Valle, which are still houses or very small building, some markets refer to them as office villas, which are office accommodation usually at expensive prices resembling more to a house or small complex highly private. If correcting for this (grey dotted line) there should be an increment in the rent levels with level 9 -10 as a limit (9 levels limit was mentioned during interviews by local developers as a perfect height and scale of a building). Buildings with 20+ levels are considered to have the ‘skyscraper’ impact where they get recognized easily and enjoy better status. Following this observation the variable was recoded to: 1-9 (Floors_0_9), 10-20 (Floors_10_20) and 20+ (Floors_20_up). Surprisingly if the base category is floors from 10 to 20, buildings from 1 to 9 floors prove to be significant (0.000) with an impact effect of 4.2 % per building. While buildings with 20+ floors prove also to be significant (0.000) with a higher impact effect of 6.8 %.

Recoding for Prestige

Although introducing the linear term of the variable prestige yielded to high significance (0.000) the B value or impact size was relatively low 0.03%. After conducting an analysis of unstandardized residuals (as can be seen in graph (8)) it became evident that prestige is only relevant for the higher-end of the market, that is buildings rated 70 or above in the users preference questioner. This observation seems logical since higher end offices have more elasticity in terms of investing in elements that are considered prestigious, which can include but is not limited to: artwork (sculptures and painting), materials (interior and exterior), brand architects, etc. By creating a categorical variable that would measure the impact of highly prestige building (above 70) we could observe a more realistic increase in impact effect. Hence the variable CAT_Prestige was introduced. It proved to perform highly significant (0.000) with an impact effect of 14.6%.



Graph 8. Level of Prestige Recoding

Final Model

Once all variables have been recoded and only the truly significant remain the model is fit. The complete list is introduced into a single regression analysis in the OLS method. The results are shown in table 12. Overall the model explains for 74.1% of the variance, which is considered by academics as a good performing model. If a model explains more than 90 or 95% of the variance it is considered unrealistic, since not all data is perfect and error always exist.

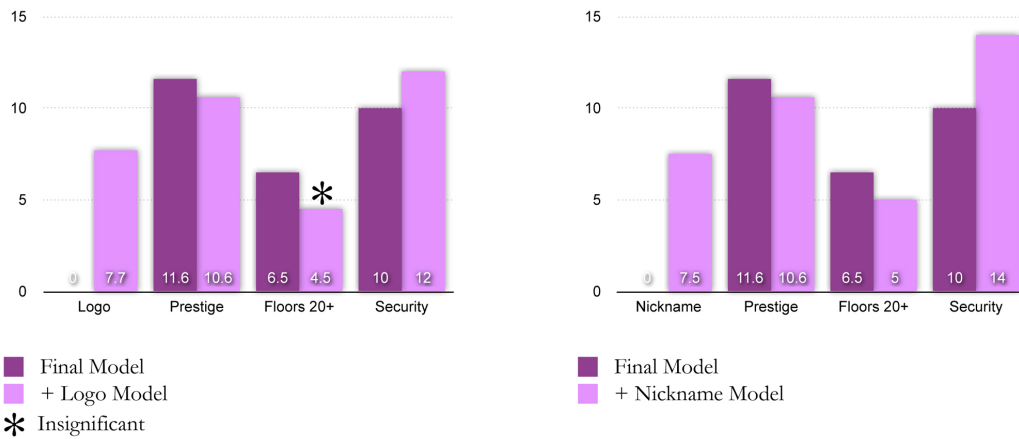
	B	R Sq.	Adj. R-Sq.	Std. Error	Sig.
Total Model	NA	0.759	0.741	0.13104	0.000

	B	Sig.
Total Model	NA	0.000
Trans_Yr 2004	0.054	0.191
Trans_Yr 2005	-0.004	0.922
Trans_Yr 2006	0.016	0.700
Trans_Yr 2007	0.003	0.949
Trans_Yr 2008	0.095	0.015
Trans_Yr 2009	0.253	0.000
Trans_Yr 2010	0.195	0.000
Trans_Yr 2011	0.152	0.000
Trans_Yr 2012	0.244	0.000
Submarket SM	0.025	0.419
Submarket Valle G	0.233	0.000
Submarket VO	0.083	0.003
Submarket Valle	0.198	0.000
Building Age	-0.005	0.000
Parking Ratio	-0.003	0.000
Avg. Floor Plate 0-2000	0.204	0.000
Floors 0-9	0.056	0.009
Floors 21+	0.065	0.030
Security High	0.100	0.007
Security Med	0.083	0.008
Categorical Prestige	0.116	0.000

Table 12. Final Model

Interest Variables (Model + 1)

In order to verify the impact of interest variables in the model without creating noise and unwanted loss of significance three variables which theoretically are relevant for the study are introduced to the model one by one once it is considered fit for the data. The effects are recorded in the following graphs and while it may possible to raise the overall interpretation of the variance (adjusted R-square), some relevant variables might loose strength and significance.



