An Investigation of Real Estate Technology Utilization in Technologically Advanced Marketplace

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Abstract
Recently, digital technology has made its way into the property market, but the applications of new interactive technologies such as Virtual and augmented realities are yet to be explored in real estate sector. The literature in this area is scarce and thus provides an impetus for thorough exploration. This paper systematically reviews the state of the art technologies in the real estate websites of the US and Australia. It presents a SWOT score matrix including the advantages and functionalities of the Real Estate Technology (RET) such as Virtual and Augmented reality, 3D laser scanners, 360 cameras and walk-throughs along with technology adoption capacity of the websites. Based on the scored matrix, the paper discusses future trend in real estate industry taking user's perspectives into account and highlights the need of Technology Adoption Model (TAM) for real estate property management. A total of 10 websites: Top 5 visited websites each from Australia and the US were selected for a systematic analysis based on the SWOT based Rubric of focused disruptive RET use, neighbourhood insights, nearby facilities, virtual tours, total results and minimum price. These assessments are made by comparing search results of Mascot Sydney and Laurel Maryland. The results, based on comparative analyses and novel SWOT scores matrix, are expected to pave the way for developing TAMs in real estate management that so far, is non-existent considering available literature. In future, the matrix can be expanded to include customers and websites from both developed and developing countries and a holistic TAM can be proposed to add both theoretical and practical value to real estate body of knowledge.

Keywords
Technology Adoption Model (TAM), Real Estate Technology (RET), Real estate websites (REW), SWOT Rubrics, SWOT Analysis

1. Introduction

Globally, there has been 11.4% increase in housing market since 2008 (Chandler, 2016). In 2017 alone, there has been 1.8% increase each in the houses and other dwelling such as units, apartments, and condos (Chung, 2017). As per the report of Gold Coast City Council (2003) there will be a growth of as much as 80% residential area into the suburban areas by 2025. Such a high magnitude of residential growth makes real estate management even more important than before. As far as the use of internet in real estates is concerned, A survey of existing homes residents by National Association of Realtors (2017) highlighted the use of internet by 56% people of the age of 36 and below, and 50% from 37 to 51 years. Similarly, a drastic figure of 86% is quoted for usage of internet by new home searchers (Jackson, 2017). This high percentage of usage calls for investigation into technology usage and adoption frameworks in real estate

management and its websites with the websites being pivotal in customers interaction and real estate selection.
With the advancements in construction technologies and era of smart cities, disruptive and advanced technologies are making their way into construction and real instate industries (Ullah et al., 2016, Sepasgozar et al., 2016). These technologies include the use of GIS based Navigation tools, Real time locating systems, 360 visualization and Virtual and Augmented Realities (Guo et al., 2017, Lee and Lehto, 2013). Real estate is gradually adopting the technologies such as 3D videos and 360 imageries, but the state of its websites requires considerable improvements to be termed as state of the art (Richardson and Zumpano, 2012, Arndt et al., 2017, Yang et al., 2017). Currently, as per UABank Australia survey (2015), 33.3% Queenslanders spend 4-6 months for accommodation searching, 14% Victorians spend 7-12 months whereas 36% South Australians spend over 6 months for this search. In general, 9% Australians spend over 2 years for searching a reasonable accommodation. Similarly, in a survey conducted by Zillow.com (Black, 2017) for the US, 51% respondents quoted finding information and use of the website as the most difficult part. These statistics display the need of technology adoption in REW to reduce the search time and help customers find a home quickly, swiftly and as per their needs (Rauniar et al., 2014). Thus, customers' perception is pivotal to the current study along with the types of technologies to be used and their adoption frameworks.

To cope up with modern age technological and internet requirements, real estate needs to transform from traditional to smart real estate management however in its current state, the literature and frameworks for the use of disruptive technologies in real estates are non-existent. In this context the use of sensors to update REW in real time, disruptive visualization technologies: 3D Modelling, Virtual Reality (VR), Augmented Reality (AR), 360 cameras, Indoor Scanning Technologies: Laser scanning, cloud generation and Data generation: Big Data, Internet of things aspects are not explored (Ekman et al., 2016, Ainsworth and Ballantine, 2017, Agrebi and Boncori, 2017, Christensen et al., 2016, Huang and Wang, 2005). Further, due to the growing demands, the theoretical frameworks required for incorporating such advanced and disruptive technologies do not exist in real estate management. This study revolves around the incorporation of disruptive technologies in real estate management. Specifically, it addresses the need of Technology Adoption (TA) frameworks for REW and its dynamic updating using latest disruptive technologies. It uses Strength Weakness Opportunity Threats (SWOT) analysis for introducing SWOT score matrix that assign values to REWs based on its strengths, weaknesses, opportunities and threats to highlight the current state of top 5 REWs for US and Australia.

