Real Estate using AR, VR, DR, Geo-referencing and other mobile applications

Teresa Florentino*

*Escola Superior de Atividades Imobiliárias (ESAI), Praça Eduardo Mondlane, 7 C 1950-104 Lisboa, Portugal

Abstract

Purpose - The use of Mobile Applications, Geo-referencing, Augmented Reality (AR) or Virtual Reality (VR) brings knowledge and understanding of how we possibly deal with Real Estate (RE) nowadays. Clients want fast access to information, real details, and sometimes a sample of a tour.

Design/methodology/approach – In this paper, first it is analysed in some interviews with owners of small and medium enterprises in RA. Then it is presented some pieces of evidence on the use of those technologies and applications. Finally, we point out some conclusions, some limitations and recommendations for future studies.

Findings – The AR and VR technologies and new applications for personal computers (PCs) or mobile engines are rising sharply in the area of medicine. We also see some advances in architecture and the exhibition of properties, in particular in views of interiors, guide visits to apartments, or houses. These issues can easily be into the RE.

Practical implications – Including Mobile Applications, Geo-referencing, AR or VR in RE business we can expect a better understanding of what consumers want, accurate details or proximity with a real word in a near future.

Originality/value – We have few investigations both in RE and very new Technologies and Mobile Applications, mainly looking towards clients. Few articles are referring to those applications in RE and considering Portugal studies are rare. This kind of research should be more frequent and compared, as possible, with other countries and other situations.

Keywords: Real Estate ICT, Mobile Applications, Augmented Reality, Virtual Reality, Digital Reality, Geo-referencing

1. Introduction

Real Estate is one of the most sectors in Services that can absorb the new technologies, and so this article focuses on technologies such as AR, AV, and Apps that are likely to generate better business to do in Portuguese Real Estate, as a case, and in general, as expected.

With this article, we intend to write about what new exists in the Market regarding technologies and well serve Real Estate, and that effortlessly and practically can leverage the sector.

We begin by referring to what there is in the little literature on the current theme of AR, VR and mobile, but we will explore some more.
As a methodology of this scientific article, we will interview some Owners/CEOs of Real Estate enterprises to know what they think and know about these subjects/technologies and their use to improve their business.

In the end, we revealed the study, showing the strategies, perceptions and other understandings of these technologies in their companies.

2. Approach to this article

The methodology used in this article is Case Study of some Real Estate companies in Portugal, with the technique of collection of information, in the field, based on interviews with Owners/Administrators in the Real Estate sector company or similar. The revelation of what they think, perceive and their perception will be the object of our study. When interviewing Portuguese businesspeople, we can express what they believe in and feel for the future of these very current issues, and sometimes unknown in many companies in Real Estate.

According to (Marconi and Lakatos, 1999, p.94), the interview as a study technique is a “meeting between two people, so that one of them obtains information about a certain subject” having advantages and disadvantages, (Barbosa, 1998). Even with a low rate of responses, it assumed that this type of study would be an exercise of analysis of the results, where the conclusions from this type of research will oblige us to double cautions but do not in any way compromise its validity, (Reis, 2011).

The issues AR and VR can be found in yearly days finally of last century. An article from (Azuma, 1997), “A Survey of Augmented Reality” referred that “Augmented Reality is far behind virtual environments in maturity. Several commercial vendors sell complete, turnkey virtual environment systems. However, no commercial vendor currently sells an HMD-based Augmented Reality system. A few monitor-based "virtual set" systems are available, but today AR systems are primarily found in academic and industrial research laboratories. (...). The first deployed HMD-based AR systems will probably be in the application of aircraft manufacturing. Both Boeing (Boeing TRP, 1994; ARPA, 1995) and McDonnell Douglas (Neumann and Cho, 1996) are exploring this technology”.

3. Some new technologies: AR, VR, APP for mobile equipment

In a recent report, (Goldman Sachs, 2016a) predicted that the VR and AR hardware market would touch $80 billion by 2025. Also, renowned magazines such as (Forbes, 2017) and (The Economist, 2017) have been highlighting the growing importance of AR and VR. This last one aims to leave users in a convincing but artificial world. In other hands, AR adds the real world, by putting useful or entertaining computer-generated data on it. This overlay can be a map with notes, or a reminder about a meeting, or even a virtual alien with a lightning gun, ready to explode. Despite the recent enthusiasm and emphasis on VR, people tend to spend more time on real realities than computer generated ones. Virtual and augmented realities are yet to be explored in the Real Estate sector, (Ullah and al., 2017).

