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An examination of Mobile Augmented Reality Apps for the Commercial Real Estate Industry in Mexico City

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Abstract

Purpose- The purpose of this research was to analyze the impact of Mobile Augmented Reality (MAR) in the commercial real estate industry. The research set theoretical framework to identify in what extent did critical success factors of MAR affect customers decisions in acquisitions of estate properties.

Literature Review- The literature review, discussed conceptual clarifications of Augmented Reality (AR), which were explained in different subthemes. Consequently the commercial real estate industry was scanned with special attention at digital marketing with lags in the MAR channels, whose meanings might be improved by the literature review of vertical integration by a realtor firm, which also was conducted.

Methodology- The study took an interpretivist perspective by adapting inductive approach through videophone in-depth interviews to 9 participants, in order to scrutinized MAR applications as key success factors for commercial real estate in Mexico City. A second questionnaire sought potential acquisitions by real estate corporations in a vertical integration.

Findings- A conceptual model made by thematic analysis compared key success factors of MAR and their interrelation to competitiveness against multinational real estate firms. The findings of this research gave a theoretical framework to evaluate future investments in mobile digital markets for real estate projects.

Originality- The exerted research analyzed MAR as a key component to improve marketing planning regarding customer expectations in SME's in an ever-changing mobile market. There is insufficient literature of mobile augmented reality and its interrelations of dynamic capabilities for real estate companies in Mexico City. The theoretical framework identified key areas of real estate developments in MAR channels.

Research limitations- This research focused on customer expectations, which might not be the desired strategy for many firms. Other critical success factors showed important evaluation such as location choices, which were not dealt during this research.

Keywords- Mobile augmented reality (MAR), mobile apps, customer expectation, mobile commerce, commercial real estate, strategy, vertical backward integration and key success factors.

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Chapter One

Introduction

1.1 Enquiry Overview

The purpose of this research is to analyze the impact of Mobile Augmented Reality (MAR) in the commercial real estate industry. The research sets a framework to identify in what extent do critical success factors of MAR affect customers decisions in future acquisitions of estate properties. The enquiry overview of this dissertation is divided into five different chapters.

The first chapter involves the explicit meaning of aims and objectives then the research plots a research question together with industry background of the MAR and the real estate industry in Mexico City. Finally the last process of this chapter shows the scope of this research together with investigation limitations.

During the second chapter, a literature review discusses conceptual clarifications of Augmented Reality (AR), which are explained in different sub concepts. Consequently the commercial real estate industry is scanned with special attention at digital marketing with lags in the MAR channels, whose meanings might be improved by a strategic vertical integration.

The third chapter is characterized by selecting a research paradigm, research approach and research strategy for this investigation. Those selections are being justified by data collection methods for backing of primary data, which at the same time have to be coherent with the research aim, and research objectives. At the end of this chapter, weaknesses and strengths are explained regarding the chosen methodology for this research.

In the fourth chapter the explanation of thematic analysis is being dealt, with detailed interpretation of each interviewee during this process. Therefore, the elaboration of a framework is created which interrelates with inductive principles of this research.

The fifth and final chapter deals with the relation of key findings and the objectives reached. It explains with words and assessment of meaning in this dissertation. At the end of this chapter the researcher demonstrate the possible implications, recommendations and future research.

1.2 Aims and objectives

The aim of this research is to explore customer habits and their daily relationship with a mobile channel, which they use to seek out commercial properties employing mobile augmented reality applications. At the same time, several non-financial performance ratios are analyzed in order to establish if realtors must invest their resources and strategic capabilities into mobile augmented reality applications as a key marketing technique for immediate success.

The research explores the extent to which realtors engage with new ways of acquiring strategic companies in relation to the new mobile augmented reality spectrum.

1. – To review existing conceptual models and theoretical frameworks related to mobile augmented reality applications.

2. – To analyze the impact of Mobile Augmented Reality (MAR) applications in the commercial real estate industry.

3. – To evaluate the key success factors of MAR applications in the commercial real estate industry.

4. – To recommend some frameworks on MAR applications, which could be used to improve the real estate industry.

1.2.1 Research questions

The mobile market in relation to real estate is fast and simple and many enormous corporations are investing in this marketplace in order to appeal to young customers. Today's macroeconomic environment targets specific mobile applications. As such, this research addresses a strategic question in order to measure commercial real estate potential in terms of mobile augment reality trading environment.

1. - Is there a better customer expectation than last experiences if potential buyers planning to acquire commercial property perceive mobile augmented reality features, in their desired ads at Mexico City?

1.3 Background of the study

Economic rewards are achieved when corporations are constantly creating new solutions. Organizations have only two principal functions, marketing and innovation (Drucker, 1954).

Taking this quote to an international scope, Mexico could be the new place for innovation. According to the National Institute of Statistics and Geography (INEGI), the service sector accounts for 62 percent of total GDP reaching 1.17 Trillion USD in 2012. The biggest segments within services are: wholesale and retail trade and real estate accounting for 16 and 10 percent respectively. The manufacturing industry constitutes 18 percent of the output and the largest segment within this sector is automobile industry accounting for 4 percent of total GDP (Trading Economics, 2014). Therefore, commercial real estate for automotive enterprises is crucial for many states. Queretaro, Puebla, Guanajuato and many others municipalities have reinvented their universities and FDI policies to attract mechanical corporations from Japan, the USA, Canada, Germany, France and the UK.

The GDP in Mexico has grown from 722165 million USD in 2003 to 1178126 million USD in 2012. This number explains long-term growth with thousands of real estate operations made during this period. The ministry of economics defines the capital region as a powerful motor for the national economy and its size and strategic location attracts global investors from many countries. Mexico City contributes 1,766,301 K USD (13%) of national real estate GDP with an annual increase of 3,480 million USD in Foreign Direct Investment (Promexico Distrito Federal, 2013). This 1.7 billion-economy changes everyday and many potential buyers use Internet tools to scan attractive estates around the city. Nevertheless, realtors use different channels for their marketing strategies.

Table 1 Mexico's GDP

Title	2003	2004	2011	2012
GDP (current US$) (in millions)	722165	774800.8	1159889.6	1178126.2
GDP growth (annual %)	1.4	4.3	4	3.8

Source: Worldbank.org, 2014

Mexico is struggling for 3G-market increase in comparison to the USA, Japan or Germany (The details are tabulated in Appendix A).

Augmented Reality browsers have achieved more than 20 million downloads from mobile app stores, and some are even preinstalled on smartphones (Langlotz *et al* 2013). The growth of the augmented reality applications market is expected to be exponential with the revenue growth from $181.25 million in 2011 to $5,155.92 million by 2016, at a Change Annual Growth Rate

(CAGR) of 95.35% from 2011 to 2016. The most attractive of all these segments is the smartphones segment; followed by the tablets segment (Web.b.ebscohost.com, 2014). A new opportunity is evidence by mixing commercial real estate necessities with mobile augmented reality solutions in Mexico City. This research therefore proposes a new equation to measure the potential annual increase of this development. This is done by multiplying 1.7 Billion USD (Mexico DF's real estate economy) by .164 (3G penetration) by 1.19 (the minimum expectation of changing interannual growth rate or Min CAGR), where this multiplication equals annual potential market growth of 344,711 M USD during 2013.

Table 2 Estimated Market Size

RE GDP MEX City	1,766,301.00	R
3G%	0.16	G
Min CAGR	1.19	A
	344,711.30	MKT SIZE
	R*G*A=MKT SIZE	

Source: The Author

1.4 Rationale of the study

The realtor's mission is to buy or sell real estate for both parties. Logistic performances have a direct relation to political, economic, social, technological, legal and environmental conditions in designated regions (Yan and Yu, 2004). Logistics' national performance and commercial real estate demand are interrelated. Therefore the struggle for unique advantages will help realtors to reach their goals. Positive forecasts in the Mexican economy can impact positively on market development expansion strategies for business managers.

Western civilization has sought intense FDI in emerging markets for more than 20 years. Therefore, global conglomerates need agile mobile Internet tools to scope out real estate markets for their expenditure budgets. Christian Lagorio-Chafkin (2014) refers to Zillow as an example of real estate company that makes strong use of mobile technology. Their new app, not only provides access to its standard real-estate listings, but it also allows any customer to look out for new rentals and homes for sale in their immediate geographic area. This business is changing paradigms and communication channels by providing on time information such geographical position linked to your mobile phone.

The research's purpose is to explore the most important clusters in Mexico's economy and to reflect over their relationship to the real estate processes. This research is undertaken so that

managers in global conglomerates can fully consider the use mobile augmented reality applications to support their businesses. The scope of this research is to look beyond the real power of decision makers to consider the merits of investing in augmented reality mobile app developers dedicated to the real estate industry. The idea of this research is to explore the extent to which investing in such strategic capabilities is beneficial and of potential interest to customers of commercial property traders.

Companies must balance more carefully their growth goals with the need to pursue sustainability. Increased attention will be paid to employing demarketing and social marketing thinking to meet new challenges (Kotler, 2011). The total number of new customers attracted through traditional media outlets such as newspapers (Scott, 2007). Word of mouth referrals or publicity agencies has been decreasing over the last two years. Therefore new methods of marketing communication must take precedence, in order to fight for market penetration and obtain the best market share. Avoiding inefficient expenses by diminishing signs and newspapers ads may lead to greater sustainable practices amongst the new enterprise culture.

Customers who require property assets for their industrial, commercial or retail residential activity will gain much more certainty by using mobile augmented reality applications (Macedo *et al* 2014). Investing in affluent residential markets such as London, New York or Hong Kong is not the same as investing in Mexico where most international investors struggle with cross-cultural problems. Somehow the mobile augmented reality scenario is not as well developed as it is in developed nations.

1.5 Scope and limitations of the study

Key operations in the real estate process are discarded also other channels are used for comparison only. The real estate industry is extensive and comprises different types of individual investors who select their own realtors and who are in charge of continuously scanning the marketplace for offers. This dissertation considers industrial and commercial clients as final users but accepts that many old-fashion marketing channels are very valuable in real estate practices. These include newspapers, street signs and word of mouth referrals. These channels are subjected to analysis in this research to demonstrate the scope of the marketplace and its strategies of reaching customers.

People who realize the real power of online commerce have met the arrival of mobile augmented reality featured on mobile websites with frequent use and access. Useful information on portals

can attract a significant audience of independent and franchise agent sites (Gee, 2010a). Although, many different brands and techniques of mobile augmented reality brands are described during this research, none of these are presented as a case study.

Transactions in M-commerce by using mobile augmented reality applications have been in existence for a short time and Mexico's capital city provides a contrary indication of what is happening in other states of the country, where most of 3G devices are not affordable to the average person to the extent that they are in European countries or the USA. Internet Companies do know about this technological gap for example Google and its augmented reality geo-localization features are updated faster in Mexico City than in other places of the country.

Many global conglomerates, which are the units of analysis for this research, prefer the services offered by Jones Lang LaSalle, CBRE and Knight Frank to achieve their real estate goals. Mobile augmented reality strategies taken up by these firms are being discarded due to their sophistication and individualistic approach to customer account management.

1.6 Summary

This chapter has obtained the enquiry overview, explaining the 5 chapters of this dissertation. Then, aims and objectives are explained, with industry background for MAR applications and the real estate industry in Mexico City. The rationale of the study, research scope and research limitations are explained at the end of this chapter. The following chapter shows literature review starting with conceptual clarification of Augmented reality.

Chapter two

Literature review

2.1 Introduction

This chapter explores the meaning of augmented reality by exploring the history and uses of the term and by offering some key definitions. Academics have detailed how this concept has been adapted to different industries in the global economy and how current innovations at this field have led to impressive growth in boosting this specific sub-industry. This chapter points out some gaps in real estate marketing and discusses some potential complementary solutions for mobile augmented reality applications. This literature review ultimately explains how vertical backward integration might be a prudent choice for real estate marketers.

2.2 Augmented Reality: Conceptual Clarifications.

Perceptions of what reality means varies from each individual's point of view at any determined moment. There are no facts, only individual interpretations (Nietzsche, 1886). The word 'reality' has a different meaning for each observer. It has a general subjective meaning, from which we individually perceive objective reality. It is, in fact, something that currently exists which affects us in different ways, interacting with the negative or positive outcomes that we might have at any given moment. Reality shows us the way things are, not how they should be. It differs from fantasy, according to the physical and 'normal' rules in our society and according to our behavior.

Reality, from a technological perspective, is in fact, any daily interaction with a screen, such as mobile phone. For example, a phone call or a music album download become 'reality' thanks to a comprehensive intention to execute and understand them. Nevertheless, these particular items will not be important for a new user if he or she does not understand the language. The songs will become irrelevant for this new owner. Reality changes from one user to another, even though the products may not have changed. So, if reality changes from one individual to another, could then reality be more determinant in key moments before planning any activity?

