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A Structural Model of Hindrances to Switch from Traditional to Virtual Real Estate Marketing in Pakistan

Abdul Aziz Khan Niazi[1], Tehmina Fiaz Qazi[2], Asna Sarwar[3], Ifra Aziz Khan Niazi[4], Abdul Basit[5]

Abstract

The real estate sector is bringing fate to the global economy. But, still this sector is rigid to move towards transformation and uses of advance technology. It is the call of day to use virtual technology in real estate sector. The aim of this study is to identify the list of barriers which create hindrance in switching from traditional to virtual real estate marketing in Pakistan. The overall design is comprises on literature review, data collection from primary sources through non probability purposive sampling. This study use qualitative techniques to analyze data. Methodology adopted is Interpretative structural modeling (ISM) along with Matriced' Impacts Cruise's Multiplication Appliqué a UN Casement (MICMAC) is used for analyzing data and hierarchized barriers according to their importance. Results show that "Lack of planning and management support" occupy *level VIII* of ISM model and lies in *independent* quadrant of MICMAC analysis. The results of ISM is verified by MICMAC analysis. Real estate needs to be improved in adoption of new innovative techniques and move from traditional to virtual real estate. After knowing the barriers we will better be able to address them. This study will contribute to the customers and investors of real estate and help to gain their confidence in virtual real estate using different innovative techniques. This study addresses the core issues faced by real estate sector due to lack of technological advancement. It provide an informative structural model and classification of barriers. The data is collected from focus groups for this study; the qualitative methodology is used to indicate the relations among barriers but do not quantify the relation. The study is prototypical initiative of academic researcher with limited physical/financial resources; therefore, generalizability of the results of study is limited accordingly. Issues are addressed in this study innovatively and creatively.

Keywords: Real estate, virtual real estate marketing, barriers, ISM, MICMAC, Pakistan

1. Introduction

Real estate bring wealth to global economy and the real estate markets can be amplified with use of 3D and virtual technologies. With the invention of digital technologies, it has become possible to virtually look at the locations/dimensions of the properties instead of physically visiting the same. The use of 3D technologies and the virtual seeing properties, though convenient, is uncommon. Research online buy offline (ROBO) is still dominant model in real estate market despite of the fact that view with 3D technologies is very closer to physical visits. (Pleyers & Poncin, 2020). But the stakeholders of real estate market are somehow not optimally benefiting from this technological advancement in Pakistan (Ullah, Sepasgozar & Wang, 2018). In fact, this is call of the day to switch on virtual real estate marketing using 3D technologies. This required the transformation of traditional approaches and methods to move towards smart technology (Yukun & Yan, 2022). From literature it is assess that there are many managerial and implementation challenges occur from developer side as well marketer's perspective. Using 3D technology for virtual real estate marketing has changed the dynamics of real estate and improve efficiency. Technology have profound impact on attracting customer through virtual marketing system. Barriers in adoption of new technology explored to unearth the reasons behind non-adoption of virtual real estate marketing. Literature in this regards gives a huge gap, therefore, current study explore this gap and impediments of switching to virtual real estate marketing using 3D technology (Hou & Wu, 2020). It is need of the day to create trust on new technologies to create sophisticated off-ground purchase of real estate property. Because it is more realistic to buy real estate using virtual reality instead of using traditional methods (Ullah, Shirowzhan & Davis, 2021). It has become imperative to apply and accept new ways and methods to increase the interest of people in digital and virtual technologies in this sector. The key focus of this study is to learn about the reason behind using traditional means instead of new technology in this era of smart technology especially in real estate sector. As virtual reality is fastest growing technology now a days, therefore, why not in real estate? To compete internationally we need to establish the link between technology and real estate sector of industry. This study has following specific objectives: (i) to identify key barriers in switching towards virtual real estate marketing using 3D technology. (ii) to determine the inter barrier relationships. (iii) to develop a hierarchy of interrelated and interdependent factors and find key factors. (iv) to classify the barriers on the basis of driving/dependence power. (v) to develop awareness in developers and marketers to create a framework to fil this gap. The methodological choices include Weighted Aggregated Sum Product Assessment (WASPAS) Stojić et al. (2018), Additive Ratio Assessment (ARAS) Liao, Wen, & Liu (2019), Multi Attribute Border Approximation Area Comparison (MABAC) Stojanović &

[1] Department of Management Sciences, University of Engineering and Technology, Lahore, Pakistan
[2] Hailey College of Banking & Finance, University of the Punjab, Lahore, Pakistan
[3] Institute of Business and Management, University of Engineering and Technology, Lahore, Pakistan
[4] Faculty of Management Studies, UCP Business School, University of Central Punjab, Lahore, Pakistan
[5] Lahore Institute of Science & Technology, Lahore, Pakistan