2. Literature Review

The modern era has seen the uprise of disruptive technologies. These technologies are a gift of the modern computerized world and provides ease of use in different domains. Though, the purpose is to provide ease to the users, this is not always the case with the people involved in a specific industry because of the humongous technological and conceptual requirements associated with such technologies (Flavin, 2017). Ganguly et al. (2017) defined disruptive technology as "the technology that displaces an established technology and shakes up the industry or a ground-breaking product that creates a completely new industry".

Strength Weakness Opportunity Threats (SWOT) analysis is a well-known and established tool used in project management researches. As the name suggests it involves exploring and stating the strengths, weaknesses, opportunities and threats presented to the item under investigation by internal or external factors. It is usually performed to know about the assets, be informed of the feebleness, know the opportunities available and plan vigilantly to avoid threats and make the maximum out of the opportunity at hand. Thus, it is at the core of risk management process that deals with maximizing opportunities and minimizing threats. In construction it has been recently used for prefabricated houses production (Li et al.,

2016), promoting off site construction (Jiang et al., 2017) and home inspection (Xiao, 2016). In real estate sector, it has only been used in real estate development planning for promoting eco cultural tourism (Wang, 2016). It has never been used for real estate website assessment previously.

Websites are a key component of information dissemination and one of the trusted source in modern internet led era. Different companies in various sectors are successfully using websites for their product marketing and sales. One of the key advantage of such arrangements is the access to information at ones convince and no travel, and in person visits. Thus, people can buy anything from their homes remotely and can get a better price for the purchase due to the price compare options and discounts offered by different companies (Arndt et al., 2017). Global websites such as *Amazon*, *eBay*, *Walmart*, *AliBaba* and *Shop.com* are well known for their online shopping facilities and global reliability. When it comes to REW, there are plenty of websites existing globally that provides the rent or buy option to the users when it comes to real estate. These websites have transformed the traditional real estate management to more modernized computer based business with remote availability and access. In future, as suggested by different studies, it is expected to incorporate the revolutionary disruptive technologies as well. Figure 1 shows a comparison of traditional and current real estate marketing using websites. It also displays the recommended futuristic tweaks for the website upgradation and inclusion of some disruptive technologies.