Augmented Reality (AR) is the technology of adding virtual objects to real scenes by enabling the addition of missing information in absolute life (El Sayed *et al* 2011). For each specific user, augmented reality is about interfacing with important trending features and updates that will help him or her to select adequate choices. The adjective "augmented", by its own definition, means a sudden increase of strategic attention, thanks to adapted virtual figures. The result strengthens direct communication between two parties; those in charge of delivering data, and those receiving it. The word 'augmented' means to provide a more realistic approach that will not grow by size or

enlarge. ‘To augment’ is to improve experiences through new capabilities. This concept is not trying to create a ‘new reality’, as there is only one reality with different perceptions among us. Reality cannot differ from what is actually happening, but certain things just as virtual diagrams that will create a better comprehension and explanation of the things around us.

AR provides the user with a real time 3D enhanced perception of a physical environment with additional virtual elements such as virtual scenery, information regarding surroundings and other type of contextualized information. It is also capable of hiding or replacing real structures (Curran *et al* 2011). The physical dimensions of augmented reality can be modified and will in turn affect the viewer’s spatial intelligence, thanks to augmented reality. The world that one perceives will be much more understandable thanks to someone else’s intention. For example, not many furniture designers are able to transfer their artistic ideas into words and non-verbal communication. Therefore, they use AR to show how their furniture will look in particular rooms. The essence of augmented reality shows surrealistic perceptions from a known environment, and at the same time, its actions create a closed form of shared communication between two or more individuals. AR is a motor, which transfers imagination inside the creator’s mind toward real places, so the viewer can appreciate what is actually happening in an information-rich environment. Therefore, such technology is extremely helpful for people with tremendous influence in visual capacity; their decision can dramatically change just by perceiving things with enormous differences beyond normal reality. The creation of such a cyber-commodity empowers marketing teams, which can strengthen the continuum of communication with its customers. Therefore, the absence of AR becomes a problem for the accustomed user.

AR creates the illusion that virtual, computer-generated objects exist in the real world (Cawood and Fiala, 2008). These interact at the same time, to enhance new perceptions through a form of aesthetic communication. The ideas of the Pepsi marketing team in London offer a salient example of augmented reality. Their concept, based on AR technology took the form of bus stop advertising boards in central London. The AR gave the illusion of a ‘see through’ display, but with unbelievable and unexpected scenes 'mapped' over the live feed (The Telegraph, 2014). Figure 3 illustrates one example created by the Pepsi marketing team.

Figure 3 Pepsi AR

Source: Veooz 2014

Robots and tigers walked behind what appeared to be a bus stop window at Oxford Street. The purpose of this advertisement was to give the public a moment of joy and fun to break the monotony of waiting at a bus stop. The spectacle drew crowds and a great deal of interest from passersby. The scope of augmented reality reached new people creating a common feeling between their audiences. The key feature was the substitution of the real world through the bus stop window. The audience thought they were just watching through a common window yet the purpose was to overlap other ads around the bus stop (Hickins, 2014).

Since the beginning of AR research, a growing number of applications have emerged that exploit various ways to represent information (Nnis *et al* 2013). Although AR technology was first developed over forty years ago, there has been no attempt to provide a consolidated overview of recent research in the field to date (Zhou *et al* 2008). For example, NFL American Football uses Augmented Reality technology, showing key yellow virtual lines for analytic purposes (Vogt, 2010). Nowadays every NFL fan knows the difference between the yellow first down line, and the touchdown line, which is shown on the TV screen using Augmented Reality. This specific object received extraordinary attention and enabled a better understating for those watching the sport for the first time. Academic research has demonstrated several possible outcomes based on

futuristic ideas. Nevertheless, more research is needed, such as an exploration of the telecoms infrastructure to explore exponential growth in user's adaptation.

'Science and technology are key tools for strong army nations and strategy is determined by perceptions of the technological capabilities of enemies whilst technological choices are determined by bureaucratic politics or by grand strategic concerns (Samuels, 1994, p. 16). Technology is a major talking point between national leaders and the most recent gadgets and innovations are often discussed. Mobile phones, TV screens, radios and robots were all initially used for military purposes. Military aircrafts and helicopters have used Head-Up Displays (HUDs) and Helmet Mounted Sights (HMS) to superimpose vector graphics upon the pilot's view of the real world. Besides providing basic navigation and flight information, these graphics, are sometimes registered with targets in the environment, providing a way to aim the aircraft's weapons (Azuma, 1997). Augmented Reality has proven to be very helpful in the military industry (Gallagher, 2014).

Consumers have experimented with Augmented Reality for the last 15 years and certain retail electronic products, such as digital cameras, can be interacted with via a simple touch screen to fine tune pictures. This way of using technology is also available thanks to AR. Other emotions and responses arise from using AR where it can be used to convey emotional states and to allow users to capture and share emotional experiences. In this way AR not only overlays virtual imagery on the real world, but it can also create a deeper understanding of the user's experience at particular locations (Billinghurst, 2014). The potential of AR for communicating goes beyond space and volume. Its features have shown a new time variable, which helps the receiver to understand the choices he or she may have and their possible outcomes in the near future. It is an exploratory way of analyzing options, together with new encounters of unsheltered feelings and emotions.

Different computerized virtual elements are used for implementing augmented reality. On the other hand, Virtual Reality (VR) is a stimulation in which computer graphics are used to create a "realistic-looking world using real-time interactivity" (Burdea and Coiffet, 2003, p. 1,2). Virtual Reality (VR) appears as a natural medium for Computer Supported Collaborative Work (CSCW). However immersive Virtual Reality separates the user from the real world and their traditional tools. An alternative approach is offered by Mixed Reality (MR), which sees the overlaying of virtual objects on the real world. This allows users to see each other and the real world at the same time as virtual images, facilitating a high bandwidth of communication between users and

an intuitive manipulation of virtual information (Billinghurst and Kato, 1999).

The boom in Virtual Reality took place during the 1990's, when Nintendo and other entertainment companies took advantage of it by creating new consoles (Stevens, 2014). Also the robotic industry invested a huge amount of time and human resources for their projects, including NASA's exploration of Mars. A realistic looking place differs from a real place in that it takes advantage of virtual images and figures for analytical purposes. The main difference between Virtual Reality and Augmented Reality is related to how each constructs the real world in relation to the viewer. Virtual reality is simply about creating a new world with natural features, while AR uses a natural framework, which exists, in our real world.

Augmented Reality Internet Technology or ARIT has persuasive effects on increasing the buying intentions and behavior of consumers by stimulating mental imagery (Huang and Liu, 2014). Yelp, with its geographical maps, has innovated in terms of the way customers seek local business for their own benefit. Consequently, new concerns have arisen in terms of how verbal communication is often insufficient to convey the imagined results of spatial arrangements. Users must occasionally expound considerable effort in either moving real objects physically or using photos or videos to compose mockups to simulate layouts (Cheng *et al* 2011). Searching for nearby cash machines shown on our mobile phones using WIFI data, or surfing the web using laptops searching Google maps to calculate times between points A and B are all examples of how we manage internet AR these days. ARIT is capable of using World Wide Web global data, in order to hand over critical and accurate information. During the early beginnings of AR, general objects were used, focusing on well-known icons, such as the yellow first down of American Football for instance. AR was created for a common purpose in society and there was no kind of customization between the creators and final users.

AR, fed by Internet technology, participates in a new battleground, where customer's habits influence their choice of brand communication channels in a world of infinite new applications. AR, as a form of experiential marketing over recent years has raised numerous controversies regarding its long-term benefits, extending from AR being only a promotional tool, to AR effectively contributing to a positive customer-brand relationship. AR is also said to add to customer satisfaction through the creation of perceived experiential value (Bulearca and Tamarjan, 2014). The Internet experience along with AR has proven to be highly efficient, especially for real estate purposes. "Guia Roji" a Mexican company in charge of supplying printed maps across the country, has now become bankrupt. Its threshold capabilities were

entirely substituted by geo digital localization maps. ARIT has started to substitute obsolete products in the real world. So, by its own essence, ARIT has revealed the new origins of shared information. ARIT has enabled users to deliver on-time customized information for different desktop users at the same time. During the last decade, ARIT's advances for commercial real estate purposes were focused on showing interactive maps with different properties across spaces. These maps showed examples of key privileges, focusing on target locations, where customers can easily compare real estate by choosing which advantages are more valuable for them, like a specific elementary school for example.

By analyzing and conceptualizing the principles of ARIT it is possible to identify how it is replicated in the basic principles of AR, using 3D virtual objects mixed with reality. However, at the same time, it differs with customization, which is a consequence of Internet users. On the other hand, it lacks practical mobility, due to the absence of a mobile friendly design to host it.

2.2.1 Mobile Augmented Reality

The "cell phone culture" is a social phenomenon, especially among young people. The volume of SMS and instant messaging has increased enormously in European and Asian countries. The "cell phone culture" will continue to constitute a major interface for online buyers once they begin to make and spend more money (Rainer and Cegielski, 2011, p. 256). Today's young people will think differently about future activities, such as sending their kids to college, enjoying family holidays or purchasing a new property. Accordingly, the mobile industry will come up with new strategies to satisfy all these desires. Tremendous changes are occurring in a rapidly changing world driven by social media and mobile applications. Instead of driving for a two-hour tour of real estate it is possible now to start thinking about how to speed up this process with mobile augmented reality apps.

A smartphone offers as more advanced computing ability and connectivity than a feature phone, and typically includes a high-resolution touch screen, offering wireless-internet access to web pages through a built-in web browser (Hsiao, 2013). Today's mobile customers have begun to create their own customized relationships with organizations. This transformation has caused a paradigm shift in a relationship once built on static, episodic periods of communication (Coussement and Teague, 2013a). The consumer relationship with favorite brands is narrowing to specific niches thanks to intelligent marketing planning. Researchers believe that long-term m-commerce business success is likely to come from consumer-oriented, rather than technology-based strategies. (Clarke III, 2014a). The service industry will immediately need to change and

adapt to this incredible way of communication. Some have already considered that 'allowing users to manipulate virtual information independently is important to stimulate their participation in shared activities' (Huang *et al* 2014, p. 127).

Mobile Augmented Reality applications are not new; whilst hardware capacities and 3G Internet technologies have grown apace in Silicon Valley's corporations. Their first approach arose when phones started integrating GPS, compass and accelerometers. Since then, several AR browsers for phones have hit the market (Mulloni *et al* 2010). The user is able to interact with and explore 3D objects as images or videos, and can collaborate with a remote user. Extensive experiments with different subjects demonstrate that proposed system advances combine the state-of-the-art in AR with novel and intuitive applications (Karlsson *et al* 2012a). Aurasma (2011), an East London company has developed an easy way to implement Mobile AR video. Their success shows how any mobile user can interact with, and generate new 4D advertisements. Digital art in motion interacts with viewers in order to establish empathy through their electronic device. Some observers have suggested that one of the many potential applications of AR (such as computer gaming, equipment maintenance, medical imagery, and so on) will emerge as the "killer app" (Feiner, 2002, p. 55). The next technological barrier appears to diminish time-consuming processes between our handset and our eyes. An assertive implementation, with correct distribution and the involvement of key hardware available to the general public could be the turbo boost that is needed for "Google glass" and its competitors. Such futuristic ideas might not be far from tomorrow's reality.

Out-door commercial spaces may require special attention from potential buyers and likewise, more sub-industries such as tourism in Mexico are adapting a new way of interaction. The approach offers the possibility to combine real sceneries with digital representations of places of interest and services for a given itinerary (Mata and Claramunt, 2013). Digital technologies increasingly form the backdrop for our lives, and both provide and shape the possibilities for interaction. "This is a function similar to that of architecture in the physical world" (Wiltse and Stolterman, 2010, p. 821-824). The physical walls can create a new way of communication while we observe them, thanks to mobile AR. The possible use of super man X rays, can clearly help us to transform information into knowledge (Avery *et al* 2009).

Mobile applications are constantly changing and our culture increasingly responds to the rapid emergence of new opportunities in the app industry. Mobile AR has gained popularity in recent years due to the technological advances of smartphones and other mobile devices (Shatte *et al*

2014). Different analyses have evaluated the various techniques, trends and challenges in relation to the design and interpretation of usability evaluations for future AR systems (Bai and Blackwell, 2012). The potential growth of telecom infrastructure may create new ways to play videos supported by image-based recognition. For example, we may start to watch 3D family videos, which will start playing by just recognizing old pictures, without touching a button.

Experience has already shown how virtual reality can offer very important support solutions in modeling the real world with the aim of extending the human capabilities of perception. This may open up a new phase in the world's socio-economic development (Tutunea, 2014). The powerful sensors in modern handsets enable designers to bring AR implementations to the hands of users (Ortman and Swedlund, 2012). Moreover our technological capacity is growing, yet a number of related approaches are built upon content-based recognition algorithms that are both memory and processing-intensive, requiring a permanent connection to a host. These are therefore inappropriate for direct deployment onto mobile devices (Zander *et al* 2012). Only recently, since the advent of augmented reality services and applications for mainstream mobile users, have researchers and practitioners become more fully engaged with how to design and evaluate the effectiveness, usefulness and usability of AR experiences for mobile devices (Sá and Churchill, 2013). In the correct direction, focused on "top quality" brand management, this strategic advantage may boost luxury market positioning. Waze, a real time transit mobile application, has overtaken the radio stations market in charge of delivering on-time transit information by adapting a top quality dynamic capability.