Graph 9. Model +1 / Logo (left) and Nickname (right)

As can be seen in graph (9) both logo and nickname models have an impact on prestige, floors 20+ and security. There is negative effect for prestige, which is slightly reduced in both cases, indicating that the information of a logo or nickname is somehow contained in the level of prestige of a building. Furthermore the number of floors (20+) suffers from a negative impact as well. In the logo model we observe it even becomes insignificant. This is highly likely attributed to the fact that buildings above 20 floors are preferred for the collocation of a company logo and have a better chance of receiving a nickname. Higher buildings have certainly a better visibility and hence are favorable for branding and promotion of businesses. Overall what the reduction of B-value in both cases indicates is that 20+ buildings are likely to have a logo and nickname, thus are more 'known'. Finally the security variable in both models rises significantly, which could indicate that buildings with logos or nicknames host important companies (international or high-end) which value security.

In addition to these model de variable quality is modeled to check on impact. It is no surprise that introducing quality in the model skyrockets the insignificance of prestige. Both variables contain the same type of information. When performing a graph of the unstandardized residual vs. quality, a rather flat line indicates overall quality in the sample remains stable, perhaps with a minor increase when reaching above 80 values. Consequently prestige is a better indicator and contains information on the quality of the building itself.

	Adj. R-Sq.	B	Sig.
Final Model	0.741	NA	0.000
+ Logo Model	0.753	NA	0.000
Logo	-	0.077	0.000
Prestige	-	- 1.0%	0.000
Levels 20+	-	- 2.5%	0.184
Security High	-	+ 2%	0.001
+ Nickname Model	0.752	NA	0.000
Nickname	-	0.075	0.000
Prestige	-	-1.0%	0.000
Levels 20+	-	-1.5%	0.094
Security High	-	+1.4%	0.002
+ Quality	0.764	NA	0.000
Quality	-	0.002	0.000
Prestige	-	-7.5%	0.129
+ Quality (-Prestige)	0.763	NA	0.000
Quality	-	0.003	0.000

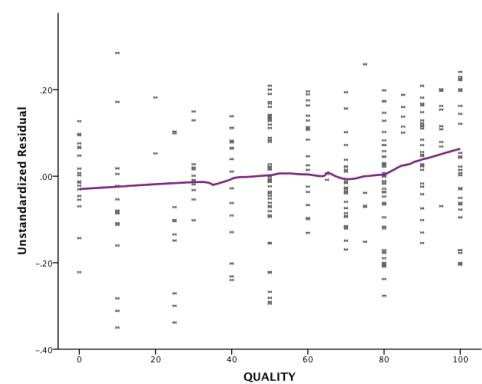


Table 13. Model +1 Summary
Graph 10. Unstandardized Residual vs. Quality

Conclusions

In the pre-selection phase we could draw the conclusion that apparently tenants are not significantly willing to pay more for façade materials, the hybridity of the building (if it has mix functions or not) or if there are single or multiple tenants in the building. This may be because façade materials do not particularly influence the flexibility of the building. The type of users does not really influence the accommodation or user-friendly environment of the building. The mix-use functions although it is perceived as an added value for employees is an emerging trend and is not quite well represented in the current sample. Future analysis of this variable with addition of new building that will be put for sale in the market during 2013 -2015 might change the impact on significance.

During the second phase of elimination of variables, tenants appear not to be significantly willing to pay for volume (shape of the footprint). The reason for this could be attributed to the fact that although some shapes have empirically been proven less inefficient than other for layout (circles or triangle) for the potential loss of space, these problems are tackled during design phases. Hence most of the times, even if a building presents irregular shapes (case of Torre XI in the sample) the floor plate has been solved to still achieve high ratios of lettable floor space.

Finally when the model is done, the exploration of interest variables such as logo, quality and nickname, provide an insight in effect on other variables and clarified possible proxies of information. Moreover the analysis allows the understanding of the possible content of data in the prestige variable.