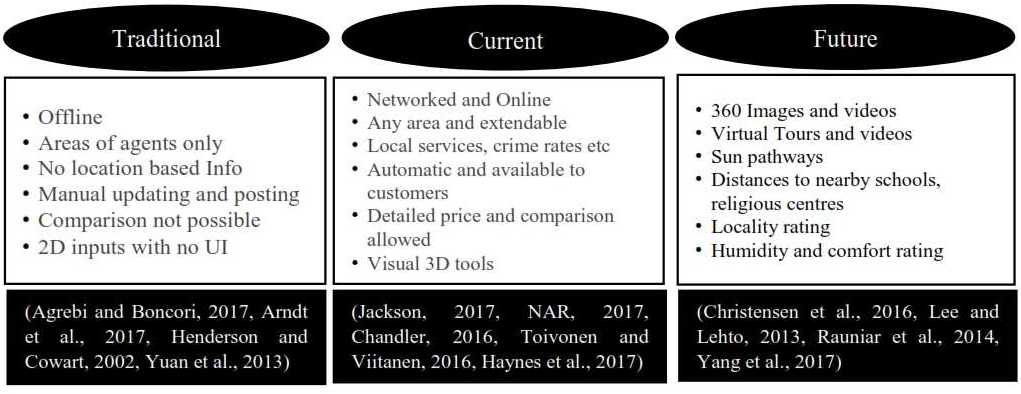

Figure 1: Traditional, Current and Future Real Estate Management

An example website in this context is *AirBnB*, that has revolutionized the hospitality industry and empowered the user to rent or buy short term accommodations including apartment rentals, hostel beds, vacation rentals, homestays, or hotel rooms. This has also empowered the home owners to bypass the traditional rigid system of hospitality services: to register the house as a rental property. Instead, the home owners can rent out a portion or a bed to a user for short time and get finances out of it without declaring their house as a full time rental service (Guttentag, 2015, Liu and Mattila, 2017). In terms of real estate, different technologies have been introduced over time such as VR, AR, Big data and Internet of things (IOT) based technologies. These technologies have revolutionized the real estate markets in terms of visualization but their incorporation in REW is almost non-existent and not explored properly. This gap is targeted in current study: to explore the use of disruptive technologies in REW and propose futuristic ideas about such incorporation. Further SWOT analysis has not been performed for real estate websites and the assessment rubric does not exist presenting yet another research impetus that is targeted in current study.

3. Methodology

In terms of study structure, the paper starts with identifying critical aspects of RET and REW. Further it explores the use of disruptive technologies in top five visited REW of Australia and the US and compares them using SWOT Scores. Figure 2 shows the methodology of current study. From relevant published literature types of disruptive RET are identified. Similarly, from online published data and website statistics, top five REW of US and Australia are highlighted. A rubric for SWOT is established for REW assessment and using case studies and relation assumptions, SWOT analysis is carried out for the REWs to highlight the state of REWs in US and Australia using SWOT Scores. This study starts with the exploration of RET critical aspects and highlights eight such aspects. These aspects are assessed and marketed using three main outlets: exhibitions, conferences and websites. The websites as per previous studies have five assessment criteria: real estate valuation, website evaluation, technology usage, website design and e-commerce. The criterion of technology adoption is focused in current study. The technology has two domains: traditional and disruptive. Disruptive technologies are of different types but specific to RET, four such technologies are focused in current study: AR, VR, IOT, and Drones. In addition, websites are assessed for basic technology adoption domains: information quality, system quality, perceived ease of use and service quality using the assessment rubric.

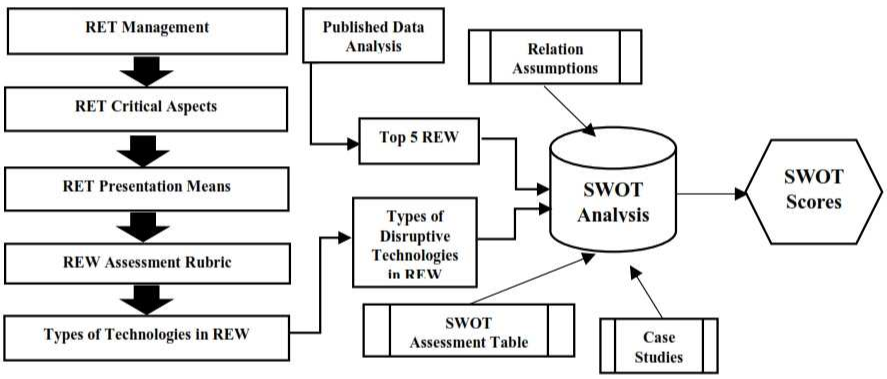

Figure 2: Study Method

For identifying the top 5 REWs of Australia and US, online published data and website statistics were used. Some popular REW include but are not limited to *zillow*, *realtor*, *realestate*, *domain* and others. Table 1 shows the top five REW for the US and Australia in terms of users visiting per month.

Table 1: Top Five REW in Australia and US

Australia					United States				
Code	Website	Users (millions)	Reach (%)	Avg time on site (minutes. seconds)	Code	Website	Users (millions)	Reach (%)	Avg time on site (minutes. seconds)
AU1	realestate.com.au	1.90	11.00	16.2	US1	zillow.com	36.00	9.17	7.1
AU2	domain.com.au	1.00	5.70	13.3	US2	trulia.com	23.00	7.00	4.42
AU3	realestateview.com.au	0.20	1.10	8	US3	realtor.com	18.00	6.09	7.14
AU4	homehound.com.au	0.20	1.10	8.3	US4	rent.com	7.09	5.43	3.92
AU5	homesales.com.au	0.15	0.50	3.12	US5	homes.com	5.00	3.73	3.35