In our ever-changing Internet environment, academics think different platforms will arise. Caught in the transition from the personal computing era to the ubiquitous computing paradigm, multimedia producers in many fields will need to adapt to AR platforms (Tinnell, 2014). The new paradigm creates different reactions to non-static commercial media. Emotionally, Mobile AR services may offer stimulating and pleasant experiences, such as playfulness, inspiration, liveliness, collectivity and surprise. The user experience categories and user requirements that have been identified can serve as targets for the design of user experiences in terms of future Mobile AR services (Olsson *et al* 2013). Other critical success factors regarding time and sacrifice will react differently after each Mobile AR commercial perception. There is a big fish unattended for luxurious real estate offers.

On the other hand, other old fashioned items have appeared with new augmented reality techniques, showing 3D synergies. There is a new interaction paradigm to augmented reality

applications. ‘The everyday tool handling experience of working with pen and notebooks is extended to create a three dimensional two-handed interface, that supports easy-to-understand manipulation tasks in augmented and virtual environments’ (Szalavári and Gervautz, 2012, p. 335). Sixth Sense technology has shown digital figures on static objects, without using tablets or traditional computers, driving interactions to the unknown. The creator of this technology thinks that we are living in an era, where computing will start to incorporate with the physical world. (Mistry, 2009). It is possible that standard static objects will substitute traditional hardware devices, improving the way we gather information. A student oyster card could rapidly show a full balance just by touching the item using Sixth Sense technology. A 3D sculpture could be shown in the blink of an eye just by transferring data via a peculiar movement of the fingers.

2.3 Real Estate

The realtors among the property market are in charge of promoting estate offers, where they use different media strategies in order to occupy empty spaces. As part of their strategy, mobile media has become a huge focus to attract young customers. The resource based-view of strategy must be to constantly redesign in this mobile commerce growth era. RBV (Resource Based-View Theory) relies on the ability to manipulate and edit internal resources and capabilities to respond to external opportunities and threats with the kind of sophisticated competitive advantage needed to exceed competitors (Dess *et al* 2008) of the many types of mobile applications in the market, a salient focus remains on AR and this technology may become one means to communicate premium advertisements to commercial real estate potential buyers. “As demand for AR technology rises, more digital marketing software providers are entering the space” (Minsker, 2014, p. 12). With AR activities of different suppliers, involved in what is a new supply chain, new risks can threaten any COO and therefore, if real estate companies do not start to look for quality measurements, their reputations may be at risk.

The use of Internet technology among office and industrial developers has shaped the industry over the last decade. Commercial property advisers and office developers cannot ignore broadband technology and need to understand and keep abreast of the latest technology crucial to their roles (Razali, 2010). Even though, many people inside this industry were nervous about the changes brought about by the Internet over the last 20 years, the early adopters have transformed their sealed inventories into new sales figures with macroeconomic scales. Other academics suggest that commercial clients are traditionally older, less tech-savvy, and more methodical in buying real estate (Curran, 2013). Consequently, this limitation threatens a number of potential

customers who are attracted through mobile channels. Regardless, their relationship with government organizations, engineers and other stakeholders in the macro environment may influence new buying behavior and may create a great opportunity for mobile channels. Nowadays, obtaining data to inform both architecture projects and real estate investments is a very bureaucratic process. City councils and technicians suffer from the same difficulties when carrying out inspections and they lack comprehensive information (Jones *et al* 2012). Real estate investors, real estate officers and many people involved in these processes all face the same situation of low efficiency by the absence of AR.

The firm's ability to earn a rate of profit in excess of its cost of capital, depends directly on 2 factors; the attractiveness of the industry where is located, and its establishment of competitive advantage against its competitors (Grant, 2001). Integrated, these two factors may motivate any corporation towards success in the marketplace. Nevertheless, in focusing on global capabilities for success at international markets, academics conclude that organizations can achieve an advantage over the longer term through the constant reconfiguration or recombination of different types of resources (Harvey and Too, 2010). “The resources base needs to be adapted to a changing environment in order to continuously provide sustained competitive advantages” (Schlagwein *et al* 2010, p. 12). As noted in the last paragraph, the real estate industry has been evolving with the use of Internet technology, and there is still room to modify mobile services into new real estate horizons. It is therefore interesting to explore how Internet users might be affected in view of these changes and the trend towards AR.

Real estate economics is a study that uses both micro and macro economic principles to analyze the impact that national, regional, community, and neighborhood changes or trends have on real estate values and uses (McKenzie *et al* 2011). Therefore, it is important to understand how different entities in commercial real estate are affected by such economic conditions. The key demand driver for the industrial sector is the strength of exports, as lower exports typically result in reduced demand for industrial space (Promexico Distrito Federal, 2013). Mexico's industrial real estate market is largely tied to the country's automotive manufacturing market. The country has risen up the Business Monitor International business environment ratings for the autos sector over recent years, thanks to strong export and production growth (Web.a.ebscohost.com, 2014). Other key people in the industrial real estate market, such as; Mike Hills, president of SOIR (a renamed real estate organization in the USA) overlooks Mexico as a competitive market, due to its proximity to the USA. He seeks to establish a new chapter of SIOR in Latin American countries (Ritter, 2013). The importance of leading mobile AR techniques will advance in an

environment of the positive building conditions (Vassigh *et al* 2014) regarding of real estate economic factors, pushing Foreign Direct Investment towards Mexico. “We are starting to see a media landscape in which innovation is happening everywhere and moving from one spot to another” (Shirky, 2007). The technologic perception of a global application for Mexican real estate economies could be the solution and may see stakeholders take stock of the marketplace before investing in real estate. This, in fact, could be a unique tool for thousands of new users willing to harness the best opportunities in the next decade.

“Facility and Real Estate Management (FM/RE) activities contribute to about 5-10 percent of the gross domestic product (GDP) of advanced industrialized countries” (Ebinger and Madritsch, 2012, pp. 185-198). The purchasing processes of buying land and facilities are quite long and strictly personalized and, for this reason, brokerage companies must be certain before investing in new technologies. Real estate industry lacks a holistic vision towards what is really happening with mobile Internet business tools. The real estate industry must capture what it is happening in retail and other sub industries of the economy. Other complementary mobile applications may work together with mobile AR to enhance the real estate market. Scientists have researched specific uses of Ambient Intelligence for healthcare facilities using AR as key technology, yet this particular feature in their investigation helped them consider how and why this could provide an environment that computer interfaces would seamlessly integrate into reality (Irizarry *et al* 2014). Interactions between users and other individuals or the environment itself may consequently occur “in the most natural and intuitive way” (Riva, 2003).

Simonson and Rosen (2014) believe that many companies need to dramatically shift their marketing strategies, thanks to the rising power exerted on future customers by the opinions of existing customers. As Razali, Manaf and Yassin (2010) suggest, it is believed that in order to be a world-class company, web- based marketing is an important tool, not only to portray a prestigious corporate image, but also to assist with a marketing strategy. In the real estate business, where the client is expected to be borderless, each country tries to attract foreign investors to invest or to buy a property. Their analysis seeks to establish a direct relationship between market strategies and the most important companies in the Far East.

The exponential growth that has been evidenced among banking mobile app transfers is a clear example of AR in emerging economies. Mexico has a 54.71 per cent mobile penetration rate, with only 25 per cent of the population participating in banking services (GSM Association, 2007). The IMF executes strategic thinking with international banks in order to accelerate this incredible

task. Consequently, other big capital services such as real estate companies must adapt to new changes.

Mak, Choy and Ho (2008) refer to real estate as another industry that extensively uses the Internet. Most of the large property developers, agencies and surveying firms have introduced "hi-tech" by developing and maintaining their own websites to provide added value and comprehensive services that help customers to complete property transactions more cost-effectively. Online services include real estate marketing and brokerage, real estate appraisals, auctions, tenders, and mortgage brokerage. The use of these activities has evolved over recent years and it is important to keep in mind how customers shape the industry by demanding specific features from different real estate websites. Nowadays, The Aurasma experience, known as an 'Aura' (image and pattern recognition to rich 3D content) allows the static print advertisement to be transformed into video to drive sales by allowing viewers to "Buy Now" from the Aura. Since its launch in June 2011, Aurasma has had more than two million downloads. "Over 1,000 partners in markets including retail, sport, automotive, consumer electronics, entertainment, advertising and publishing are using the free technology in their campaigns or embedding the technology in their own applications". (Aurasma Catches Waves of Interest and Announces 1000th Partner -- Shark Watches, 2011, p. 1)

Corporate Real Estate is as a functional unit in an organization, which is responsible for real estate asset holdings and their activities. It supports the organization to achieve its business objectives (Ali *et al* 2008). As one of the most important activities, real estate assets may be essential for business operations, in a determined organization, where each new tool is necessary for a subsequent development. More often, young executives are in charge of expenditure decisions and their potential customers are finding new ways to search for commercial real estate offers. Hence, mobile electronic channels for real estate customers have tremendous potential to drive sales, particularly those that are based on AR.

Industry experts think that a growing percentage of renters are under the age of 35 years, and research shows that this demographic continues to grow. What differentiates this generation from others is their expectations of doing business electronically. Such users seek convenience, speed and flexible business hours (Bonardi, 2013a). Taking this into consideration, those in charge of working in client corporations will seek mobile advantages and therefore, a new strategy of targeting mobile companies must be developed in order to succeed in the mobile real estate market. Operational Risks come along with uncertainties and as a strategic choice to avoid them,

general managers focus in organic growth (by their own means) or mergers and acquisitions. The synergy of acquiring a new enterprise will bring value added at different departments in the mobile value chain such as; Product and technology development and sales and marketing (Scornavaccaa and Barnes, 2008).

Uncertainty for decision makers becomes a major issue for new AR adapters in the real estate industry. Therefore most real estate executives are used to investing in tangible assets yet bricks and mortar remain their main focus. The essence of a low-risk investment in contrast to an augmented reality investment creates fear and uncertainty issues for financial officers in real estate companies, because most of them are not familiar with this new technology.

Organizational/internal uncertainty is defined as a lack of timely communication among decision makers who have partial information. From this comes a lack of coordination, which leads to ineffective or misdirected decisions (Krickx, 2000a). Experts who can easily modify specific appearances on any mobile application should manage those unknown areas of technology. The new level of uncertainty between real estate executives could be disregarded if they embrace AR. Vertical integration is expected for recurrent transactions under conditions where high levels of uncertainty are paired with high levels of specific assets (Krickx, 2000b). Backward vertical integration by real estate companies targeting specific suppliers of Internet augmented reality companies may create a new battlefield for knowledge. The switch strategy is time-consuming, owing to the time required to train production workers to operate highly sophisticated equipment. Therefore, decisions should be made in advance. One way to ensure timely agreements is to anticipate integration, for which a trigger moment is key (Fernandes *et al* 2012a). Making compromises will strategically reduce all those time consuming processes, which can become a real constraint to operational activities

2.4 Summary

This chapter has outlined different points of view regarding AR, emphasizing the necessity in creating dynamic capabilities for commercial real estate firms. The scope of possible solutions points to a new strategic direction affecting every stakeholder in the process. An intelligent acquisition can attract powerful advantages such as rapid knowledge. The following chapter will set out how the approach takes to carrying out research.

Chapter Three

Research Methodology

3.1 Introduction

In order to carry out research, different philosophies must be considered in order to identify the best research approach. The research paradigm is initially considered below to understand the background to this investigation. Consideration of the advantages and disadvantages of different paradigms will facilitate the choice of an appropriate method.

3.2 Research paradigms

A paradigm is a way of examining social phenomena from which particular understandings of these phenomena can be gained and explanations attempted (Saunders *et al* 2013). A research paradigm is needed in order to discuss and observe different attributes of analyzing information. The research must use solid elements to explain how and when things happen. There are two approaches to research and these are positivism and interpretivism and each is selected according to different epistemological, axiological and ontological assumptions. These branches of philosophy discuss the ways in which this dissertation should develop to reach its aims.

Positivism is a research philosophy that involves working with an observable social reality. The emphasis is on a highly structured methodology to facilitate replication, and the end product can be law-like generalizations similar to those produced by physical and natural scientists (Saunders *et al* 2013). The intangible relationship between AR applications and real estate customers is not generalized. The essence of a positivist paradigm is not suitable to analyze the experiences of mobile AR users. Instead of analyzing how things should be questioned and inspected, positivism is based on observation and quantitative processes.

Positivism can therefore be rejected as a philosophical approach suitable for this research. Such a method is typically based on creating or constructing ‘closed systems’ or using sampling methods to try in some way to replicate the ‘natural sciences’ (Knox, 2004). Positivism according to Flowers (2014) obtains data through quantitative methods proving other similar theories, then, generalizing to obtain a conclusion. Quantitative solutions are rejected since simple observation is considered in appropriate on its own to understand mobile phone usage. The researcher instead needs to explore specific feelings, actions and emotions in relation to mobile AR applications.