Puška (2021), Level Based Weight Assessment (LBWA) Ögel, Ecer, & Özgöz, (2022), Total Interpretive Structural Modeling (TISM) Mathivathanan et al. (2021) and Interruptive Ranking Process (IRP) (Shojaei, Jajarmizadeh, & Esfandyari Mahni, 2018).Methodology used is Interpretative structural modeling (ISM) couples with Matriced' Impacts Cruise's Multiplication Appliqué a UN Casement (MICMAC). Remaining structure of paper is divided in four parts: Literature review; Methodology; Data analysis and results and discussion; and conclusion.

2. Literature Review

Keeping in view the previous literature and detailed review of literature the outset of study is determined. We explored well-known databases containing scientific literature, e.g. JStor, Emerald, Elsevier (Science Direct), Willey Blackwell, sage etc. We use google as search engine to further explore the topic. Key words to search literature are real estate and digitalization, real estate and 3D technologies, barriers of virtual real estate, online real estate, innovation in real estate, new techniques in real estate, real estate and augmented reality, real estate and world economy, real estate and contribution, artificial intelligence in real estate, technology adoption, online platform for real estate marketing. Literature reviewed from year 2000 to 2022 and 350-400 articles were examined. There is multitude of studies related to online real estate, its importance, need of digitalization but no study highlights the problems and barriers faced in Pakistan which creates hindrance in switching to virtual real estate marketing using virtual and digital technologies. So many smart technologies were introduced but there is still lack of trust on digitalization in real estate sector. (Ullah et al., 2021) explored the barriers of switching from traditional approaches to digitalization and innovation in real estate. It described the importance of real estate in global economy and their impact in countries growth. The virtual age has just been created by globalization based on competition, virtualization or digitalization made possible by technology, as well as the shift to a knowledge-based economy. All organizations are striving to keep up with the digital technology age in order to become knowledge-based organizations. (Karadag, 2022). In essence, the way real estate companies conduct business in the modern corporate climate has undergone a considerable revolution because to ongoing technological advancements. The extent to which technology is integrated into all aspects of operational procedures will, nevertheless, have a significant impact on the real estate sector's performance. The key to driving growth in such a scenario will nevertheless be dependent upon the willingness of real estate players to accept sophisticated technologies and seamlessly integrate them within their business operations. (Qian, 2013). Real estate sector of developing and developed countries are growing but in Pakistan due to lack of trust in digital technology adoption in real estate sector growth rate is reluctant. The literature on barriers adoption and innovation in digital technology in real estate is scarce. Various research in the fields of real estate and smart cities have examined these technologies (Kim et al., 2018; Munawar et al., 2020; Sinaeepourfard et al., 2018; Stone et al., 2018; Ullah et al., 2018; Yang et al., 2019).The user perspective and factors that led to their adoption are the main focus of these relevant studies. However, the managerial viewpoint is hardly ever examined. To determine the important factors that prevent digital technology from being used in real estate, this issue needs to be investigated. List of barriers which create hindrance in switching traditional to virtual real estate marketing are taken from literature and refined by panel of experts and verified list of twenty one barriers is generated which help to conduct this study to address the issue.

3. Methodology

Research philosophy of this study is interpretivism. Inductive approach is used to analyze the barriers which create hindrance in switching to virtual real estate marketing. The studies design comprises of identification of barriers from literature review, collecting data from primary sources for qualitative research.

The population of study is folks of stakeholders (i.e., real estate developers, real estate marketers, real estate buyers and sellers, industrialist, agents, broker, investors, community at large, regulators/government and researchers of the domain). Size of sample is chosen on the base of non-probability purposive sampling, whereas size of sample is depends on the standard of homogenous/heterogeneous panel of experts available in qualitative studies (Clerk, 2018). Heterogeneous panel consisting of twenty panel of experts were chosen from real estate and government regulatory bodies of Pakistan to provide accurate judgments. A matrix type questioner (VAXO) collect primary data from panel using $n(n-1)/2$ matrix (Shaukat et al., 2021). Different methods like in-depth discussion, face to face, one to one, brain storming and approval voting on alternatives are commonly used to extract data (Li et al., 2019; Shaukat et al., 2021). This study use face to face in-depth interviews to collect data on questioner using VAXO for every paired relation, in order to study the pair-wise comparison of the barriers, the influence or enhancement of each barrier was examined in relation to all other barriers. Barriers are identified by exploring literature review (Ali et al., 2018) and expert's opinion (Abbass et al., 2021). Interpretive structural modeling along with MICMAC is used as research methodology (Manjunatheshwara, 2018). On primary data which is collected through survey from panel of experts, classical ISM and MICMAC procedure is applied on primary data. Then the results is converted into ISM model. MICMAC analysis place the barriers among four Scale centric quadrants. This study uses literature review to identify barriers, The ISM