To avoid using the websites names over and over, codes were used as shown in Table 1 with the first two alphabets representing the website country and the digit represent its position. Thus, US1 means the top website of US: *zillow.com*. From Table 1, the most visited website for Australia is AU1 with 1.9 million users followed by AU2 with 1 million users whereas the last among the top 5 lists for Australia is AU5 with 0.15 million users. Similarly, for the US the market leader is US1 with 36 million users followed by US2 with 23 million users and US5 as the 5th highest user attracting real estate website. Another key information displayed by Table 1 is the reach in terms of population percentage. For example, AU1 has 11% reach meaning that 11% population of Australia are exposed at least once to this website or simply, they know about it. The last column shows the average time in minutes spent by a user on the website. This may not exemplify the success or failure of the deal, but it gives an idea about the interactivity and keeping users involved or immersed in a website which is a critical success factor for such websites.

Further to explore the feel and ease of use of these REW, the results displayed by these websites have been explored for 1 bed 1 bath apartments in Mascot 2020, Sydney, New South Wales, Australia and Laurel 20707, Prince George County, Maryland, United States. Table 2 provides the details of the case locations. These locations are selected based on comparable areas, population and authors know how of the suburbs. In future, this ongoing study will result into a matrix for REW assessment to pave the path for TAMs in real estate that will lead to smart real estate management.

Table 2: Case locations details

Details	Australia (Sydney, NSW)	US (Prince George's County, MD)
Suburb	Mascot	Laurel
Zip	2020	20707
Area	9.2 km^2	11.2 km^2
Population	24181	32099

After identification of the top 5 REW for both countries, the next step was to perform SWOT analysis for these REW. For the swot analysis, two major considerations were considered: the assumptions of relations and assessment table for assessing the "how much" of strength or weakness of REW to assign it a SWOT score. In this context, the relations shown in Equations 1 to 3 were assumed. Equation 1 shows that weakness reduces with strength. Thus, an REW with more strength will have less weakness. Equation 2 shows that opportunity is the value of an REW to get the maximum points when strength score is deduced from the total. For example, if the total score is 50 and strength value is 10, the value of opportunity will be 50-10 =40. Thus, there is "40" points chance of improvements. Following the same logic in Equation 3, threats and opportunities go hand in hand, thus an "REW" having "40" points opportunity has the same value of threat as this opportunity if not availed will become a threat according to the basic definition of risk.

$$\textbf{Strength} \propto \frac{1}{\textit{Weakness}} \quad (1)$$

$$\textbf{Opportuinty} = \textbf{Total Score} - \textbf{Strength} \quad (2)$$

$$\textbf{Opportunity} \propto \textbf{Threats} \quad (3)$$

Once these relations were assumed, the next step was to define and introduce the assessment rubric for calculating the strengths and weaknesses of the REWs. The rubric, as shown in Table 3, use a 5-point Likert scoring philosophy. All the assessment indicators were scored against the 5 points in accordance with the values corresponding to each score. For example, an REW displaying 38 results for the case projects was assigned a value of "4" against "R", thus in the SWOT matrix shown in results section, the "R" was placed in column 4 corresponding to its value from Table 3. Similarly, if a website offered fully digitized inspection, it was assigned a value of "5". The rubric houses 13 assessment factors for REWs: 9

of these are related to disruptive technologies usage while 4 are specific to the website design and qualities.

4. Results

Figure 3, representing the SWOT score matrix, shows the results of the study for the disruptive technologies in top five REW of Australia and the US. In addition to these disruptive RETs, the websites were also assessed for the number of results shown for 1 bed, 1 bath rented apartments or houses in the case areas of Mascot 2020, Australia and Laurel 20707, US. From Figure 3, none of the website is currently using any of the focused disruptive technologies except one only using 360 images and a few planning to use 360 videos in future. Top three Australian REW are moving towards the introduction of 360 videos as shown by the currently inactive 360 video buttons on these websites. Similarly, only one website i.e. AU3 is planning towards using VR in their online websites. Rest of the websites do not use any disruptive technologies. All the websites lack the remote inspection feature due to absence of 360 videos thus the inspection is manual request based where the clients must request for a time to visit the property.