The research therefore adopts an interpretivism research philosophical approach, whereby it seeks to understand the subjective reality and meanings of participants as Saunders Lewis and Tornhill

(2013) have defined. Interpretivism is a strategy used in sociology to interpret the meanings and actions of actors according to their own subjective frames of reference (Williams, 2000). Each mobile AR user interested in real estate across Mexico City has different experiences with this channel. Consequently, an interpretivist research philosophy fits much better with this philosophical approach. The important frame of reference in this research is the customer experience. Emotions, feelings and experiences are the most important feedback for this dissertation.

Epistemology is the study of knowledge and justified belief (Steup, 2005). It also concerns what constitutes acceptable knowledge in a field of study (Saunders *et al* 2013) and it literally translates as the "theory of knowledge." It is derived from the Greek ‘episteme’, meaning "knowledge," and logos, which has several meanings, including "theory" (Guisepi, 2014). Positivist ideals observe and make conclusions that generalize data to find simplicity in social phenomena. Meanwhile, interpretivists seek for subjective meanings and social phenomena pointing out details and motivations. Interpretivism is therefore embraced as a fitting research paradigm.

“Ontology is concerned with the nature of reality and assumptions researchers have about the way the world operates and the commitment held to a particular view” (Saunders *et al* 2013, p.110) or as a theory of the nature of social entities (Bryman and Bell, 2011). Positivism captures reality as the external actions of the researcher’s spectrum. As a result, it has to be totally separate from individuals. Interpretivism is based on a premise that “social reality” is in people’s minds and is personal and can be changed by analyzing it (Collis & Hussey, 2009). Reality is thus consequently changing and is measured by how it is changing and what it is doing. In other words, the researcher must take in consideration the individual actions and feedback of future customers. Measuring participant feelings during interviews will capture the nature of reality during this exploration.

According to the axiological assumptions of interpretivism, the researcher is a valuable part of the analysis. The researcher that relies on quantitative data is external and functions only as an observer. On the other hand, with interpretivism, the subject of the research is continuously learning and participating by interacting and discovering different reactions, reasons and explanations (Saunders *et al* 2013). Axiology makes no direct contribution to understanding things that do not add any value (Bahm, 1993). A scientific explanation for realists is not the deduction of a statement describing an event from a set of other statements, but rather a

description of the mechanisms that produce it (Juma'h, 2006). A realist paradigm will only be focused on when describing the nature of what is actually there.

3.3 Research approach

Neuman (2003) suggests inductive research begins with detailed observations of the world before moving towards more abstract generalisations and ideas. The inductive approach starts with observations and theories, which are then formulated towards the end of the research as a result of observations (Goddard and Melville, 2004). The hypothetical way of understanding generalizations is achieved through interpretivism. General observations of specific mobile AR channels are important to this research, as are experiences, memories and expectations.

In social scientific research, methods that rely on deductive reasoning start with a theory, which is narrowed down to a testable hypothesis. Data is then collected and analyzed to see if the hypothesis can be confirmed and the theory substantiated (O'Leary, 2007). During the 20th century, many social scientists carried out their research using the deductive style. Although, deduction was much more popular during the last century, they started to misunderstand the way in which humans were interpreting their world (Saunders *et al* 2013). The process lacked particular observations of “how” and only focused on ‘how many’ or ‘how often’ certain things were happening. An inductive approach is therefore accepted as pragmatic for this analysis. The research question must be answered by abstract words from key businessmen, and not by statistical distributions, which can lead to less valuable data. This research values qualitative data in the shape of words explained and described by 9 individuals who participated as interviewees.

The procedures of qualitative research, or its methodology, are characterized as inductive, emerging, and shaped by the researcher’s experience of obtaining and interpreting data (Creswell and Creswell, 2007). When research into a topic is new and where there is little existing literature, it may be more appropriate to work inductively by creating data and analyzing and reflecting upon what theoretical themes the data are suggesting (Saunders *et al* 2013). So, the experiences of the researcher in obtaining testimony will be analyzed in the context of the little existing literature on the chosen topic, which is mobile applications and AR in Mexico City. The data gathered will support marketing real estate teams to consider the customer in relation to the mobile channel. Little has been written about the real estate market in Mexico City in the context of AR mobile applications.

3.4 Research strategy

Qualitative research usually emphasizes words instead of numbers in the collection and analysis of data (Bryman and Bell, 2011). Therefore it is important to select the correct tools to explain the analyzed phenomenon. To derive such information, a qualitative researcher needs to be open-minded, curious, meticulous and emphatic as well as flexible and able to listen to the people telling their own version (Hennink *et al* 2011). This research strategy must be adapted with specific features that will allow the researcher to gain an understanding of the key issues and individual experiences. The choice of philosophical approach is a reflection of researcher values, as is the choice of data collection techniques (Saunders *et al* 2013) and consequently, they will express their emotions and feelings when participating in qualitative interviews.

The term ‘case’ associates the case study with an area, such as a community or organization. Emphasis tends to be placed upon an intensive examination of the setting (Bryman, 2012a). The examination is related to the title of this research; consequently the research explores the real estate community in Mexico City. Case studys address 'How' and 'why' questions and are more explanatory in nature. They are likely to lead to the use of experiments, histories and case studies. These questions tend to deal with operational links, which occur during a span of time, rather than incidents or phenomena, which occur at intervals over time (Aghapour, 2012). The research seeks improve efficiency at operational levels in terms of new marketing techniques in mobile AR channels for this reason, a revelatory case study is considered appropriate. During a revelatory case, ‘the basis exists when an investigator has an opportunity to observe and analyze a phenomenon previously inaccessible to scientific investigation’ (Yin, 2009, p. 48). Operational observations shed light on many businesses and so to target unique problems, a case study is considered useful. Case research is particularly appropriate for certain types of problems and particularly those in which research and theory are at their early, formative stages (Roethlisberger, 1977). The basis of revelatory case consolidates the early stage of mobile AR uses in smartphones, especially in the service industry. A hypothetical case study was therefore presented to participants towards the end of each interview, so the interviewee could start to think of innovative ways to use mobile AR technology.

The hypothetical case study was be discussed with the interviewer, and they were asked to contemplate choosing a local realtor that uses AR to sell real estate and the extent to which they might be motivated to buy real estate following exposure to such a form of communication. Participants were engaged in this discussion after watching real estate AR videos in a UK market context. Interviewees were then asked if they would buy from global conglomerates or local realtors. The case strategy adopts a mutually exclusive decision, which he or she must choose

according to recent experiences during the interview. Such interview gathered data from 9 participants working in cluster industries (retail, manufacturer, real estate) in Mexico City.

3.5 Data collection methods

Data gathering is a key element of this dissertation and constitutes most of the next chapter in the form of analysis. The key data sources are interviews with participants, observations, documents, and artifacts. The data were transformed into written text for analytical use. Interview participants were selected using purposive and iterative strategies. The production of interview data required some awareness of the complexity of self-reports and the relationship between experience and language expression (Polkinghorne, 2005). Success in this investigation required a detailed effort to search for precise words spoken by the interviewee and attention was paid to non-verbal communication reactions. The selection of each interviewee depended on their level of involvement with the digital real estate market in Mexico City. Qualitative interviewing is a broad term used to describe a wide range of interviewing styles. Moreover, qualitative researchers employing ethnography or participant observation typically engage in a substantial amount of qualitative interviewing (Bryman, 2012b). Even though a qualitative research design might depend on one or more ways of collecting data, one of these must predominate in order to retain the most important values. In this case, open-ended interviews allowed the interviewer to obtain the most important data needed to achieve the aim of the research question.

Interpersonal reflexivity recognizes that the interview setting and the inter-personal dynamic between the researcher and participant can influence knowledge creation (Hennink *et al* 2011). The interviewer interacted with AR applications made in London while asking for feelings ad emotions from the interviewee. Key words and positive scenarios were used to prompt interviewees. The mobile AR was used to illustrate the technology.

An open-ended interview is commonly used for elicit life-histories, as a strategic goal to obtain rich data (Silverman, 2011). An open-ended interview differs from a structured interview in terms of flexibility, rapport with the interviewee and active listening. Meanwhile, a structured interview focuses on training to ensure consistency (Noaks and Windcup, 2004). Therefore, this Internet project must seek relevant information in order to succeed along its research aims, research objectives, research questions and research methods. The units of analysis were sub-industry executives focusing in specialized decision-making and qualitative methods were used to produce reliable conclusions. Online Skype open ended-interviews achieved a multinational view and meanwhile a detailed analysis interrogated the results and used these to suggest future research.

The manufacturing industry is the most important unit of analysis for this research. Although many others such as tourism and retail are relevant. The following sub-sectors were analyzed: shoe manufacturing, car manufacturing, the aerospace industry, shipbuilding, agriculture, textiles and apparel, metal and engineering industries, and information systems. Remember that those entrepreneurs working for the mentioned industries are the main targets for commercial and industrial real estate in Mexico City. The research took place in London and was based on Internet surveys sent to multinational corporations in located in Mexico. In addition, online open-ended interviews were tailored to various customer demographics, language and purchase experiences by creating multiple versions of the interview. This, each respondent was asked only pertinent questions (Evans and Mathur, 2005). Open ended interviews with specific executives in global corporations; realtors and publicity executives were undertaken. This set of interviews was analyzed in order to examine levels of interest in new industrial and commercial clusters in the Mexican economy. A hypothetical revelatory case study was delivered during interviewees in order to set the context for experimented executives dealing in digital marketing and the macro environment of real estate. AR plays a key role in the new decisions among the interviewees.

3.6 Open-ended Interview

Often, interviewing is seen as a tool for data collection, while in reality it is a complex, subtle process that cannot be separated from the dynamic of the project or from the numerous and changing contexts of everyday life (Shostak, 2014). Interviews are also useful where it is likely that people may enjoy talking about their work, families, communities, emotions, feelings or relationships, rather that filling in questionnaires (Gray, 2014). Empathy during the interview process played a key role in order to make the experience enjoyable. Open-ended interviews were undertaken with a set of questions, which were invaluable as aide memories. However, explicit questioning helps researchers to separate what is salient for each respondent (Barbour, 2103). The interviewees were asked to describe 4 different adjectives after watching a mobile AR video showing Pepsi's AR advertisement at a London bus stop. Nevertheless, questionnaires played an important role in gathering relevant information with different outcomes from each interviewee.

During the first week of May 2014 the interviewees were formally asked to arrange a 55-minute Skype videophone call. They were given specific objectives in relation to this research and in relation to the AR industry in London, United Kingdom. This strategy helped to build confidence between the interviewer and the interviewee. It is important to mention that objections to video

recording are more common that for audio recording and so an appropriate sampling method helped to achieve the strategic goals for this research. Convenience sampling selection was undertaken in order to diagnose an appropriate sample (Greener, 2008). The research needs to get information from; potential customers, real estate developers and online media enterprises to measure viability of AR applications and its impact to future tenants. Some 9 people working in real estate, digital media, car industry and food and beverage franchise entrepreneurs were selected. Each interviewee spent 10 minutes watching videos of mobile AR examples. The annual AR industry's potential in Mexico City was explained and discussed with every participant (Chapter 1).

Open-ended interviews were combined with standard questionnaires focusing on obtaining key answers regarding the specific job descriptions of the executives and their current vision in relation to digital marketing communication channels in Mexico City. The interviewees are expert in their own industries, but most of them do not know about digital media tendencies and the immediate impact it might have. Before asking specific mobile augmented reality questions, the interviewee described what they thought about the term "augmented reality". An extensive orientation to this term was given in order to explain step by step the conceptual clarifications of mobile AR. Different videos demonstrating mobile AR real estate features were shown during the interview process, obtaining new reactions and emotions from interviewees following each video. At the same time, they had the opportunity to look at a TED.com video showing current mobile AR solutions in museums, journals and other industries. After obtaining this information, each interviewee was asked to give his or her point of view and identify how their organization could benefit.

The interviewees had to compare their last real estate experience with future expectations of SMEs using mobile AR applications. A hypothetical revelatory case was interpreted to each interviewee to provide the context of real estate and AR applications. Each interviewee provided a unique perspective and each identified some pros and cons in relation to AR and real estate. At the end, the interviewer asked how financial resources should be distributed to this specific channel. A general annual budget of 35,000 USD was given, where they had to choose a certain percentage for mobile implementations, if they were SMEs dedicated to the real estate industry. The interviewees also had to explain how they interacted with typical five-star rankings of ITunes and Google play and important information was captured focusing on the key drivers of change in relation to new app selection. All the questions were asked during a videoconference and each

discussion added something new to explain the interrelation between mobile AR applications and real estate.