introduced by (Warfield 1973), method is applied to construct a hierarchy on research barriers and to evaluate the significance of each barrier in relation to the others. Each barrier's driving and dependence power is studied using MICMAC (Godet, 1986). Matrix type questionnaire is used to collect data and step wise classical procedure of ISM is used from (Abbass et al., 2021).

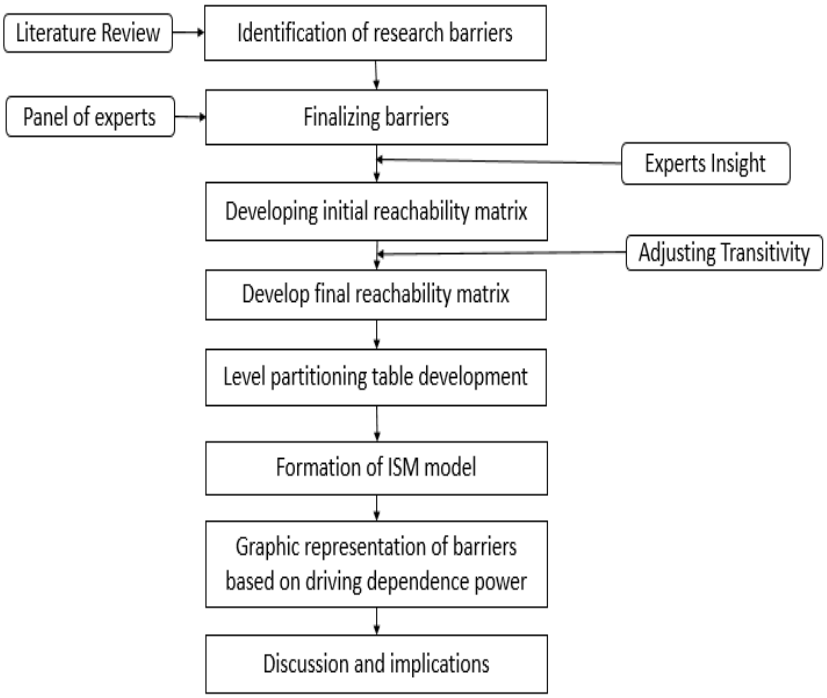

Figure 1: Steps of Research Design

3.1. Panel of experts

A panel of experts is frequently used when data on the topic being researched is scarce, expensive, unreliable, or nonexistent. There is a lack of easily accessible information pertaining to this study, specifically about the barriers which create hindrance in switching from traditional to virtual real estate marketing. Expert-provided data has higher quality and dependability than statistical data, which makes it more valuable, legitimate, and significant. A panel of fifteen to twenty-five people is thought to produce the best findings. The size of the panel varies depending on the study's purpose. The expert panel for qualitative studies may consist of 5 to 25 members, or 15 to 25 for homogeneous studies and 25 or more for heterogeneous investigations. For this investigation, a panel of twenty experts is sufficient to produce trustworthy results (Warfield, 1974). The panel's experts were chosen based on their theoretical understanding and at least ten years of relevant practical experience. We use different panels for both surveys because it is difficult to get filled both surveys from same panel, as ISM survey is time taking. The first panel consist of PhD teachers having experience of eight to ten years from different universities. Second panel which is for final ISM survey is consist of four researchers, some investors and head of marketing department of different marketing firms both public and private sector. Experts have between 10 and 15 years of practical experience, which gives them greater legitimacy to offer solutions that are pertinent to the research. Throughout the course of the investigation, the experts were contacted three times. They first went to them to establish a relationship, get information about the nature and goals of the study, and cast votes for or against include certain criteria in the final questionnaire. Second, one-on-one interviews were conducted with them in the field to collect data. Thirdly, they consulted specialists to assess the model and to provide theoretical, logical, and conceptual validation. The entire process took around three months. On the (n (n 1)) 2 matrix, each expert separately supplied data on the paired relations of the factors (ij part of the questionnaire). VAXO symbols are employed for data extraction. The directions for filling out the questionnaire were included with the questionnaire (Annexure). Using mode, the results for each element were recorded.