3.1. Some definitions of AR and VR

Virtual Reality and Augmented Reality are among the technologies making a transformational impact on numerous activity sectors. Together, the two technologies account for an enormous market, also with other technologies like virtual tours - 360º or geo-referencing.

3.1.1 Definition from (Deloitte, 2017)

- Augmented Reality has some characteristics like overlays digitally created content into the user’s real-world environment. Features include transparent optics and a viewable climate in which users are aware of their surroundings and themselves.
• Virtual Reality (VR): Creates a fully rendered digital environment that replaces the user’s real-world environment. Features body and motion-tracking capabilities.

• Digital Reality (DR): An umbrella term for Augmented Reality, Virtual Reality, mixed reality, 360°, and immersive technologies (immersive technology refers to technology that blurs the line between the physical world and digital or simulated world, thereby creating a sense of immersion, (Dorrier, 2017).

3.1.2. Definition from (Spotlighted, 2017)

• Virtual reality is an immersive experience that transports the user into an imaginary world in three dimensions (3D) created by a software program inspired, as much as possible, by reality. It generally requires the use of a headset into which virtual objects (e.g., images, videos) projected and with which the user can interact in real time.

• Augmented reality consists of enriching the real world with virtual information created by a software program with the objective of intensifying the user’s understanding of and interaction with his or her environment. It usually involves the use of special glasses, a computer, tablet or smartphone to which virtual information has been added to provide further information to the user. In this regard, the sense of vision, in particular, is brought into play.

• Mixed reality, also known as hybrid reality, is an environment in which objects from real and virtual worlds can co-exist and interact. Mixed reality requires the use of a device, such as glasses with transparent lenses, to visualise virtual objects expected in the form of holograms. Mixed reality is the next evolution in human, computer, and environment interaction.

3.1.3. Definition from (eMarketer, 2017)

• Virtual reality (VR): VR fully immerses a user inside a no fixed visual environment, such as a virtual world or experience”. Examples of VR include 360-degree videos, photos and product demos via any device (e.g., connected TVs, desktops/laptops, mobile devices and headsets that let users navigate through the experience), and games via head-mounted displays (HMDs). Examples of VR headsets include AuraVisor, Google Cardboard, Google Daydream View, HTC Vive, Oculus Rift, PlayStation VR and Samsung Gear VR.

• Augmented reality (AR): AR enables a user to interact with virtual objects and other types of digital information that overlaid over the real world”. Examples of AR include filters for videos and photos (e.g., Snapchat Lenses); games (e.g., Pokémon Go); navigation (e.g., heads-up displays [HUDs]); interactions with objects (e.g., Blippar, HP Aurasma); and 3-D product demos and projections via headsets and smart glasses.

3.2. Examples of Applications from (Spotlighted, 2017)

Table 1 - In Virtual Reality

<table>
<thead>
<tr>
<th>Fields</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education/training</td>
<td>Use Virtual Reality for technical training purposes or state-of-the-art training of future medical personnel, notably concerning specific surgical procedures.</td>
</tr>
<tr>
<td>Real estate/Interior design</td>
<td>Stage a virtual visit of a future residential unit before a Real Estate project is completed.</td>
</tr>
<tr>
<td>Health</td>
<td>Offer behavioural therapies geared to persons with conditions such as depression, anxiety, phobias and schizophrenia.</td>
</tr>
</tbody>
</table>
Table 2 - In Augmented Reality

<table>
<thead>
<tr>
<th>Fields</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail trade</td>
<td>Using a tablet equipped with Augmented Reality, the user can visualise an article of clothing from all angles and personalise its design (style, colour, etc.).</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>Augmented reality glasses make it possible to be there at every step in the manufacturing of a product. Employees are thus able to know all the tools required to design the product and reproduce the steps involved in manufacturing it.</td>
</tr>
<tr>
<td>Tourism</td>
<td>Augmented reality lets the user discover the history of a place or a work by pointing a smartphone camera at it.</td>
</tr>
</tbody>
</table>

According to the firm (Goldman Sachs, 2016) three sectors – video gaming, live events and entertainment – will be the chief beneficiaries of this growth. These technologies will be used, increasingly, in other strategic sectors, including in Real Estate, health, logistics and distribution, education, defence, and engineering. The RE also has a slice of $2.6 billion. See Graphic 1.