Some challenges regarding ethical issues arose at various stages such as minimization of harm and looking for voluntary participation (Hennink *et al* 2011). The general ethical issue here was that the research design should not subject those in the research population to embarrassment, harm or any other material disadvantage (Saunders *et al* 2013). Therefore, each question obtained by the interviewees was carefully analyzed during interviews and participants were told that they could withdraw from the process at any time. For example one interviewee just answered certain features regarding his needs of new property capabilities, he told the researcher the minimum information, because it is one of the best secrets to succeed at fast food beverage business.

A pilot study was conducted during the research process so that errors could be identified and the order of important questions could be changed. The pilot interviewee suggested clarifying what was meant by commercial real estate and shortening the process from 45 to 38 minutes. He also suggested establishing eye contact during the interview.

3.7 Strengths of the methodology

In-depth interviews objectively identify individual perceptions, beliefs, feelings and experiences. Those elements mean the researcher can gain in-depth information, identify personal experiences and the data is useful for analyzing sensitive issues and identifying the context of participants' lives. However, a focus group may have added value through group interaction, which means a range of issues and opinions among many participants can be explored at the same time, compared with other methods. Interviews are also relatively economical in terms of time and resources (Hennink *et al* 2011). The cross-cultural nature of the research that is based on perceptions of phenomena in two nations is another advantage that will give this investigation a multinational view. Nonetheless, as already noted, one of the strengths of qualitative research is its ability to access directly what happens in the world; that is, to examine what people actually do in real life rather than asking them to comment upon it (Silverman, 2011). Qualitative data can capture vivid reactions and feelings and this was a major strength of this methodology.

Qualitative researchers engage in naturalistic inquiry, studying real-world settings inductively to create rich narrative descriptions and construct case studies (Patton, 2005). The sampling method chosen during this research focuses on multinational conglomerates operating or planning to invest in industrial or commercial areas. Nevertheless, certain local SME's gave specific feedback

regarding their experiences and expectations of the real estate industry. A comparison between experiences and expectations can bring about a rich analysis of how mobile AR features must adapt to fulfill business needs in emerging economies. Primary data from key stakeholders can be useful for any marketer in the real estate business and their emotions and expectations of future needs can shape the future of this industry.

The researcher obtained strategic help by diplomats, academics and business executives for the adequate design of the interview the purpose of this action intend to diminish validity issues. The interviews delivered reliable information for realtors who want to invest in new tendencies regarding digital communication. It is important to keep in mind that global conglomerates in real estate are investing in different types of technology at this precise moment. The objectivity of a piece of qualitative research like this is calculated in terms of the reliability and the validity of its observations (Kirk and Miller, 1984).

3.8 Weaknesses of the methodology

There are situations that favor non-standardized (qualitative) interviews that will make this an obvious choice of method to collect data. Apart from the research strategy, these are related to the significance of establishing personal contact, the nature of data collection questions, and the length of time afforded to those who provide data (Saunders *et al* 2013). Each interview lasted over 40 minutes and some were completed in in a hurry during labor day. Nonetheless, the interviewer needed to carry out interviews during the late afternoon of the working day so their attention span was perhaps compromised. It is acknowledged that this could have an affect on reliability of some data.

The research design must be put together with care in order to mitigate poor data in relation to AR in other industries. The interviewer had to establish a direct theme regarding the principal topics of the investigation. However, it is important to keep track of different ways of gathering data. According to Kennedy (2010), triangulation can be used in order to minimize bias. This research was therefore based on both secondary research and financial statement analytics. Even though this is an important subject for potential customers, they may have been afraid to discuss their strategic intentions, which amounted to confidential information. In such cases, they were allowed to answer fewer questions. Quantitative information was only used during the interview in order to obtain their attention and the potential of mobile AR in the near future. Certain questions sought information on the industry size of 3G subscribers in Mexico compared to the USA and China, and the expected growth of mobile AR and real estate GDP in Mexico City.

This research is based on reliable information on specific global organizations such as CIA, IMF, and Real estate groups. Also secondary data has been analyzed by other academics in both countries along with annual reports from public companies, world trade associations, newspapers, national statistics, magazines, journals, technological news and records of new trends found by searching webinars and specific technological resources.

3.9 Summary

Chapter 3 set out which methods were used to carry out this research. The research paradigm, strategy and approach were identified and primary data collection was discussed focusing on the strengths and weaknesses of the methodology to reflect over the reliably and validity of the research. The following chapter analyses the data gathered and interlinks each variable to the aims and objectives.

Chapter Four

Analysis of findings

4.1 Introduction

The last chapter set out the methodology for this research. This chapter focuses on data analysis. At the beginning the research discusses a number of data analytical approaches before identifying thematic analysis as an appropriate approach. Then, the chapter refers to limitations regarding thematic analysis. Afterwards the researcher codes themes explaining key differences among interviewees. At the end, this chapter explains how key drivers of change interact with each individual and the interrelation between AR in Real Estate strategies.

4.2 Data Analytical Method: Thematic Analysis

In order to arrive at a valid set of findings it is necessary to find an appropriate way to analyze the data. A qualitative approach must focus on human behavior observed during interviews. A qualitative researcher must engage in effective and demanding analytic processes throughout all phases of the research (Thorne, 2000). Aronson (2014) suggests that thematic analysis focuses on identifiable themes and arrangements of behavior, identifying particular similarities between users and suggesting how are they related to the research aims and objectives. In thematic analysis there is a need to create conceptual tools to classify and understand the phenomenon under research (Marks and Yardley, 2004). Technology and service-based companies are the changing paradigms of mobile marketing and thematic analysis helps to identify common perceptions among users and designers. Therefore thematic analysis is accepted as a pragmatic means to analyze the data gathered for this research. Thematic analysis, as with grounded theory and the development of cultural models, requires more involvement and interpretation from the researcher. Thematic analysis moves beyond counting explicit words or phrases and focuses on classifying and describing both implicit and explicit ideas within the data, that is, themes (Guest *et al* 2012). Thematic analysis is about using codes to make sense of data and the approach is explained and applied in the following sections.

Thematic analysis is flexible and what researchers do with the themes once they uncover them can vary based on the intentions of the research and the process of analysis. Many researchers use thematic analysis as a way of getting close to their data and developing a deeper appreciation of the content (Boyatzis, 1998). A thematic perspective encourages the diminishing of an invisible lag between the researcher and data (Guest *et al* 2012). For instance, thematic analysis is an intuitive framework useful for analyzing new uses of technology such as mobile AR applications

for real estate purposes. Inductive research first involves making specific observations, then identifying patterns within the observations, then making broad sense of a generalization and eventually making tentative theories (Southampton Education School, 2012).

Qualitative research principles embrace thematic and narrative analysis provoking flexibility for common uses (Braun and Clarke, 2006). Some qualitative methods are not aligned toward finding patterns and commonalities within human experience, but they instead seek to discover some of the underlying structures or essence of that experience through the intensive study of individual cases (Thorne, 2000). Discovering the essence of familiarity and its possible relationship to essence and intensive investigation does not drive this research toward a phenomenological selection. The importance of reflection as a key-learning tool in professional research development is important during longitudinal studies. For this research, thematic analysis is a useful analytical method that is accessible to 'beginners'. The importance of reflection as a key-learning tool in professional research development. It is argued that strong reflection should result in the interviewee, the investigator, and the reader sharing a common experience as to the meaning of a certain lived experience (Lien *et al* 2014). The detailed actions of every entity in this process of investigation were being scanned, explained and carefully inspected in order to observe key themes in relation to AR and local realtors. Thematic analysis adopts a few of the traits of phenomenological and ground theory thanks to its freedom and adaptability. It therefore takes advantage of the different characteristics at each method.

The idea that the very experience of using electronic environments has an effect on search behavior and decision-making has huge intuitive appeal (Bellman *et al* 2006). Each of the electronic advantages dealt with through the entire research process inform new themes in order to classify important experiences according to the interviews undertaken.

4.3 Limitations.

Thematic analysis uses semantic fields of obtained data and organizes themes into codes, which reflect the directions and decisions taken during the research process. Nevertheless, other methods such as chronological analysis provide a comparison focused on time connected with the steps taken by interviewees. Eriksson and Kovalainen (2008) suggest that an individual case drafts a general description, which may be constructed by chronological or thematic order. Thematic analysis is time limited, and there is no follow-on process as with chronological analysis.

Thematic analysis may identify common factors between interviewees, but it does not capture deeper findings as other qualitative methods do. For example, grounded theory provides a set of procedures, which promote the development of a theory about the phenomenon under investigation (Marks and Yardley, 2004). This research seeks to explore common emotions between real estate mobile AR adapters, in spite of the tremendous growth potential of this industry. However, the analysis is not focused on investigating a set of procedures. Subjective reality, then, is about different individual perceptions for potential customers looking to invest their financial resources into real estate products. There is therefore no way of understanding procedures through this research, as these could be contemplated only by using grounded theory.

Interpretative Phenomenological Analysis is a methodological framework and analytical method, which takes its theoretical assumptions from phenomenology and hermeneutics. It is an idiographic method that it is devoted to understanding individuals' lived experiences (Brown, 2014). Even though, the research intends to explain and relate experiences and emotions, it does not consider phenomenological analysis as central to the theoretical framework. Experiences, traumas, memories and cognitive reactions are not approached as the main causes or effects of this dissertation. For example, phenomenological analysis is often used in research into young adults and their comprehension of self-individuals. Harter and Susan (1992) have agreed that a young adolescent can construct single abstractions about the self; yet he or she cannot yet simultaneously compare these abstractions in order to experience opposing attributes.

4.4 Analysis of Entities

There are three constituent participant groups that can be identified who use mobile AR for commercial real estate purposes and each provided a different point of view in relation to their daily experience of acquiring new properties as key assets for their enterprise’s activities. These are; Potential buyers who look for specific features and amenities before leasing or purchasing any real estate; Online media enterprises who design and strategically allocate financial resources; and Real estate firms in charge of delivering offers for their customers. Each participant reflects positive and negative outcomes regarding mobile augmented reality future involvement in Mexico City.

The foundations of this analysis facilitate the gleaning of knowledge of the meaning made of the phenomenon under study (MAR in commercial real estate) by the groups studied (3 entities) and provides the necessary groundwork for establishing valid models of human thinking, feeling and behavior (themes playing as key success factors). (Harper and Thompson, 2012).

The following figure explains the relationship between the three entities, where buyers are attracted to advertisements made by media enterprises, whom are contracted by real estate companies.

Figure 4 The 3 entities

Source: The Author

4.5 Coding Themes

Transcripts of each interview were made in order to capture feelings, emotions and non-verbal reactions towards AR videos and to capture reactions towards the revelatory case studies. The data gathered allowed the researcher to read and re-read complex scenarios. The author adapted a seven-step process from Braun and Clarke's model (2006) by including a middle step for the data gathered to take account of the detail in every non-verbal expression of each interviewee, where non-verbal communication captured sudden reactions of happiness, joy and curiosity. Additionally, the data were examined using a systematic processes based on organizing, coding, writing, theorizing, and reading (Tuckett, 2005). The first step was focused on familiarization with data and reading each transcript several times. The second was intended to generate initial codes, where each interview was summarized into 4 sentences with abstract adjectives. The third searched for initial themes including different adjectives into a more complex abstract generalization including all interviews at the same time. Consequently the fourth step illustrated

the themes separately over a disordered written keyboard and the fifth step involved reviewing themes and eliminating some for their lack of importance or repetitiveness. The sixth phase was about selecting and renaming the most important themes and classifying direct and indirect relationships amongst them. The last phase created different diagrams and related conceptual maps to explain the analysis of findings.

The thematic analysis has found two different groups of themes; one of them is the trustworthy theme, which outlines positive attributes regarding MAR expectations. Meanwhile, the other is the untrustworthy theme characterized by negative attributes regarding MAR implementations in the real estate business. The semantic fields obtained during the thematic analysis have helped to develop the final 6 themes by inductive approach, which are the following; Assertive, versatile, smart, unfeasible, nonessential and hazardous. Each one of those themes has different lineaments. There is an adverse horizontal relationship between each theme, for example assertive opposes unfeasible and there is also an interdependent relationship between vertical themes where assertive is reciprocal of smart and versatile. The next table explains the key ideas and descriptive words obtained by the interviewees.