4. Analysis, Results and Discussion

4.1. Analysis

This section analyze the barriers which create hindrance in switching from traditional to virtual real estate marketing using ISM and MICMAC in order to develop a hierarchy of barriers according to their importance.

4.2. Interpretative structural modeling

The traditional ISM procedure created by Warfield (1973) is used for structural modeling. The structural self-interaction matrix (SSIM) aggregates the export data (Table 1).

Table 1: Structural Self-Interaction matrix (SSIM)

Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1		V	O	O	A	O	V	A	O	V	A	O	A	A	O	O	A	O	X	A	A
2			V	A	X	O	A	O	A	V	V	V	A	A	O	O	A	O	A	O	A
3				A	A	A	O	X	A	A	A	A	A	A	O	O	A	A	A	A	A
4					V	V	A	V	V	O	V	A	V	A	V	V	V	O	A	O	A
5						V	V	V	X	V	V	A	A	A	O	V	A	O	A	V	A
6							A	V	A	A	A	A	A	A	O	V	O	O	A	A	A
7								V	V	V	X	V	A	A	O	V	V	O	A	A	A
8									A	A	A	V	A	A	O	V	V	O	A	A	A
9										V	A	V	V	A	V	O	A	A	A	A	A
10											V	A	A	A	V	O	A	A	A	V	A
11												A	A	A	V	A	A	A	A	A	A
12													V	V	V	V	V	X	A	V	A
13														A	V	V	A	A	V	A	A
14															V	V	V	A	A	O	A
15																O	V	O	A	A	A
16																	V	A	A	O	A
17																		O	A	A	A
18																			O	O	O
19																				O	A
20																					A
21																					

To convert SSIM into a binary matrix, Niazi et al. (2019) apply the common criteria developed by Warfield (1973) Table 2.

Table 2: Initial reachability matrix

Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	1	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0
2	0	1	1	0	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
3	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	1	1	1	1	1	0	1	1	0	1	0	1	0	1	1	1	0	0	0	0
5	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	1	0	0	0	1	0
6	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
7	0	1	0	1	0	1	1	1	1	1	1	1	0	0	0	1	1	0	0	0	0
8	1	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	1	0	0	0	0
9	0	1	1	0	1	1	0	1	1	1	0	1	1	0	1	0	0	0	0	0	0
10	0	0	1	0	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1
11	1	0	1	0	0	1	1	1	1	0	1	0	0	0	1	0	0	0	0	0	0
12	0	0	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0
13	1	1	1	0	1	1	1	1	0	0	1	0	1	0	1	1	0	0	1	0	0
14	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0
17	1	1	1	0	1	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0	0
18	0	0	1	0	0	0	0	0	1	0	1	1	1	1	0	1	0	1	0	0	0
19	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	0	1	0	0
20	1	0	1	0	0	1	1	1	1	0	1	0	1	0	1	0	1	0	0	1	0
21	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1

MS Excel is used to systematically test the transitivity of each 0 in the direct reachability matrix. The reachability matrix incorporates transitive relations and converted into a binary transitive matrix (Table 3). The transitive relations can be identified by the symbol 1*.