Exhibit 4: Our 2025 base case VR/AR software assumptions by use case

Source: Goldman Sachs Global Investment Research

Graphic 1 - Preview AR / VR. Goldman Sachs 2016.

For IDC de Worldwide revenues for AR and VR will have a huge increase in 2020 and 2021. See, Graphic 2.
Resuming and simplifying: AR is a technology that shows to users more than you can think about the product or service and VR put you in the scene and make you a personage on the stage.

3.3 Geo-referencing

The coordinate system of a map or aerial photo image can be related to a ground system of geographic coordinates. Real Estates had already used this technique to show their apartments. Some easy tools like Google, ArcGIS or Georeferencer, can be useful in this field. Nowadays, these tools can be the usual tool in RE.

3.4. Games and education

The games have been the engines for the advancement of AR and VR and with their advances in perception schemes, achievement of targets, brands, strategy among others, have allowed the evolution of technologies for the fields of medicine, Real Estate, Sales and Marketing of products as well as Marketing of Things and Products.

Consumer-oriented investments in gaming and entertainment continue, but increasingly the real action is happening in the workplace. IDC estimates that industry AR/VR use cases that will attract the most significant investments in 2017 are onsite assembly and safety ($339 million), retail showcasing ($250 million), and process manufacturing training ($248 million). IDC also projects that the investment in AR/VR gaming use cases, alone, will reach $9.5 billion by 2021, (International Data Corp., 2017).

In their article (Machado and al., 2011) said, “One of the technologies for developing serious games is Virtual Reality which offers 3D computer environments with advanced interaction capable of providing high levels of motivation in the learning process. In the context of medical education, such applications present a niche that has received relatively little attention, considering their relevance and potential impact on society. In their article, they present serious games based on Virtual Reality as a proposal for teaching specific contents in the medical field and how they developed in recent years, their components, characteristics of development, and potential and opportunities for research, development, and business.”
3.5. Business use

In 2016, Boeing, a major American aircraft manufacturer, described how it was using AR glasses to give workers in their factories instructions on how to assemble components as well as to verify that the work had been correct. The result, said Paul Davies of Boeing’s research division, is faster work with fewer mistakes.

HoloLens has Augmented Reality applications with the contribution of lenses. HMDs (the head mounted display) with either VR or AR will have great potential in the field of surgery. Their functionality has the potential for benefit in a range of clinical settings across the Microsoft Deployment Toolkit (MDT) and medical education. Innovations like Microsoft HoloLens and the emerging mass market of VR headsets would indicate that these technologies would become familiar to surgeons and inevitably we will find a way to integrate them into our day-to-day practice. The digital surgical environment is about to change drastically, (Khor, 2016).

Company (Deloitte, 2017) explores cases of Retail, Travel, Leisure and Real Estate companies. For example, “Estée Lauder has launched a virtual makeup mirror on its Web and mobile sites that adjust light, skin texture and brightness so users can virtually experience product colour using their photo or video at alive”. Museums as Louvre and others have virtual tours on its website predicting the way for further use of VR and AR.

3.6. Real Estate (RE) Sector

In 2017 Deloitte published an article on the trends of digital reality technologies shortly, and the context of Construction, Urbanism, and Real Estate referring how these sectors could increase the improvement of the conception, perception and final results using those technologies.

Associated with RE are the Engineering and Construction and one of the successful cases in Finland is the Gatur method which consists in involving residents in town planning and use the interaction between public authorities and citizens, (Kosnt-Laakso and Salminen, 2010 in Olsson, 2012). The idea is to perform a walking tour with residents or other stakeholders along a defined route. During the trip, questions and opinions asked for about surroundings. After the visit, they all discuss and sum up outcomes, (Olsson, 2012).

Consider the top two hurdles of the average Real Estate agent:

- Agents have to manage the time it takes to go from one visit to the other, dealing with traffic among other elements out of their control.

- The most commonly heard phrase in Real Estate is, “It doesn’t look like the pictures.”

For Real Estate the most significant problem will be the costs, both of the purchase of equipment for 360º video recording, and of the time to cover all the offers, as well as the management of the products that are being bought and sold. However, (Goldman Sachs, 2016) believes that even with RV technology costs of 10% a year, there will be a return on commissions and there may also be changes in the business model. Even so, a Virtual Tour can be done with technological resources, having for this purpose several free programs like Animoto, SeekBeat, EYESPY360, LifeTour, etc.