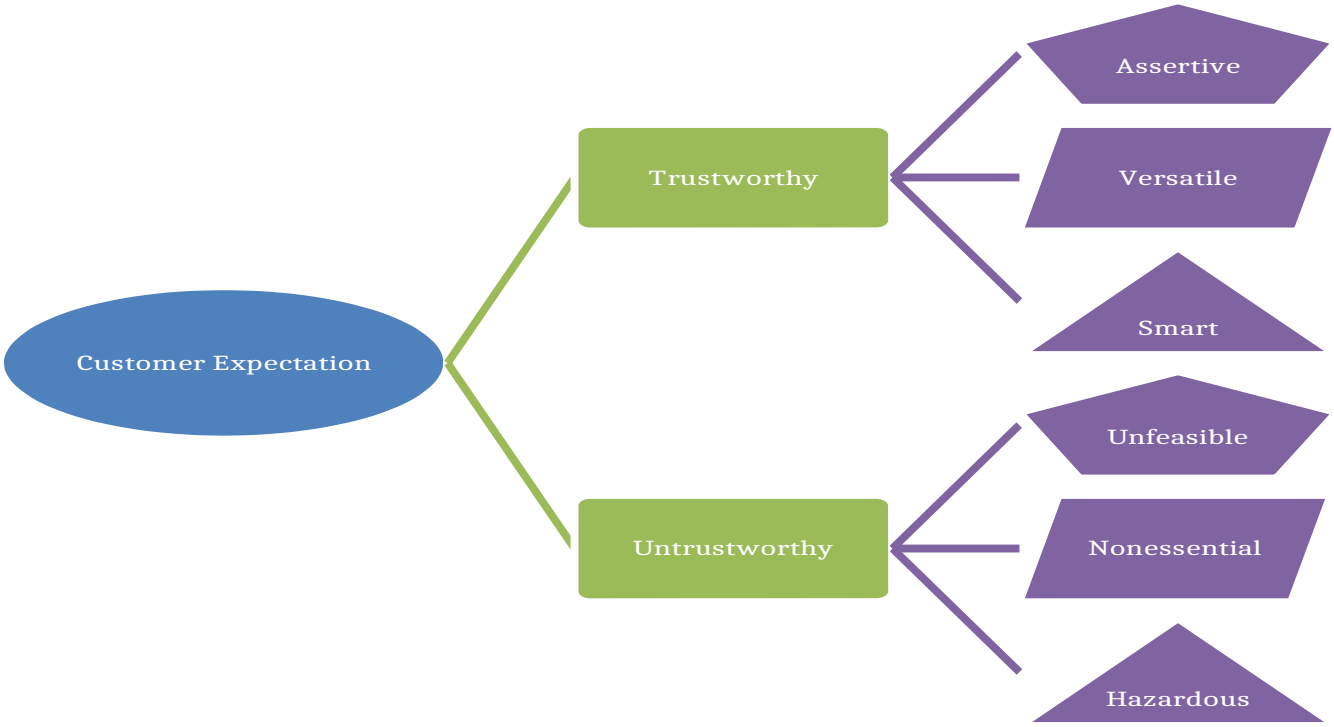
Table 5 Descriptive Themes

Trustworthy Themes	Descriptive ideas	Untrustworthy Themes	Descriptive ideas
Assertive	The interviewees classified this theme as; updated, modern, rich, surrealist, capitalist, futuristic, convincing and powerful.	Unfeasible	The interviewees classified this theme as: Costly, non-adaptable, abnormal, unsustainable and non-affordable.
Versatile	The interviewees classified this theme as allowing them to: Customize, manage rapid interaction, creates curiosity, transfer knowledge, and start in-joint activities with their suppliers.	Non essential	Interviewees have identified this theme in realtor's activities as: Flippant, skeptic, divergent in communication, unimportance and ill repute.
Smart	The interviewees identified this theme by giving them advantages of: Practicability, automation, economical, sustainable, efficiency, teachable.	Hazardous	The interviewees have identified this theme as: Falseness, implausibility, deceitful, lastingness, and unsuitable.

Source: The Author

Therefore explicit geographical figures will give another dimension to the data analysis of this dissertation. Concept mapping encourages the group to stay on task and the results relatively quickly from an interpretable conceptual framework. The framework is expressed entirely in the language of the participants and yields a graphic or pictorial product, which simultaneously shows all major ideas and their interrelationships (Trochim, 1989a). The following mental map shows the interrelation between each theme analyzed in the last table. Its main connections and classifications are also explained and conceptualized with different geometrical figures.

Figure 6 The 6 Themes' Mental Map



Source: The Author

A concept mapping shows an organizational structure focused on customer expectation through trustworthy and untrustworthy themes. Each theme reacts by capturing special feelings from each one of the interviewees, for example the assertive themes is being classified as trustworthy. 'Assertive' inside the pentagon, represents achieving efficacy through technology and cash flow management (powerful). On the other hand, 'Unfeasible' reflects unaffordable (costly) to the average person in Mexico. Versatile and nonessential are indirectly related thanks to their quick response such as; customized rapid interaction vs. disconnecting direct communication. The triangle comparison between smart and hazardous identifies the most relevant themes between

the interviewees, yet false possible reality and time saving, both of the, take strategic attention as the most mentioned and distinguished characterizations.

The interviewee's emotions showed different reactions to the mentioned themes and there is no logical reason to exclusively separate them by one distinct behavior; nevertheless it is necessary to meticulously observe and re-think the data examples in terms of each one of the obtained themes.

4.6 Trustworthy Themes

This research identified two different types of themes as either trustworthy or satisfactory among potential customers. The investigation found 3 different types of trustworthy themes, which were different yet, complementary.

4.6.1 Assertive

Assertive is classified as a trustworthy theme, which arose out of customers' expectations through observing 'status' patterns from the majority of the interviewees. The long history of modern media as psycho-technologies reflects an aesthetic-epistemological frame, which conditions what can and cannot be perceived (Karppi, 2014). When interviewees relate beauty and comfort a positive outcome is achieved and therefore customer expectation rises toward real estate developments. This crucial factor relates to the use of convincing tools among participants. For example, one of them said the following:

Experimenting with augmented reality is just magical, it reminds me to a Harry Potter movie, therefore my brain just reacts positively by discovering new things, such as visual images, music or any other pleasant experience, yet there is positive tendency toward how humanity's tends to appreciate visual effects provoking positive reactions inside their minds. In spite of investing in high quality virtual designs, my expectations think of a respectable, convincing, and powerful financed company. (Female, 24, Logistic Operations Manager, German Manufacturer Company, Querétaro, México).

The magical and surrealist features are influencing this potential customer who sees the real estate company as having a high financial status. She relates her experience as being magical and pleasant, therefore her expectations have increased. Another participant said

This corporation must be dealing with massive projects, yet their digital assets appear to be expensive with no proved achievement in the industry. The complexity of managing peculiar technical details into mobile applications at this scale clearly reflects a strategic thinking focusing on unique capabilities. Many threats come to place if you start to consider other factor such as potential market and sustainability. (Male, 26, Architect, Swiss Commercial Real Estate Company, Zurich, Switzerland).

The respondent identifies capital strength for those using mobile AR, as an expert in his industry he focuses on the specific details, which can influence design lovers for final purchase. Nevertheless, He suggests this is just about customer expectations and awaits further research for future investment. Overall, the reactions suggest there is some confidence in virtual developers that might support future investments in real estate.

4.6.2 Versatile

The 'Versatile' theme refers to a different profile of interviewees. Designers can capture and replay synchronized videos and sensor data, allowing them to work off-site and to test specific parts of their experience more effectively (MacIntyre *et al* 2004). They focus on customization as a key common factor. For example, one of them said the following:

Is a powerful and dynamic tool to create and customize my own spaces, this particular technology may boost my sales as soon as I adopt it, especially for interior design. It is totally related to improve my supply chain; any customer will love to visualize the possible furniture distribution before buying. My experiences with national realtors are phenomenal; our small and medium national companies can give you better service than global corporations. (Male, 27, Commercial Director, Furniture Company, Mexico City, Mexico).

The reactions to mobile AR are associated with his business taking customization to the next level considering different purposes for it in the supply chain. Although, He have had a good previous experience with a small company, the relationship between customer expectation and a AR implementation is not as strong as it is in the assertive theme. Another participant referred to mobile augmented reality applications used for real estate, as follows:

I have seen personalized applications of logistic enterprises adapting virtual renders at warehouses before executing any operational decision, which helps them to create a possible layout before starting any operation. In my experience, your vision changes as soon as you start interacting and customizing your possible future apartment using augmented reality. My aspirational dreams took me to see myself in the future, resting in my condo where I had the power of choosing specific features. Their sales techniques and attention was also a key factor for the acquisition of that property. (Male, 47, Architect, Mexico City, Mexico).

The respondent's emotions and feelings toward customization allowances became a critical success factor for the purchasing of retirement property. The intuition of helping customers to interact with possible designs may give them a feeling of power and dominance in order to finally select a real estate offer. Other features proved to be relevant especially in terms of cost-based decision makers.

4.6.3 Smart

AR was seen as something that makes contextually relevant information easily available and allows for novel interactions with the physical world (Olsson *et al* 2012). The ability to respond intelligently has astonished the interviewees in this theme. They relate timesaving features to AR applications. One of the interviewees said the following:

Sometimes real estate companies are slow and inefficient, their lack of focus can interfere in your specific needs, and therefore I do prefer to establish a direct contact with the property owner. You may find problems such as; poor amenities, which are not always as promised, misinformation, and harmful security deposits. On the other hand, mobile augmented reality applications can contribute to transfer knowledge management before leasing your desired property; this could be a tremendous advantage for my franchise partners. (Male, 31, CEO, Fast Food Company, Mexico City, Mexico).

Intelligent features have surprised this entrepreneur who has considered how to attack those specific weaknesses when acquiring commercial spaces with his franchise partners. His motivations for using this particular technology are intended to diminish communication problems at the moment of acquiring real estate assets. The smart theme acts as an auxiliary feature for realtors with ill repute. Another respondent said the following:

I think this technology is the future; augmented reality tools help you to get rapid information toward your every day decision. For example, during my last job experience at UBER I clearly appreciated how new taxi drivers were buying 3G phones in order to compete among themselves and get new passengers through this intuitive taxi application. Many technological companies are choosing to hire virtual offices with exceptional features at the best locations. I perceive this technology with tremendous potential allocated to pre-sale luxury condos, hopefully with better techniques and sophistication, yet their involvement toward real estate in Mexico City is just beginning. Another important issue is that I am just talking about customer expectation, there is too much left, such as customer service and location. (Female, 28, Commercial Director, San Francisco Mobile App Company, Mexico City, Mexico).

This respondent clearly valued the intelligent features of mobile AR in her own company by substituting traditional transportation processes. In spite of being a technological company spreading their services in México City, she perceives of an opportunity to use mobile AR applications to sell real estate in a specialized niche marked which is influenced by technology and power.

4.7 Untrustworthy themes

The negative influences obtained by the interviewees are dealt in untrustworthy themes. The following explanations will help us to understand how and when they are expressing negative views regarding mobile AR applications in Mexico City.

4.7.1 Unfeasible

This theme is a reaction of specific feelings such as country's capacity to obtain mobile augmented reality applications, reflecting inefficient adaptability to nation's behavior. Other circumstances come across, such as a being tremendously expensive for small and medium enterprises.

I think mobile augmented reality is an exploitable tool to attract your customers, mobile Internet users are growing, but many people still prefer traditional communication channels. The telecom capacity is insufficient compared to other countries such as Korea. In Mexico, just Google is using Augmented Reality for an intelligent search-engine process, which uses your current location. Nevertheless, I chose to lease my offices without using any realtor, by reading a signal, which gave me much more confidence for my final decision. (Male, 25, CEO, Advertisment Agency, Mexico City, México)

This potential customer works on a daily basis using marketing strategies for different companies in Mexico City and he believes that Mexican culture will not adapt rapidly to fast changes brought about by mobile AR implementation in the biggest city. He also mentions how Google, which has a different purchasing power than many other SMEsis harnessing mobile AR applications. The researcher understands from this customer's reaction that there is a long learning curve for medium developers and designers to consider before adapting mobile AR as their main strategic options. He does not perceive an increase in customer expectation by implementations of AR in real estate ads.

4.7.2 Nonessential

This theme reflects mobile augmented reality features as non-predominant for executing basic marketing strategies in Mexico City. Even though, this is an incredible technology for the majority of interviewees, another industry expert in charge of developing online media strategies, said the following:

Online media strategies are simply really important for every enterprise in Mexico City. Even though, mobile augmented reality is being really famous nowadays there is still too much to investigate in this field. Nintendo and many Japanese companies have tried to engage their virtual products to the retail industry with unsatisfactory results, keep in mind that reality is being modified and users may confuse information with actual features. In my experience other traditional techniques are much more affordable and efficient such as physical newspaper, flyers and many others. Many office managers are not being labor-efficient by using mobile chat applications in their jobs, and certain mothers just want to distract their little kids by giving their children new ipads to play with. There is social change between families especially in developed countries such as the US, Japan and UK, on the other hand many kids do prefer to use mobile augmented reality as an escape door, in a way of avoiding their parents' discontent. You must invest as a pioneer hoping for this technology to give your desired results in 20 years from now,

personally I think you may communicate that your business network is disorganized, therefore you need to reach this gap in order to build a coherent mobile augmented reality application. (Male, 31, Commercial Director, Online Media Business Company, Mexico City, Mexico).

The respondent's reactions criticize the lack of research in this area towards specific businesses, social disorders and misunderstood realities. He does not think there is a positive outcome of customer expectation by implementing AR in real estate developments, because there is too much to analyze at each company before executing MAR strategies. Experts in this industry require further analysis to develop real estate purposes. Social problems are dealt in this theme where communication problems are a big concern between online developers. 'So given limited screen real estate, they can distract attention from the task at hand. Thus custom interfaces can better encapsulate workspaces, action and other objects from specific complex tasks' (Kumar and Anil, 2012, p. 413). The focal point of this theme suggests it is pertinent to analyze distraction issues as realistic problems for mobile AR applications.