Table 3: Fully transitive matrix/ Final reachability matrix

Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Driving
1	1	1	1*	1*	1*	1*	1*	1*	1*	1	1*	1*	1*	1*	1*	1*	1*	1*	1	1*	1*	21
2	1*	1	1	1*	1	1*	1*	1*	1*	1	1	1	1*	1*	1*	1*	1*	1*	1*	1*	1*	21
3	1*	0	1	0	0	0	0	1	0	0	0	1*	0	0	0	1*	1*	0	0	0	0	6
4	1*	1	1	1	1	1	1*	1	1	1*	1	1*	1	0	1	1	1	0	1*	1*	0	18
5	1	1	1	1*	1	1	1	1	1	1	1	1*	1*	1*	1*	1	1*	1*	1*	1	1*	21
6	1*	0	1	0	0	1	0	1	0	0	1*	1*	0	0	0	1	1*	0	0	0	0	8
7	1*	1	1*	1	1*	1	1	1	1	1	1	1	1*	1*	1*	1	1	1*	1*	1*	1*	21
8	1	1*	1	1*	1*	1*	1*	1	1*	1*	1*	1	1*	1*	1*	1	1	1*	1*	1*	0	20
9	1*	1	1	1*	1	1	1*	1	1	1	1*	1	1	1*	1	1*	1*	1*	1*	1*	1*	21
10	1*	1*	1	1*	1*	1	1*	1	1*	1	1	1	1	1	1	1	1	1	1	1	1	21
11	1	1*	1	1*	1*	1	1	1	1	1*	1	1*	1*	0	1	1*	1*	0	1*	0	0	17
12	1*	1*	1	1	1	1	1*	1*	1*	1*	1	1	1	1	1	1	1	1	1*	1	0	20
13	1	1	1	1*	1	1	1	1	1*	1*	1	1*	1	1*	1	1	1*	0	1	1*	0	19
14	1	1	1	1	1	1	1	1	1	1*	1	1*	1	1	1	1	1	0	1*	1*	0	19
15	1*	1*	1*	0	1*	0	0	0	1*	0	1*	0	1*	0	1	0	1	0	0	0	0	9
16	1*	1*	1*	0	1*	1*	1*	1*	1*	0	1	0	1*	0	1*	1	1	0	0	0	0	13
17	1	1	1	0	1	1*	1*	1*	1	1*	1	1*	1	0	1*	1*	1	0	1*	1*	0	17
18	1*	1*	1	1*	1*	1*	1*	1*	1	1*	1	1	1	1	1*	1	1*	1	1*	1*	0	20
19	1	1	1	1	1	1	1	1	1	1*	1	1	1*	1	1	1	1	1*	1	1*	0	20
20	1	1*	1	1*	1*	1	1	1	1	1*	1	1*	1	0	1	1*	1	0	1*	1	0	18
21	1	1	1	1	1	1	1	1	1	1*	1	1	1	1	1	1	1	1*	1	1	1	21
Dependence	21	19	21	16	19	19	18	20	19	17	20	19	19	13	19	20	21	11	17	16	7	371

The iteration approach is used to distribute the transitive binary matrix (Warfield, 1973). (Table 4-11).

Table 4: Iteration I

Code	Reachability Set	Antecedent Sets	Intersection Set	Level
1	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	I
2	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,2,4,5,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,2,4,5,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	
3	1,3,8,12,16,17	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,3,8,12,16,17	I
4	1,2,3,4,5,6,7,8,9,10,11,12,13,15,16,17,19,20	1,2,4,5,7,8,9,10,11,12,13,14,18,19,20,21	1,2,4,5,7,8,9,10,11,12,13,14,19,20	
5	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,2,4,5,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,2,4,5,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	
6	1,3,6,8,11,12,16,17	1,2,4,5,6,7,8,9,10,11,12,13,14,16,17,18,19,20,21	1,6,8,11,12,16,17	
7	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,2,4,5,7,8,9,10,11,12,13,14,16,17,18,19,20,21	1,2,4,5,7,8,9,10,11,12,13,14,16,17,18,19,20,21	
8	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20	1,2,3,4,5,6,7,8,9,10,11,12,13,14,16,17,18,19,20,21	1,2,3,4,5,6,7,8,9,10,11,12,13,14,16,17,18,19,20	
9	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,2,4,5,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,2,4,5,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	
10	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,2,4,5,7,8,9,10,11,12,13,14,17,18,19,20,21	1,2,4,5,7,8,9,10,11,12,13,14,17,18,19,20,21	
11	1,2,3,4,5,6,7,8,9,10,11,12,13,15,16,17,19	1,2,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,2,4,5,7,8,9,10,11,12,13,15,16,17,19	
12	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20	1,2,3,4,5,6,7,8,9,10,11,12,13,14,17,18,19,20,21	1,2,3,4,5,6,7,8,9,10,11,12,13,14,17,18,19,20	
13	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,19,20	1,2,4,5,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,2,4,5,7,8,9,10,11,12,13,14,15,16,17,19,20	
14	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,19,20	1,2 ,5,7,8,9,10,12,13,14,18,19,21	1,2,5,7,8,9,10,12,13,14,19	
15	1,2,3,5,9,11,13,15,17	1,2,4,5,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,2,5,9,11,13,15,17	
16	1,2,3,5,6,7,8,9,11,13,15,16,17	1,2,3,4,5,6,7,8,9,10,11,12,13,14,16,17,18,19,20,21	1,2,3,5,6,7,8,9,11,13,16,17	
17	1,2,3,5,6,7,8,9,10,11,12,13,15,16,17,19,20	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,2,3,5,6,7,8,9,10,11,12,13,14,15,16,17,19,20	I
18	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20	1,2,5,7,8,9,10,12, ,18,19,21	1,2,5,7,8,9,10,12,18,19	
19	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20	1,2,4,5,7,8,9,10,11,12,13,14,17,18,19,20,21	1,2,4,5,7,8,9,10,11,12,13,14,17,18,19,20	
20	1,2,3,4,5,6,7,8,9,10,11,12,13,15,16,17,19,20	1,2,4,5,7,8,9,10,12,13,14,17,18,19,20,21	1,2,4,5,7,8,9,10,12,13,17,19,20	
21	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,2,5,7,9,10,21	1,2,5,7,9,10,21	