Table 3: SWOT Assessment Rubric

ID	Indicator	Score				
		1	2	3	4	5
R	Search Results	≤ 10	11 to 20	21 to 30	31 to 40	41 to 50
MP	Min Price ($)	1301 - 1500	1101 - 1300	901 - 1100	701 - 900	501 - 700
AR	Augmented Reality	Not present at all	Idea exists about starting the services. Just a mention on the website or news feed	Inactive button is present on the website indicating the sooner start of the service	The services are present in the form of active button. Not fully functional and limited to advertisement videos only	The services are present on the website and are fully Functional
VR	Virtual Reality	Not present at all	Idea exists about starting the services. Just a mention on the website or news feed	Inactive button is present on the website indicating the sooner start of the service	The services are present in the form of active button. Not fully functional and limited to advertisement videos only	The services are present on the website and are fully Functional
360	360 Videos/Images	Not present at all	Idea exists about starting the services. Just a mention on the website or news feed	The services exist but are limited to interactive Images only	The services are present in the form of active button. Not fully functional and limited to advertisement videos only	The services are present on the website and are fully Functional
VT	Virtual Tours	Not present at all	Idea exists about starting the services. Just a mention on the website or news feed	The services exist but are limited to Plain Images only	The services exist in the form of both Videos and Images but are not fully functional	The services are present on the website and are fully Functional
NF	Nearby Facilities	Not present at all	Only education related facilities are shown	In addition to previous, hotels and clubs are also shown	In addition to previous, childcare, entertainment and parks are also shown	Extra facilities are shown in addition to the previous
SI	Suburb Insights	Not present at all	Only Plain/ interactive maps are displayed on the website	In addition to previous, occupation, age, dwelling types are also shown	In addition to previous, neighbourhood insights, crime rate, virtual agent are also shown	Extra facilities are shown in addition to the previous
IT	Inspection type	Not present at all	The traditional paper based request forms need to be filled	An online but manual request form was present	A mixed method existed having manual and digitized forms	The process was fully digitized for easier use
IQ	Information Quality	Just basic level information was present	Some more information existed than basic level but was difficult to use	Information provided was good, comprehensive, rich and somewhat easier	Information provided was better, comprehensive, elaborate, reliable and updated. Additional	Very easy terminology, novelty of information, rich content, more

		and was difficult to understand	and extract the key information	to use with greater improvement prospects	features were missing but was easier to use and get the information	content, accurate, reliable, detailed & updated information images from interior, 3D Models, and mortgage calculator was present
SQ	**Systems Quality**	The website design is poor and very slow speed.	The website design is basic level with normal speed and lesser graphics	The website has an acceptable design and good speed, has a few hyperlinks and normal response time with potential to improve	The website has good design and speed, a more logical information structure and more graphics but lacks customization	The website had quick response time, customization, page location, consistent graphics, hyperlinks, good design and loading speed, more immersion and logical information structure
PU	**Perceived Ease of Use**	The website is difficult to use and learn	The website requires significant efforts to understand and use. It had navigation tools, but usage was not easy	The website is easy to understand and had navigation tools with no option of going to previous pages	The website and information on it was easily discoverable. It has return option as well but lacks customization	Finding required information and learning the website was very easy. It has good navigation tools with easy returning to previous pages and customization
SE	**Service Quality**	The service quality is poor	The service quality is acceptable with lesser and lower quality products. The prices are high.	The service quality is good with normal quality products displayed and higher prices	The product and service quality are good and convenient, but prices are high	The product & service quality is good with greater convenience and lower priced properties

The top three websites show maximum results in terms of number of properties displayed with a maximum of 39 properties displayed by domain.com.au. This site also houses the lowest priced property for the case location. None of the Australian REW uses AR, VR or 360 videos currently. VR is planned to be used by AU3. Currently, normal advertisement based videos exists on the top three websites that are planned to be replaced by 360 videos in near future. The virtual tour facility on all these REWs is based on plain images and none of them use the 360 images. In terms of nearby facilities, maximum facilities are listed down by AU5 with distances. AU4 on other hand enlists the names of places only whereas the top three have special features of interactive maps enabling the users to scroll around and know the locality. In terms of suburbs insights, all the websites entail basic details such as occupation, age, family types and income of the locals. Additionally, AU3 offers the advantage of an online agent for answering specific queries and AU4 has the statistics of greenhouse gas contribution for houses.