4.7.3 Hazardous

This theme was obtained by questioning the expectations of interviewees, where many of them pointed to risky situations that could harm their expectations. One of the respondents said the following:

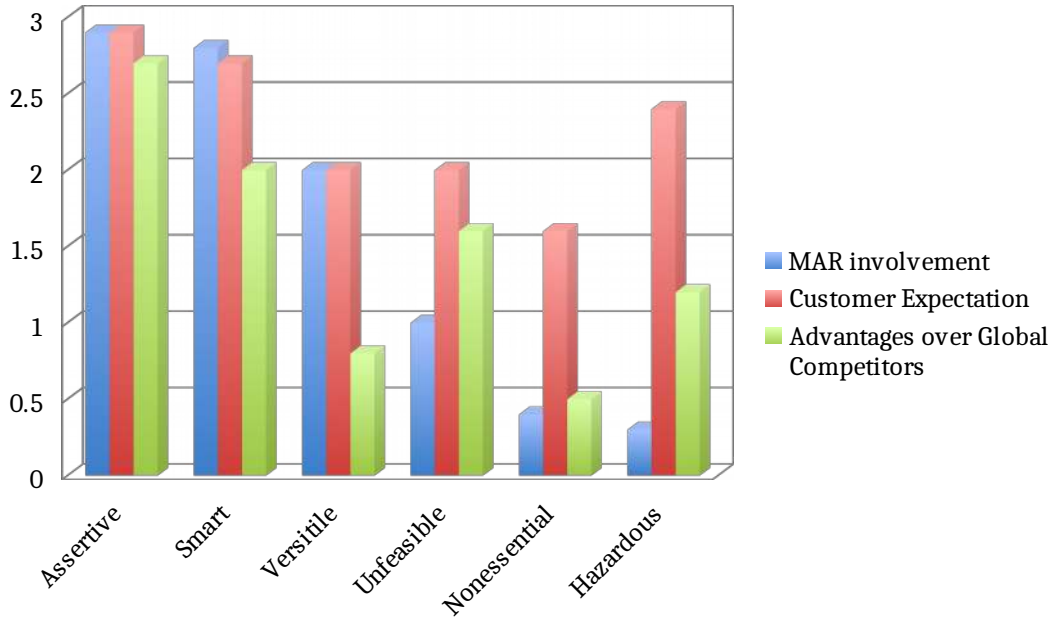
My job has given me the opportunity to admire social media growth in Mexico City, but focusing on augmented reality ads you may be able to transfer different capabilities such as; creativity, fun and interactivity. Customers get impressed really easy with new technology, such as implementing mobile augmented reality features to real estate projects. Nevertheless, from my personal opinion this could reflect low credibility with many risks involved. For example, new features may not be similar to the ones you remembered back then by using mobile augmented reality. It is as using avatars, for example playing The SIMS, where you know it is fantasy, but sometimes what you really want is a confident company selling you real condos. Therefore, I believe in traditional marketing strategies like flyers, or salesmen just outside the new building. There are many scams out there, and buying a new home is a difficult decision. (Female, 28, Marketing Manager, Social Media Company, Mexico City, Mexico)

This interviewee identified new threats in comparison to the other 2 untrustworthy themes, and her reactions focused on pre-sales risks, and false expectations. The intention of using interactivity such as an avatar gaming process reveals more problems to her than advantages. Even as an estimated cost, this is a lot to lose on a false image, and could lead to lengthy legal action against the builder or developer on account of false advertising (Legal Aspects of Augmented Reality: Projecting false images, 2013). This participant thinks there is a negative outcome of AR's participation in the real estate industry by giving just an idea and not a real product. Nevertheless, she perceives a positive customer by her experience with small companies.

4.8 Examination

Thematic analysis has helped this research to separate out different themes in order to observe the particular approaches obtained by 3 types of entities. Each respondent has explained their point of view after discussing with the interviewer the possibilities for mobile AR for the real estate industry in México City. The inductive approach manipulates the researcher's analysis to identify interrelations between the interviewees' activities and customer expectations in small and medium enterprises. The researcher allocated a numerical value from 0 to 3 depending on the interviewee's satisfaction level during the videoconference. The following graph illustrates such values.

Chart 7: Interrelation between MAR/CE/Adv vs. GC.



Source: The Author

The research has identified the assertive theme as the most important theme for influencing customer expectations, thanks to the evolution of mobile AR applications. The two respondents working in global corporations at Zurich and a German Manufacturer at Queretaro have given powerful feedback and positive expectation. Brand image for SME's raises provocative reactions towards experienced executives in this industry. The two interviewees detected a rapid link between mobile AR applications with high customer expectations by referring to the commercial developer as a financially strong company. The smart theme is characterized by identifying

mobile AR features and their possible automation at key processes. In contrast, the emotions and feelings expressed are not interrelated to give a globalized competitiveness to small and medium enterprises. Both respondents within this theme made suggestions for future real estate companies to attract customers using mobile AR applications. The versatile theme has related features with the assertive and smart selections. Nevertheless, the two respondents involved the use of mobile AR for their suppliers and other stakeholder in their organizations. One theme specifically referred to his competitor's clients, who use logistic mobile AR applications for their daily operations. The other interviewee noted that national realtors are competent thanks to their everyday commitment regardless of new uses involving AR applications. There are some positive outcomes regarding mobile AR, but both interviewees do not find a straight interrelation by improving the brand image. Instead they want to implement this type of technology for their stakeholders' necessities.

The unfeasible theme reacted positively towards the experiences of real estate negotiators, but mobile AR features were excluded. The advantages over global corporations are important for this interviewee as a regular potential buyer, where he reacted positively thanks to confidence issues and nationalist ideas. Nevertheless, gigantic tech companies are in charge of dealing mobile AR applications nowadays according to the vision of this advertisement agency entrepreneur. At this point, it is the first time that the researcher has detected an important decrease in mobile augmented reality involvement as a key dynamic capability for customer expectation. In the nonessential theme the online media entrepreneur refers to an "escape door" to the common social family problems nowadays, thanks to the mobile industry and customer's habits. Consequently, he thinks there is still too much to cover and investigate between the links of mobile augmented reality and real estate offers in Mexico City. He discards the connection between mobile AR as a dynamic capability for customer expectations. Global competitors are much more valuable for him by showing a closed form of communication. In contrast, the versatile theme shows totally the opposite. This theme is in charge of disconnecting and slowing relationships. The hazardous theme is characterized by reflecting the negative feelings of mobile augmented reality used for real estate applications; therefore the graphs show a low level of MAR involvement. On the other hand, the interviewee understands that certain operational changes and target markets may boost the use of mobile AR applications. The smart theme is totally opposite and risky ideas scare potential customers.

As a second phase of the interview, each interviewee answered 6 strategic questions during the data collection process and it is important to describe that the first question took place at the

beginning of the interview. Meanwhile the other 5 came along after mobile AR examples and a clear explanation of the hypothetical revelatory case. Appendix B contains the entire questionnaire along with the answers obtained.

The 3 types of entities react in distinctive directions. For example, the fifth participant from top to bottom reacts negatively by analyzing past experiences and customer expectation from 5 to 4 respectively, although, she fell into the smart theme categorization. She did mention that this is just a customer expectation and there are other important factors such as customer service and location. Meanwhile, only two participants could consider a future acquisition for strategic purposes if they could have a strategic decision of acquiring a new company with AR experience. There is also a positive interrelation within time-economy expectations and a strong financial allocation in new investment of mobile augmented reality applications. In other words, just those respondents selecting a high annual budget for MAR purposes have had a really good experience and customer expectation grade through the interview.

All potential customers, real estate companies and online media enterprises are open to discover new realtors in the moment they need to do so. The use of global corporations is not a unique advantage for them. The interviewees need on average a 3-star ranking in order to download a new app and just three of them were totally careless about this situation. Furthermore, contrary to what the researcher expected the untrustworthy themes are dominated by online media enterprises, maybe they knowledge in the tech industry is much better than the other two entities. This research is dealing with human beings and each one of the respondents has delivered valuable information for further conclusions.

4.9.2 Summary

First, this chapter has analyzed the findings by arriving at six different themes using an inductive process. Secondly, six themes were analyzed in relation to customer expectations, MAR involvement and the advantages of Global conglomerates. Thirdly, a complex analysis emerged contrasting past experiences with customer expectations and acquisition appetite. The subsequent chapter concludes the research by explaining the future outcomes of the obtained information.

Chapter Five

Conclusion

5.1 Introduction

During the last chapter, the research analyzed the findings obtained. In this chapter the outcome of the full thesis is being explained. Firstly, this chapter describes the evaluation of key findings, then research limitations, afterwards the research objectives are compared, and finally a set of implications, recommendations and future research provides the researcher's thoughts about the analysis of findings.

5.2 Evaluation of key findings

This research set out to observe the future capacities of commercializing MAR applications among potential customers, online media enterprises and real estate companies. The findings suggest an interrelation between feelings and emotions in customer expectation. The comparison allows seeking key success factors of brand expectations vs. last experience. The following are the main findings of this research:

- The 3 entities in MAR
- The 6 themes
- Interrelation between MAR, Customer Expectation and Advantages over Global competitors

5.2.1 The 3 entities in MAR

The real estate industry with augmented reality in Mexico City has had a potential of 344,711.30 million USD in 2013 with a CAGR of 90%. Mexico's industrial real estate market is largely tied to the country's automotive manufacturing market. The country has risen in the autos sector over recent years, thanks to strong export and production growth (Web.a.ebscohost.com, 2014). Mexico's car industry is a focal point for commercial real estate groups; therefore MAR's channels must attract potential buyers. The research has identified potential buyers as people who realize the real power of online commerce have met the arrival of mobile augmented reality (Gee, 2010b). Potential buyers are being analyzed during the thematic analysis and all of them being 3 out of 9 interviewees have chosen trustworthy themes.

"As demand for AR technology rises, more digital marketing software providers are entering the space" (Minsker, 2014, p. 12) other entities of this process such as online media enterprises, are adapting to rapid changes as well. The research has gotten 4 out of 9 interviewees as online media enterprises, where 1 of theme characterized MAR applications in trustworthy themes, meanwhile the rest have selected untrustworthy themes.

Real estate developers are planning to consider mobile AR as a new channel in their marketing strategy, thanks to the visual tendency and the incursion of global players. The expenditure relies on the future capacities of rapid adaptation in the commercial real estate industry. Therefore, the real estate companies are the last entity, where 2 of 9 interviewees participated in the research, where both of them selected trustworthy themes.

5.2.2 The 6 Themes

Inductively obtained by a thematic analysis, the different emotions and feelings have merged into 6 distinctive qualifications. The essence of each one of those themes is carefully explained in chapter 4. The six themes are interrelated as the key emotions, feelings and threats of each entity participating in this research. Therefore this research focuses on exploring Mexico City as an early adapter of this technology. Investing in traditional media with experienced marketers is not the same as adapting new solutions in a rapid ever-changing environment such as mobile applications with AR features. The first companies to invest in this new world of possibilities may acquire attention from future buyers who want to use these channels (Bonardi, 2013b). The total universe of key success factors is dealt in the trustworthy themes, meanwhile the untrustworthy themes deal within threats of MAR involvement in the real estate industry. The six themes participate in a particular universe of explaining the user which type of features is sought by the entities.

5.2.3 Interrelation MAR/CE/Adv vs. GC

The research has adopted strategic findings along its way, but there is no reliable meaning until the comparison of each one of them. Therefore, after analyzing the 3 entities and each one of the 6 themes during this research, the analysis has focused on the relationship between the three variables, where each theme gets a different result and this gives key information for an intelligent marketing plan. The research has found that the assertive theme is the most important for the target market, which is the first interviewee who works at an international manufacturer and was surprised by MAR applications. Nevertheless other themes such as; smart, versatile,

unfeasible, nonessential and hazardous have tailored features that use MAR applications amongst stakeholders. Extensive experiments with different subjects demonstrate that proposed scheme advances combine the state-of-the-art in AR with intuitive applications (Karlsson *et al* 2012b). Meantime, the spectrum of mobile AR concentrated in advertisement is exponentially growing in many industries such as retail, banking, education and museums, still there is too much to analyze at the real estate industry in Mexico City.

5.3 Research limitations

There is a huge field of possibilities thanks to powerful devices made by an industry giant such as the renamed 'Google Glass' a MAR device which functions as eyewear. There are many promises by Google glass and its competitors; consequently this may be a tremendous barrier in order to reach a profitable market. This study has not taken into consideration the difference between free mobile AR platforms, which could lead the research to another goal, yet the commercial universe of Augmented Reality in real estate is still really young. Szalavári and Gervautz (2012) think that the everyday tool handling experience of working with pen and notebooks is extended to create a three dimensional two-handed interface. Indeed, the AR universe has not reached the level of exponential growth that social media reached during the end of the last decade. Even though this research examined in-depth features by using a thematic framework, other approaches such as phenomenological or grounded theory can explain deeper issues regarding this subject. For example, there is a second reaction of real estate developers after perceiving customer satisfaction. Emotionally, Mobile AR services may offer stimulating and pleasant experiences, such as playfulness, inspiration, liveliness, collectivity and surprise. The user experience categories and user requirements that have been identified can serve as targets for the design of user experiences in terms of future Mobile AR services (Olsson *et al* 2013). The research is limited to analyze a one-period step, where any continuous conclusion would not be in-depth resolved.