Table 5: Iteration II

Code	Reachability Set	Antecedent Sets	Intersection Set	Level
2	2,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,15,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,4,15,16,18,19,20,21	
4	2,4,5,6,7,8,9,10,11,12,13,15,16,19,20	2,4,5,7,8,9,10,11,12,13,14,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,19,20	
5	2,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,15,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,15,16,18,19,20,21	
6	6,8,11,12,16	2,4,5,6,7,8,9,10,11,12,13,14,16,18,19,20,21	6,8,11,12,16	II
7	2,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	
8	2,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,20	2,4,5,6,7,8,9,10,11,12,13,14,16,18,19,20,21	2,4,5,6,7,8,9,10,11,12,13,14,16,18,19,20	
9	2,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,15,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,15,16,18,19,20,21	
10	2,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,18,19,20,21	
11	2,4,5,6,7,8,9,10,11,12,13,15,16,19	2,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,15,16,19	
12	2,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,20	2,4,5,6,7,8,9,10,11,12,13,14,18,19,20,21	2,4,5,6,7,8,9,10,11,12,13,14,18,19,20	
13	2,4,5,6,7,8,9,10,11,12,13,14,15,16,19,20	2,4,5,7,8,9,10,11,12,13,14,15,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,15,16,19,20	
14	2,4,5,6,7,8,9,10,11,12,13,14,15,16,19,20	2 ,5,7,8,9,10,12,13,14,18,19,21	2,5,7,8,9,10,12,13,14,19	
15	2,5,9,11,13,15	2,4,5,7,8,9,10,11,12,13,14,15,16,18,19,20,21	2,5,9,11,13,15	II
16	2,5,6,7,8,9,11,13,15,16	2,4,5,6,7,8,9,10,11,12,13,14,16,18,19,20,21	2,5,6,7,8,9,11,13,16	
18	2,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,20	2,5,7,8,9,10,12, ,18,19,21	2,5,7,8,9,10,12,18,19	
19	2,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,20	2,4,5,7,8,9,10,11,12,13,14,18,19,20,21	2,4,5,7,8,9,10,11,12,13,1418,19,20	
20	2,4,5,6,7,8,9,10,11,12,13,15,16,19,20	2,4,5,7,8,9,10,12,13,14,18,19,20,21	2,4,5,7,8,9,10,12,13,19,20	
21	2,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,20,21	2,5,7,9,10,21	2,5,7,9,10,21	

Table 6: Iteration III

Code	Reachability Set	Antecedent Sets	Intersection Set	Level
2	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	III
4	2,4,5,7,8,9,10,11,12,13,16,19,20	2,4,5,7,8,9,10,11,12,13,14,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,19,20	
5	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	III
7	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	III
8	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20	III
9	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	III
10	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,18,19,20,21	
11	2,4,5,7,8,9,10,11,12,13,16,19	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,16,19	III
12	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20	2,4,5,7,8,9,10,11,12,13,14,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,18,19,20	
13	2,4,5,7,8,9,10,11,12,13,14,16,19,20	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	2,4,5,7,8,9,10,11,12,13,14,16,19,20	III
14	2,4,5,7,8,9,10,11,12,13,14,16,19,20	2 ,5,7,8,9,10,12,13,14,18,19,21	2,5,7,8,9,10,12,13,14,19	
16	2,5,7,8,9,11,13,16	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	2,5,7,8,9,11,13,16	III
18	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20	2,5,7,8,9,10,12, ,18,19,21	2,5,7,8,9,10,12,18,19	
19	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20	2,4,5,7,8,9,10,11,12,13,14,18,19,20,21	2,4,5,7,8,9,10,11,12,13,1418,19,20	
20	2,4,5,7,8,9,10,11,12,13,16,19,20	2,4,5,7,8,9,10,12,13,14,18,19,20,21	2,4,5,7,8,9,10,12,13,19,20	
21	2,4,5,7,8,9,10,11,12,13,14,16,18,19,20,21	2,5,7,9,10,21	2,5,7,9,10,21	