The US REW although having more users due to the greater population of US, seemingly take a rather casual approach towards disruptive RET. None of the websites except US4 is using such technologies. US4 on the other hand is the only REW among all studied websites that is using the 360 images for its properties display. That is one of the reason for its larger user attraction despite being the newest website among its competitors. It also displays the most property results in terms of number: 30 properties. All other websites use the traditional 2D images based virtual tours. None of the top five US REW are using or otherwise indicating the use of disruptive RET including VR, AR and 360 videos. US4 plans on incorporating 360 videos in future as evident from the 360-tour button on their website. All the US REW focus schools in the nearby facilities with US1 and US2 mentioning clubs, markets, universities and businesses and hotels respectively. US4 like AU3 has the facility of online agent. US1 has unique features of transit and walk scores for suburb insights. Walk Score measures how walkable an address is based on the distance to nearby amenities whereas Transit Score measures how well a location is served by public transportation. Similarly, US2 and US4 have the unique features of displaying crime rates on their websites to give an idea about the suburban safe passages and dangerous zones. These two along with US3 have the features of interactive maps as well. US5, unlike above, displays and uses plain 2D maps only. In terms of minimum price, US1 displays the cheapest property at $815 per month. In terms of the

website design and usefulness factors, as expected, the top 2 REWs for both countries are getting maximum points followed by medium marks for US3 and AU3 whereas the last two REWs are getting lowest marks for website design and features related to information, service and systems quality, and ease of use.

SWOT score, a key contribution and novelty of the current study was calculated in such a way that an REW can get a maximum of 50 points in its strength score. It is calculated in such a way that each indicator has a value of 0.77. This value is assigned so that the indicators which are 13 in number should get a maximum value of 10 (13*0.77). Thus, the maximum value an REW can get is possible only when all the 13 indicators get a maximum score of 5 each. The corresponding value in this case will be 13*0.77*5 = 50, where 13 is the number of indicators, 0.77 is the conversion factor and 5 is the corresponding value column. As an example, consider US1, where 3 indicators have value of "1", next 5 have value of "3" whereas 5 has value of "4". So, the score for this REW is ((3*1) + (5*3) + (5*4)) *0.77 = 29). Similarly, values for all REW are calculated using the above concepts. In terms of the SWOT score, AU2 and AU3 stands out of the studied REW with a strength score of 31/50. All the indicators are placed in the corresponding value columns based on Table 3 SWOT rubric. The lowest strength score "16" is obtained for US5 whereas none of the indicators are getting a value of above 3. Similarly, weaknesses are calculated by inverting the value of strengths. For example, a factor placed at value 2 corresponds to value 4 if the minimum score is 1 and maximum is 5 otherwise, the highest points are inverted. Consider US1, where the maximum value is 4 and minimum is 1, thus the boundaries for inversion are 1 to 4. Therefore, factors AR, VR, 360 placed in 1 are inverted into 4 in weakness column to get the corresponding weakness value of 21. It can also be done simply by subtracting the strength values from total possible score: 50-29 = 21. But, understanding the concepts needs logical underpinning, therefore logically all the values must be inverted. Thus, US5 the minimum strength scorer gets the highest weakness score. This is in line with the assumptions that greater the strength score, lower will be the weakness and vice versa. Further, pertaining the logics of assumptions, opportunities and threats are calculated as equal to weakness or the weakness score subtracted from the total strength score. This is since more weakness presents more opportunity and at the same time presents equivalent threats if things go wrong or corrective measures are not taken.