5.4 Research Aims and Objectives

The addressed objectives will be analyzed according to the information discussed during the last chapter.

5.4.1 Customer Expectation in RE

1. – To review existing conceptual models and theoretical frameworks related to mobile augmented reality applications.

This objective was achieved according to the elaboration of Table 1 and Figure 2 in Chapter 4, where the six themes are described within a theoretical framework. Concept mapping encourages the group to stay on task and the results relatively quickly from an interpretable conceptual framework. The framework is expressed entirely in the language of the participants and yields a figure or pictorial product, which simultaneously shows all major ideas and their interrelationships (Trochim, 1989b). The research has concluded that the elaboration of a conceptual map comes from an integrated process of physiological analysis according to the actual situation of the MAR scope in the real estate industry at Mexico City.

2. – To analyze the impact of MAR applications in the commercial real estate industry.

This objective was achieved during the final part of chapter 4. The real estate Industry is a focal point for strategic development in Mexico City and the distribution channels must adapt to ever-changing environment. The 6 themes analyzed proved in general a satisfactory level of customer expectation from the people interviewed. Most of the key emotions linked to customer expectation were referred to nationalist principals of supporting SME's. The assertive theme showed the greatest positive evaluation of customer expectation yet their involvement in AR reflects a powerful financed corporation following confidence, seriousness and a powerful firm who can easily compete with global players. The smart theme gave tremendous advantages to how a problem-solved system can recreate the automation of solutions and the interviewees agreed that their expectation is interlinked but there are still too many factors involved along the process of a real estate purchase such as customer service and amenities. The versatile theme has shown acceptable results regarding customer expectation and MAR involvement. Nevertheless the interviewees had suggested such intuitive tools could be much more efficient for many of their stakeholders instead of just focusing on real estate needs.

The unfeasible theme is characterized by getting an acceptable customer expectation level, but with non-interrelation regarding mobile AR adaptations. Instead the interviewee expressed that the battleground is not yet built, and that Mexico City is just setting out with mobile AR technologies. The nonessential theme addresses the worst customer expectation with a low negative interrelation of MAR involvement, provoking communication problems between the salesman and the potential buyer. It also reflects networking problems and demonstrates a low competitive level toward global corporations. The hazardous theme has proven to reflect an acceptable customer expectation with good global competitiveness, but negatively correlated to

MAR involvement, in fact it shows terrible threats as fraudulent expectations, and inconvenient promises along with dangerous legal threats at the moment of delivering real estate.

3. -To evaluate de key success factors of MAR applications in the commercial real estate industry.

The objective regarding this question was achieved at Chapter 4, where the researcher identified repetitive factors among the 3 different trustworthy themes. These factors reflected the following:

- The enterprise reflects to be continuously updated
- Modern company
- The company invests in knowledge management tools
- Automation processes

By gathering this information, the researcher thinks that the marketing philosophy at real estate companies must change. The consumer relationship is narrowing to specific niches thanks to intelligent marketing planning. (Clarke III, 2014b).

At the same time the interviewees were asked to give special feedback regarding mobile application ranking at the App store or Google Play. The, the research analyzed important feedback from interviewees and most of them realize the importance of a good quality measurement by first users. Other detailed features were relevant in this analysis such as average time per application in the market, if such application has reached the top 20 in its niche, and most importantly comments and quality feedback from other users currently deploying a mobile application. Simonson and Rosen (2014) believe that many companies need to dramatically shift their marketing strategies, thanks to the rising power exerted on future customers by the opinions of old customers On the other hand, two participants rejected a minimum of 3 stars at the app store or Google play, in spite of just seeking their desired applications by mouth-to-mouth referrals.

4. – To recommend some frameworks on MAR applications, which could be used to improve the real estate industry.

This objective is achieved by customizing future frameworks of research projects. The researcher recommends to elaborate a pros and cons table, matching specific needs of a given segment and comparing such table with key success factors of MAR involvement in the real estate industry

(with its conceptual map). This type of analysis leads to an efficient marketing plan for real estate projects.

Based on Appendix C none of the interviewees analyzed prefer multinational providers instead of SME's. Nevertheless, they admit every company with wide arms open, at the same time the expressed a lack of commitment toward these two types of companies, contrary to the expected results. The researcher has perceived that many participants prefer to do business alone with private investors. A closed relation between buyers and sellers reflect a rapid adaptation of key necessities with economic benefits of avoiding commission fees.

The researcher recommends including the mobile AR channel as a new form of approaching young buyers. Just one out of 9 participants, did not choose to allocate financial resources for their MAR marketing strategy. Meanwhile 3 of them have decided to invest less than 30% of their annual expenditure ($390,000 USD). One way to ensure timely agreements is to anticipate alliance, for which a trigger moment is key (Fernandes *et al* 2012b). As a diversification strategy the researcher recommends that this investment should take place in different platforms taking advantage of the expertise by Aurasma and participating in early adaptations of the Google glass project. Vertical backward integration is not recommended due to the early stages of mobile augmented reality adaptations.

5.3.2 Research question

The research question is discussed by analyzing the objectives and processes of this investigation.

1. - Is there a better customer expectation than last experiences if potential buyers planning to acquire commercial property perceive mobile augmented reality features, in their desired ads at Mexico City?

There is perhaps a higher customer expectation especially in specific niches such as luxury condos or huge commercial developments with retail companies involved. If the architect seeks to communicate modern, futuristic and technological feelings this channel will be useful in the near future. Today's mobile customers have begun to create their own customized relationships with organizations. This transformation has caused a paradigm shift in a relationship once built on static (Coussement and Teague, 2013b). The communication of ideas and spaces is at the forefront of real estate companies using this particular tool. On the other hand there are many parallel threats if this is not planned and questioned, such as transmitting fears and uncertainties to first time buyers. Curran (2013) thinks that commercial clients are traditionally older, less tech-

savvy, and more methodical in buying real estate. The hazardous theme has explained possible scams in Mexico City with last experiences of known friends of this interviewee.

5.4 Implications

The findings of this study have created a framework to fight uncertainty when commercial real estate companies want to adapt military technologies such as the current situation of mobile augmented reality. An extensive conceptual clarification of mobile augmented reality has given this research a unique point of view, and the methodology offered a qualitative approach to find out about the feelings and emotions that strengthened the research question.

This research helps to evaluate the positive and negative outcomes regarding the typical question of every marketing manager at a small company. The dilemma is whether or not to invest in new mobile AR channels. By carefully analyzing the different themes the research shows the key advantages and disadvantages of using this type of technology for future real estate projects in Mexico City. Mobile AR is a tool with powerful features and a technique that may resuscitate real estate projects with a powerful customer expectation along with global competitiveness. Industry pioneers are rethink about this situation for example; commercial researchers at Qualcomm in particular appreciate this since the largest application opportunity for AR is interactive marketing, advertising, and sales. Different types of AR marketing can add value to the product itself, either in the form of an enhanced product or a more engaging viewer experience (Gervautz and Schmalstieg, 2012). Interactive marketing allows any customer to customize and discover unsheltered features of his or her desired property. The essence of connection between buyer and seller is growing with these types of applications for the real estate industry.

Avery (2009) compares an X ray vision with the new capabilities of adapting MAR applications in mobile phones. The meaning of using this model permits the future customer to scan the real estate from the inside without even getting out of a car. Therefore, the use of this framework permits a healthy marketing plan, which can moderate new market risks in MAR applications.

5.5 Recommendations

The research has shown the advantages and disadvantages of AR adoption. The six themes deliver a comprehensive tool to analyze if the potential target market of a given real estate project could be interested in using mobile AR as another form of communication.

The researcher recommends using this technique for pre-sale at luxury holiday condos, where there are language communication barriers. For example, AR may motivate a Canadian couple buying a retirement property in Coyoacan at México City. A new industrial park dedicated to Chinese companies in Toluca is another example. As soon as they visit the first phases of the pre-sale any salesman with low levels of English or Chinese can show them a virtual example with a realistic landscape. These examples are mentioned in order to demonstrate by long distance communication the real power of mobile augmented reality tools. The researcher also recommends a hand-tailored mobile augmented reality strategy for each real estate project, evaluating threats and opportunities.

5.7 Future Research.

There are still many areas of research within real estate and modern MAR applications. The future research can treat other aspects of these entities, such as; self-identification of mobile real estate applications. Technological companies must answer questions like: How products within real estate can be transformed to a MAR platform? The future research must get an idea that real estate should not only be the object analyzed, but also a super computer with adapted MAR features. For example, a person might be washing his car and start to pre-heat the oven at the same time just touching over a certain virtual spot on the wall. In our ever-changing Internet environment, academics think different platforms will arise. Caught in the transition from the personal computing era to the ubiquitous computing paradigm, multimedia producers in many fields will need to adapt to AR platforms (Tinnell, 2014). The uses of MAR are changing our everyday habits. But, those ideas should be tested in order to have success in information technology.

5.8 Summary

The final chapter explained a comprehensive effect of MAR in real estate marketing strategies. The final comprehension allows different frameworks for strategic purposes. Consequently, the research question was answered with implications, recommendations and future research. Therefore, the dissertation was able to exhibit how MAR in real estate marketing creates a flow of young customers who might be the biggest leaders of tomorrow’s organizations in Mexico City.

Appendices

A) Top 14 Mobile markets

Country	Mob Subs	Population	%/Pop.	3G/4G subs.	3G/4G %/Pop
World	6,587.4	7,046	93.5%	1,876.6	26.6%
China	1,246.3	1,351	92.3%	448.3	33.2%
India	893.3	1,237	62.5%	41.95	3.4%
United States	345.2	313.9	110.0%	287.4	91.6%
Indonesia	285.0	246.9	115.4%	45.5	18.4%
Brazil	272.6	198.7	137.2%	110.2	55.5%
Russia	237.1	143.5	165.2%	41.2	28.7%
Japan	137.9	127.6	108.0%	108.8	85.3%
Vietnam	127.7	88.8	143.8%	18.0	20.3%
Pakistan	126.1	179.2	70.4%	N/A	N/A
Nigeria	175.0	168.8	76.2%	12.7	7.5%
Germany	113.6	81.9	138.7%	46.0	56.2%

Bangladesh	116.0	154.7	75.0%	34.6	22.3%*
Philippines	109.5	96.7	113.2%	16.6	17.1%
Mexico	102.7	120.8	117.6%	19.8	16.4%

Source: Mobithinking.com, 2014

B) Questionnaire

1. From 1 (terrible) to 5 (excellent) how would you rate the last real estate experience involving a new acquisition of commercial property? Did you reach a national realtor, global corporation or none of them?
2. Imagine that you want to download a new mobile app regarding real estate. How many stars would be an acceptable ranking in the App store or Google Play? Why?
3. You have good recommendations from family and friend regarding global conglomerates dedicated to real estate. Nevertheless a new link shows you mobile augmented reality features. Would you plan to consider this small company for a future visit?
4. If you have had a positive answer at question number 3, please give me the following feedback: From 1 (terrible) to 5 (excellent) how would you rate customer expectation? Emotions Feelings?
5. Now, you are dealing with capital budgeting as a Real Estate/Realtor company. You must allocate financial resources to your annual marketing expenditure plan using only $390, 000.00 USD per year as your 100%. Which percentage should be accurate for mobile augmented reality expenses?
6. If you have a chance to acquire a small company for the same budget, would you do it? Do you expect long-term economic benefits by doing it?

The data obtained during this investigation is explained in the next table:

C) Customer Expectations and Vertical Backward Integration.

Theme	Entity	Gende	Q1	Q2	Q3	Q	Q5	Q6

		r Age				4		
Assertive	P. Buyer	F. 24	4 Real E	4 stars	Yes	5	60 %	No
Assertive	R Estate	M.28	5 Glob	1 star	Yes	5	30 %	No
Versatile	P. Buyer	M. 27	4 Real E	4 stars	Yes	4	20 %	Yes
Versatile	R Estate	M. 47	5 Real E	2 stars	Yes	5	50 %	No
Smart	O Media	F. 27	5 Real E	4 stars	Yes	4	30 %	No
Smart	P. Buyer	M. 31	2 Real E	3 stars	Yes	5	60 %	No
Unfeasible	O Media	M. 25	5 None	4 stars	Yes	5	35 %	Yes
Nonessentia l	O Media	M. 31	2 Real E	3 stars	Yes	3	0%	No, N
Hazardous	O Media	F. 28	2 None	4 stars	Yes	4	55 %	No, No

Source: The Author

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