VI. Discussion

Introduction

In the first section it was mentioned that value of a building (the return on investment for the developer) depends on the user's willingness to pay, which for office buildings is translated to tenants willing to pay (lease or buy) for office space. It was stated that features on an object level (hardware and software) and on an object 'aura' level (humanware) are of such importance in the fitness of use that they influence the willingness to pay. This led to the argument that such features should be included (or more thought of) as criteria for real estate investors adding to the typical concept that 'location, location, location' is the only things that matters in real estate.

These resulted into the following hypothesis:

'Building features on a object and 'aura' level are of such importance to the asking rents that they need to be considered in the decision-making criteria for developers to build and brokers to accommodate tenants'.

In order to reach a justification for this statement a number of questions had to be answered. What criterion is currently important for developers and tenants? To what extent do prestige and image (object's aura) factors affect the asking rent? And finally how should this knowledge be translated to practical advice for developers and brokers?

In the following paragraphs the results obtained will be discussed and answers to the sub-questions. Subsequently the outcome of the research will lead to a response for the main research question acknowledging for possible limitation. For this recommendations for local brokers and developer and recommendation for future research will be presented.

Discussion of Results

Identifying the decision making criterion

When confronting the decision to accommodate office space every tenant has unique motives, strategies, circumstances, budget and people involved in the process. Different target markets require specific solutions to be obtained in the process. International companies might be seeking to unify corporate strategy with real estate strategy whilst national corporations might just be looking for a more efficient space. New creative talent might just be in need of the 'right' address and appreciates aesthetic areas and high quality services. The economic situation also affects decisions greatly, when prices are low tenants have more power in the decision, because they can choose from different properties and the market turns out to be demand driven. In contrast when prices are high tenant are forced into what they 'can afford' and the market is driven by supply. More importantly decision-making relates to the 'Pareto Principle', where few end-up deciding for the majority (80/20). The decision relays in the hands of few whom can act rationally or irrationally.

The criterion researched leaves more questions than answers. Ambiguity in trying to match literature with expert's interviews makes it difficult to understand what exactly drives corporation to select one lease over the other.

However all corporations and seem to play the same rules of the game. The determination of basic departing points to choose where to accommodate office space suits all, regardless of economic situation or particular objectives. It turns out all criteria

turns out to be categorized in four main areas. Three out of the four categories have been broadly researched but the extra one seems to have a rather strong subjective power. Rents decisions are made based on: location, building exterior (hardware), building interior (software) and the building aura (humanware). Criteria gains importance if knowledge of the effect exists on the long term and short term. The research intends to explain each variable (criteria) and its performance, which can be placed in the mentioned categories.

Rental Levels and Premiums

The performance in the research is expressed in terms of rental rates since it is an economic term that can easily be read and understood in terms of variance in dollars or pesos. Due to the fact that only asking rents were obtained the results can be negligent to actual transaction rates, but due to the fact that the real estate market lacks of transparency asking rents is considered a good unit of measurement. A negative aspect of the asking rents obtained is the currency. In Mexico (specially in northern cities like Monterrey) many luxury products are transacted in dollars, office space is one of them. The fluctuating relation between peso and dollar makes it even more difficult to track the exact rate at which transactions occur. The dollars were translated to pesos according to the annual average provided by Banxico and thus are believed to provide a close view of reality. Nevertheless office space is transacted at daily rates, which could vary greatly.

It is also important to mention that other costs such as maintenance rates and extra-parking spaces are not considered in the asking rents and could potentially have an impact on the willingness to pay by tenants.

Furthermore a discussion on green, sustainable or energy related subjects is not incorporated in the research due to the limited number of cases that present such characteristics in the area.

Significant Attributes

The answer to the question of which attributes impact the willingness to pay for office space is found by testing the hypothesis on a pre-selected set of features (obtained through literature reviews) in a regression prediction analysis. The implication of the results will be discussed further but is limited to the buildings to which there was access to information in terms of rents and specific building features, out of the initial dataset of 165 buildings only 70 were considered.

Although the results indicate low levels of influence (B-value) of location features and hardware features efforts were made to support the importance of economic trends, location and basic object level characteristics. Opposite to what is generally presumed this variables had a slight effect over the financial performance. By creating a on firsthand a base model the economic trend and location factors the intention to introduce them in the model is clear. Nevertheless their low power of explanation can be achieved to location (submarkets) act as proxy for some of the information contained in overall quality and prestige. Because the object level and object's aura level are more detailed there is a higher chance of obtaining more knowledge of the building and hence the significance levels are raised.