Table 7: Iteration IV

Code	Reachability Set	Antecedent Sets	Intersection Set	Level
4	4,10,12,19,20	4, 10,12,14,18,19,20,21	4, 10,12,14,19,20	
10	4,10,12,14,18,19,20,21	4,10,12,14,18,19,20,21	4,10,12,14,18,19,20,21	IV
12	4,10,12,14,18,19,20	4,10,12,14,18,19,20,21	4,10,12,14,18,19,20	IV
14	4,10,12,14,19,20	10,12,14,18,19,21	10,12,14,19	
18	4,10,12,14,18,19,20	10,12,18,19,21	10,12,18,19	
19	4,10,12,14,18,19,20	4,10,12,14,18,19,20,21	4,10,12,14,18,19,20	IV
20	4,10,12,19,20	4,10,12,14,18,19,20,21	4,10,12,19,20	IV
21	4,10,12,14,18,19,20,21	10,21	10,21	

Table 8: Iteration V

Code	Reachability Set	Antecedent Sets	Intersection Set	Level
4	4,14	4,14,18,21	4,14	V
14	4,14	14,18,21	14	
18	4,14,18	18,21	18	
21	4,14,18,21	21	21	

Table 9: Iteration VI

Code	Reachability Set	Antecedent Sets	Intersection Set	Level
14	14	14,18,21	14	VI
18	14,18	18,21	18	
21	14,18,21	21	21	

Table 10: Iteration VII

Code	Reachability Set	Antecedent Sets	Intersection Set	Level
18	18	18,21	18	VII
21	18,21	21	21	

Table 11: Iteration VIII

Code	Reachability Set	Antecedent Sets	Intersection Set	Level
21	21	21	21	VIII

Conical matrix Table 12 is created using the Warfield (1973) permutation approach. The extraction of the ISM model is indicated by the grey pixels on diagonals.

Table 12: Conical matrix

Code	1	3	17	6	15	2	5	7	8	9	11	13	16	10	12	19	20	4	14	18	21	Driving
1	1	1*	1*	1*	1*	1	1*	1	1*	1*	1*	1*	1*	1	1*	1	1*	1*	1*	1*	1*	21
3	1*	1	1*	0	0	0	0	0	1	0	0	0	1*	0	1*	0	0	0	0	0	0	21
17	1	1	1	1*	1*	1	1	1*	1*	1	1	1	1*	1*	1*	1*	1*	0	0	0	0	6
6	1*	1	1*	1	0	0	0	0	1	0	1*	0	1	0	1*	0	0	0	0	0	0	18
15	1*	1*	1	0	1	1*	1*	0	0	1*	1*	1*	0	0	0	0	0	0	0	0	0	21
2	1*	1	1*	1*	1*	1	1	1*	1*	1*	1	1*	1*	1	1	1*	1*	1*	1*	1*	1*	8
5	1	1	1*	1	1*	1	1	1	1	1	1	1*	1	1	1*	1*	1	1*	1*	1*	1*	21
7	1*	1*	1	1	1*	1	1*	1	1	1	1	1*	1	1	1	1*	1*	1	1*	1*	1*	20
8	1	1	1	1*	1*	1*	1*	1*	1	1*	1*	1*	1	1*	1	1*	1*	1*	1*	1*	0	21
9	1*	1	1*	1	1	1	1	1*	1	1	1*	1	1*	1	1	1*	1*	1*	1*	1*	1*	21
11	1	1	1*	1	1	1*	1*	1	1	1	1	1*	1*	1*	1*	1*	0	1*	0	0	0	17
13	1	1	1*	1	1	1	1	1	1	1*	1	1	1	1*	1*	1	1*	1*	1*	0	0	20
16	1*	1*	1	1*	1*	1*	1*	1*	1*	1*	1	1*	1	0	0	0	0	0	0	0	0	19
10	1*	1	1	1	1	1*	1*	1*	1	1*	1	1	1	1	1	1	1	1*	1	1	1	19
12	1*	1	1	1	1	1*	1	1*	1*	1*	1	1	1	1*	1	1*	1	1	1	1	0	9
19	1	1	1	1	1	1	1	1	1	1	1	1*	1	1*	1	1	1*	1	1	1*	0	13
20	1	1	1	1	1	1*	1*	1	1	1	1	1	1*	1*	1*	1*	1	1*	0	0	0	17
4	1*	1	1	1	1	1	1	1*	1	1	1	1	1	1*	1*	1*	1*	1	0	0	0	20
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1*	1*	1*	1*	1	1	0	0	20
18	1*	1	1*	1*	1*	1*	1*	1*	1*	1	1	1	1	1*	1	1*	1*	1*	1	1	0	18
21	1	1	1	1	1	1	1	1	1	1	1	1	1	1*	1	1	1	1	1	1*	1	21
Dependence	21	19	21	16	19	19	18	20	19	17	20	19	19	13	19	20	21	11	17	16	7	

ISM model built using level partitioning achieved due to iterations shown in (Table 4-11).