REW	Strengths					Score	Weaknesses					Score	Opportunities	Threats
	1	2	3	4	5		1	2	3	4	5		50- Strengths	50- Strengths
US1	AR, VR, 360		R, VT, NF, SI, IT	MP, IQ, SQ, PU, SE		29		IQ, SQ, PU, SE	R, VT, NF, SI, IT		AR, VR, 360	21	21	21
US2	AR, VR, 360	R	MP, VT, NF, IT	SI, IQ, SQ, PU, SE		28		SI, IQ, SQ, PU, SE	MP, VT, NF, IT	R	AR, VR, 360	22	22	22
US3	AR, VR, 360	NF	R, MP, VT, IT, IQ, SQ, PU, SE	SI		25		SI	R, MP, VT, IT, IQ, SQ, PU, SE	NF	AR, VR, 360	25	25	25
US4	AR, VR, NF	SI	R, IT, 360, IQ, SQ, PU, SE	MP, VT		24		MP, VT	R, IT, 360, IQ, SQ, PU, SE	SI	AR, VR, NF	26	26	26
US5	AR, VR, 360, PU	R, NF, SI, IQ, SQ, SE	MP, VT, IT			19			MP, VT, IT	R, NF, SI, IQ, SQ, SE	AR, VR, 360, PU	31	31	31
AU1	AR, VR	MP, NF	VT, IT, 360	R, SI, IQ, SQ, PU, SE		30		R, SI, IQ, SQ, PU, SE	VT, IT, 360	MP, NF	AR, VR	20	20	20
AU2	AR, VR		SI, NF, 360, MP, IT, PU	R, VT, IQ, SQ, SE		31		R, VT, IQ, SQ, SE	SI, NF, 360, MP, IT, PU		AR, VR	19	19	19
AU3		PU	R, MP, VR, AR, 360, NF, IT, IQ, SQ, SE	VT, SI		31		VT, SI	R, MP, VR, AR, 360, NF, IT, IQ, SQ, SE	PU		19	19	19
AU4	R, MP, AR, VR, 360	NF, PU	VT, SI, IT, IQ, SQ, SE			21			VT, SI, IT, IQ, SQ, SE	NF, PU	R, MP, AR, VR, 360	29	29	29
AU5	R, AR, VR, 360, PU	MP, IQ, SQ, SE	VT, SI, IT	NF		20		NF	VT, SI, IT	MP, IQ, SQ, SE	R, AR, VR, 360, PU	30	30	30

Figure 3: SWOT Score Matrix

5. Conclusions

This study focuses the investigation of technology adoption and subsequent use in REW of Australia and the US. The results based on SWOT scores for case studies of Mascot 2020 Australia and Laurel 20707 US, show that none of the top five REW for each country is using any disruptive RET in its current state. The only REW to use 360 images is US4, a US based REW. Three Australian REW: AU1, AU2 and AU3 are planning of introducing the 360 videos soon as indicated on their websites but none of the US REW is inclined towards it except US4 which is attracting larger audience. The Australian REW provides more details of the nearby facilities as compared to the US counterparts. None of the REW are providing 360 videos based virtual tours so far which can act as a crowd and potential buyers' attraction for upboosting the online markets of REW. Some useful features such as Transit scores and Walk scores introduced by US1 are a good step towards more information of the suburbs and users comfort but till date there is no remote tour facilitation on any REW which if introduced can lead to more customer satisfaction and attraction. Currently, all REWs are using the manual request based inspections of the properties which is time consuming and often ends in disappointment for customers due to excessive travel and no useful results. The SWOT scores for the top 5 US and Australian REW confirms that in its current state, the websites are below par in terms of strengths. Only three Australian REWs are getting 60% and above score which is alarming as these are the top 5 used websites in developed countries. These lower scores, displaying a poor current state of REW, present an opportunity at the same time to improve and uplift the REW state to state of the art. In total, 5 out of the 10 REWs are displaying 50% and above improvement opportunity which can act as an incentive for investors, property developers and researchers to explore and implement counter measures.

This study has both theoretical and practical implications. The theoretical implications include better understanding of technology adoption, risks and opportunities in real estates. Development of multiple Theoretical TAM frameworks for smart real estate management based on website design, VR & AR, Laser scanning and 360 cameras. Each can be taken as a research task and steps should be taken towards formulating theoretical frameworks. In terms of practical implications of this study, customers or end users can enjoy VR & AR based virtual tours and walkthroughs of homes. Have an idea about Sun pathways, Humidity levels and Defects in homes for smart decision making. Get access to location based services: Nearby schools, Hospitals, Police stations, and Religious centres when making a home rent/buy decision. Realtors will have improved business and more sales. Cost saving due to no inspection arrangements as well as time saving due to customers remote tours will also be achieved. Website Developers will have more business growth and can hire VR Technology aware people in time and exploring real estate market for business growth. This will also create job opportunities for people equipped with disruptive technology knowledge and subsequent software based incorporation in real estate website. This study is part of an ongoing investigation into the customers perception of REW and tweaking them in such a way as to achieve more customer satisfaction and attraction. The current study lays the foundation for futuristic TAM formations for each of the disruptive technologies. Further, the SWOT scores introduced in current study is the novelty of this research and can act as launching pad for many related and relevant exploratory researches.

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