Even though building age, security levels, prestige, average floor plate, parking ratio and number of floors appear to be significant in the model it is plausible that there is certain interrelationship between them.

... WORK IN PROGRESS

The results are that the increase in number of floors

Building age
Parking ratio
Average floor plate
Floor number
Security level
Prestige
+1 Logo, nickname and quality

Implications

What do the results mean? And how can they be translated to practical advice for developers and brokers in the market?

Demand driven market

To what extent are pricing strategies coherent with value of attributes?
Is it a demand driven markets? Do developers price rents at their will?

Type of Developers:

Expeculative construction for sale
Fondo entre varios inversionistas (%)
Fondo entre inversionistas por piso

Framework

Based on Bjerke et al (2007) a framework was adapted to visualize the behavior and strategies of corporations according to their level of investment in prestige and the interest area of investment. The idea is to introduce the potential strengthen of corporate image through investment on the aura level of a building.

The quadrant is divided into four categories of corporations:

An organization that invests in prestige, but does not invest an anything but location features can be categorized as corporate prestige narcissist, this means top-managers are motivated by the desire to be publicly admired. An organization that invests in prestige and all three areas (location, hardware and software features) can be categorized as prestige aware; this action is motivated by a desire to improve the image of the corporation and to align it with corporate strategy. Organizations that do not invest in aesthetics and only are interested in belonging in the right address can be categorized as corporate prestige philistines, which indicates that the organization believe funds should be better invested elsewhere. When organizations have minimal invest in aesthetics but are interested in building features (internal and external – hardware and software) can be categorized as prestige minimizers. Although further studies need to be done to locate companies in a certain area of the quadrant this could function as an active policy to move towards improvement in corporate image and maximize the potential benefits of investments in prestige.

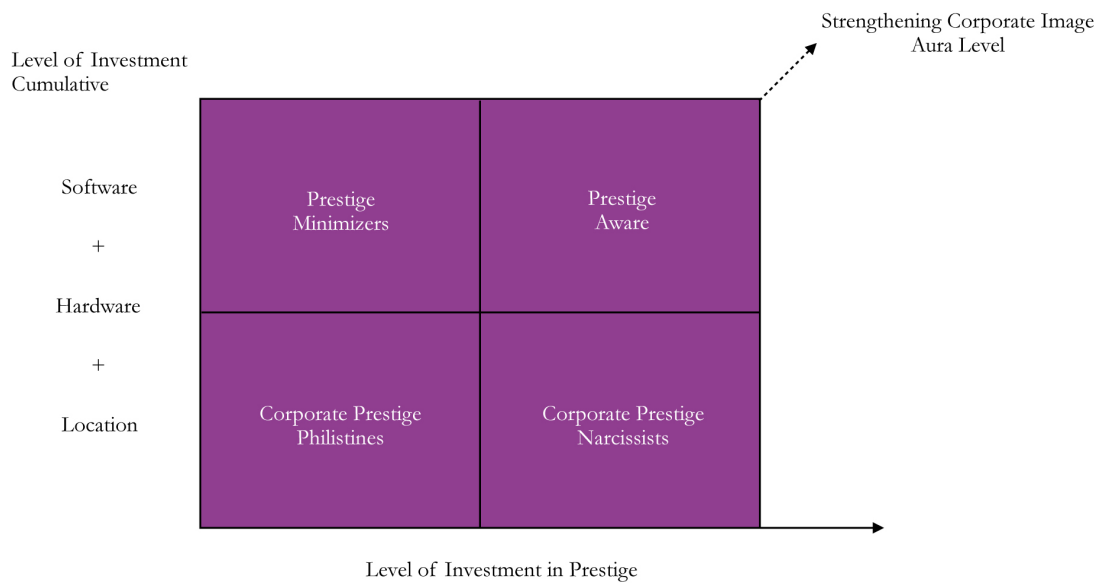


Fig 14. The investment in prestige and levels matrix

Matching with existent knowledge

Restrictions and Limitations

- Limited Data
- Not being in the country
- Generalization of the information
- Time!

Recommendations

For Brokers

For Developers

For Future Research

- Employee satisfaction
- Comparative with other markets (NL)
- However despite the limitations the results could potentially be generalized to different buildings in the region and eventually even to other cities and countries.

Conclusion

Personal Feedback

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Banxico

Appendix

Figure List:

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Table

1-13

Graph

1-10

Others:

Interview Scheme

List of Interviewees

Building Checklist

Documents sent to rank (pdf + word)

Output SPSS.

Never lucky! Always blessed!