Forbes in 2017 said that there are at least three approaches to VR related with RE:

1. Guided Virtual Visits: This is mainly just like a promotional video, except that it produced and shot in 360 degrees. This method works wonder for existing properties. For properties still in construction, VR will be a ground-breaking tool for Real Estate agents, as they will be able to show unfinished projects like never before. It can be storytelling mixing different types of devices using 360-degree photography, video footage and 3D renderings.

2. Interactive Virtual Visits: To take virtual visits to the next level, the experience can be made interactive through movement determined by the user. It is merely the experience of a lifetime from the perspective of the buyer. Considering that most of the population has heard, but yet to try out VR, the effect will be mind-blowing. This experience needs to be “housed” (pun intended) in a mobile app. By keeping your sight on the
hotspot, you are transported to where the hotspot is located, allowing a virtual walk-through of the property at your own pace.

3. Virtual Commerce. Take the interactive virtual visit described above and add the ability to make custom changes to the home, just like e-commerce except this is now virtual commerce. The Real Estate industry should be the first to jump at the chance to adopt this: The interactive virtual visits, because of their technological requirements, need to be housed in an app.

In the past year, AR has been gaining traction in the Australian Real Estate industry with the launch of a few Augmented Reality Real Estate apps to streamline Real Estate marketing as well as home styling and design, (Propertyme, 2018). IKEA Place “thanks to augmented-reality (AR) technology and launched in the autumn of 2017, the IKEA Place app lets customers see exactly how more than 2,000 furniture items would look - and fit - in their homes”. Curate by Sotheby’s International Realty allows consumers to visualise a house as their own before purchase, thereby curating the home buying experience.

Virtual Reality (VR) has become so accessible that it’s on track to becoming a 29.7 billion dollar industry in 2020. “With VR, potential buyers and renters can virtually tour the property from anywhere in the world, at any time. It means that the property is open for inspection 24/7, allowing agents and clients to save time and money while increasing efficiency and engagement. Meanwhile Augmented Reality (AR) apps superimpose a computer-generated image of an object into real life, allowing people to do things like capture Pokémon or virtually decorate a space using their phones or tablets”, (Propertyme, 2018).

In Real Estate, and concerning cartography and geo-referencing, Augmented Reality can provide great “visualisations” of future perspectives. According to (Souza, 2016), his studies were positive during the cartography tests, “The results of the experiment show that the teaching-learning process in the area of cartographic is a suitable ground for the performance of AR, becoming a starting point for the development of an augmented cartographic base map”. With AR, there are opportunities to present an increased cartographic base, such as relief, showing the forms and features in the visualisation of contours, digital terrain and surface model, and topological relationships, with a margin for better viewing of toponyms (hill, mountain range, valley and others).

4. Collected data and results

Our study combines the projection of new emerging technologies, AR, VR, DR, among others with questionnaires to administrators/owners of five Real Estate companies or related to this sector. Portugal has mostly franchising or small investors in Real Estate. In this case, we only choose the owners of small and medium RE enterprises.

Social Questions.

From our collected data we have from the top Administrator, one man and four women, average 48 years old, Higher Education level and an average of 25 years in Real Estate business, specifically in: Asset Management and Real Estate development; In Real Estate Real Estate Mediation and more recently in purchase and sale and rehabilitation and construction of real estate.

Specified questions related to the subject - Responses resume

What type of these applications do you know?

Glasses for virtual visualisation, 3D drawing and some applications for mobile phone in the scope of Real Estate; Facebook, Twitter and blogs; I know some, though I do not use them. My knowledge is little practical level.

How do you see the emergence and adherence to this type of applications?
• All tools that replace communication or part of it between the operators of an organisation and its customers, suppliers or any third party, must be implemented as soon as possible because more and more spoken or even written language is less precise and so it gives rise to growing misunderstandings. This type of applications, since well parameterised and the information is complete, will provide the information to the recipient much more comprehensive and rigorous;

• The adhesion by the companies of this branch to applications / social networks to make known their offer, as well as their work.

• Adherence to this type of depends on the money we will have to invest.

What advantages and disadvantages can point to this type of applications (by the variety of forms)?

• “I do not think there are disadvantages since, and I repeat, the parameterizations are done with rigour and assertiveness. Otherwise, we will exponentially multiply errors and inaccuracies. Let’s look at our heritage management activity with 700 housing units, every month we have an average rotation of 30 units entering the rental market through the traditional advertisements, i.e. with photographs the potential tenant can get an idea of the apartment. However, if we apply SketchUp images to scale the client can virtually enter within the divisions take measurements and check if the furniture they have or intends to buy fit. In these days, the most wanted stores like Ikea already have all the measures in their virtual catalogues. Let’s imagine a client who has been moved from Lisbon to Porto and will have to furnish his new house, to be able to do it at a distance, we will naturally be at an advantage concerning the competition, and still, the client has not left the chair your home”

• Advantages of all of them: Gain greater visibility; increase demand; increase reach; creates greater contact between company and customer and facilitates communication with them. Disadvantages of all of them: it consumes a lot of time; we must be very present in the social networks, and we must always be updating the offer.

• Since I know little about these applications, I can add little.

• The app is practical in our industry, but I can give you the example of my company. This app in question is useful because the commercials have access to information on the street without relying on the store coordinator, but our fear is also this: access to any information anywhere and without supervision.

• The database is always something we want to protect.

What kind of role do you think these applications will have in the Real Estate business (by type of applications)?

• “If we think about the promotional activity, imagine what it is that the promoter himself creates from his office with his PC the first image of what he is thinking, see if it fits on the ground, shape immediately the limits that the law imposes for the area, etc. How many meetings have been spared with the architect, how many objections have answered at once, and endless advantages, saving time and money?”

• Promote the activity and work of the company and fundamentally establish a more significant connection with the public.

• “In my business (mediation) the app represents a useful tool and that after due adjustments, something to use”.

• VR and AR, depending on the investment can be used in rehab and construction.

Are you currently using any of these applications/tools?
No, “as I said before that the introduction of some of these technologies require time and knowledge that I think few companies have the resources to do, in this time all the human resources of Real Estate companies are allocated to the activity and cannot be deviant, however much it might boost the work.”

No, “When we contact institutional IT companies, Microsoft agents or others are completely unaware of this type of applications. “

No, “I did not find any company in the market that provides this service, one thing is to give continuity (maintenance) that yes, it is simple, with one or two hours of training anyone does, but see our case as we put in Virtual Reality 700 plants? “. “Simple as APPs are already being thought out and will be implemented later this year”.

Yes, essentially Facebook.

In AA Company, app usage is in tweaks. In AB Company, virtual reality is something that I would like to have.

(if the previous answer is affirmative)

What motivated the company to use these tools?

Facebook, because it is one of the most used social networks at the moment, to also have greater visibility and reach a more significant number of clients.

How often do you use it? (scale response)

a) Is the use widespread? Accepted
b) Is it frequent?
c) Is it infrequent?
d) Is the use of rare?

(if the previous answer is negative)

Are there any predictions about using Apps, AR and/or VR?

- Apps, this year, the others only if external service providers arise.
- Apps are in the settings and the other I am analysing because I think it is worth.
- I do not know when to invest.
- I do not know.

Do you know any companies in your sector that already use these tools?

- Many APPs, the others appear in small structures or very centralised in a mono product.
- Yes, almost every Real Estate agent.
- I’ll use at least Facebook.
- I do not know.

What is your foresight for the future of these tools in the Real Estate Sector?

- They will be widely used, heavily enforced, but labour is required to address the issue of entering each organisation’s data into the respective application.
• Of course, things change and evolve, and the use of certain applications / social networks lose interest from the public, companies are likely to be using new apps and social networks and not the ones they use today.

• I do not know.

5. Conclusions

One of the main findings from interviews is that they know about new technologies, they use some of them but for a more expensive step they think there is too much money involved and it represents a considerable effort in human resources and pays for their enterprise.

In (Florentino and Casaca, 2013) paper about Social Webs in Real Estate, it looked like the same. Everybody wants to enter in new technologies, but the cost is too much. Presently seems the same for new technologies as in last years for social webs. We may say that is a lack of human and financial resources, especially for small enterprises that can squeeze the exploration of the new technologies.

The future sure will adapt their technologies and price to reach their customers. Our interviews can accept new technologies, they know something about that, but they have to adjust their costs to use these tools.

6. Recommendations

Some more studies with this format should be done in coming years and comparison with others small RE enterprises in Europe or Worldwide. Comparison with other countries will be a must, particularly in small and medium enterprises.

7. References


Dorrier, J., (2017) The next great computer interface is emerging—but it doesn’t have a name yet [Online]. Available at https://singularityhub.com/2017/05/21/the-next-great-computer-interface-is-emerging-but-it-doesnt-have-a-name-yet/ (Accessed: 30 July 2018)