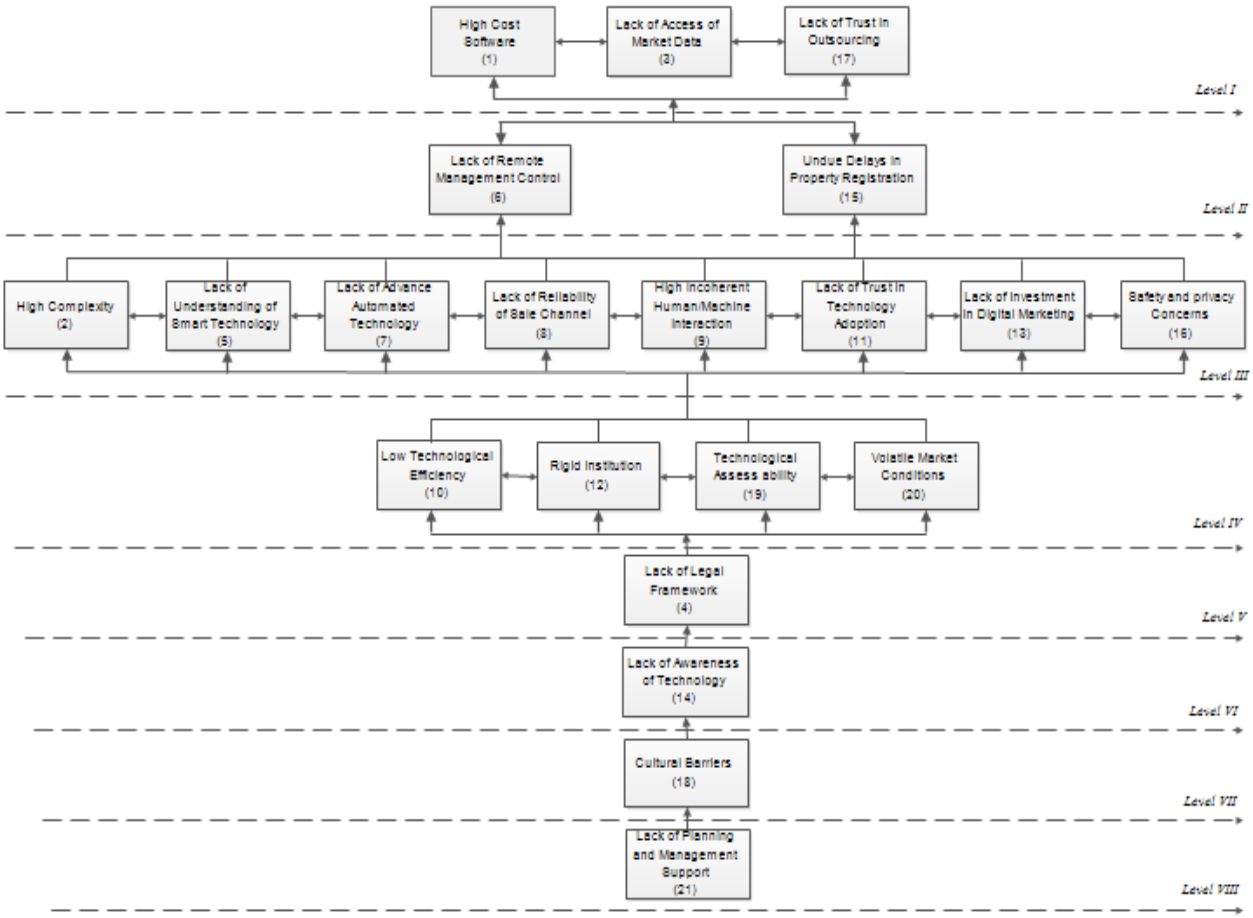

Figure 2: ISM model

ISM model shows that barriers which create hindrance in switching from traditional to virtual real estate marketing, factor 1, 3, and 17 occupy Level I; 6, 15 occupy Level II; 2, 5, 7, 8, 9, 11, 13, 16 occupy Level III; 10, 12, 19, 20 occupy Level IV; 4 occupy Level V; 14 occupy Level VI; 18 occupy Level VII; 21 occupy Level VIII shown in Figure 2.

4.3. MICMAC

The transitive binary matrix (Table 4) is utilized to create a driving-dependence diagram (Figure 3) using a scale-centric methodology and the MICMAC algorithm devised by Godet (1986).

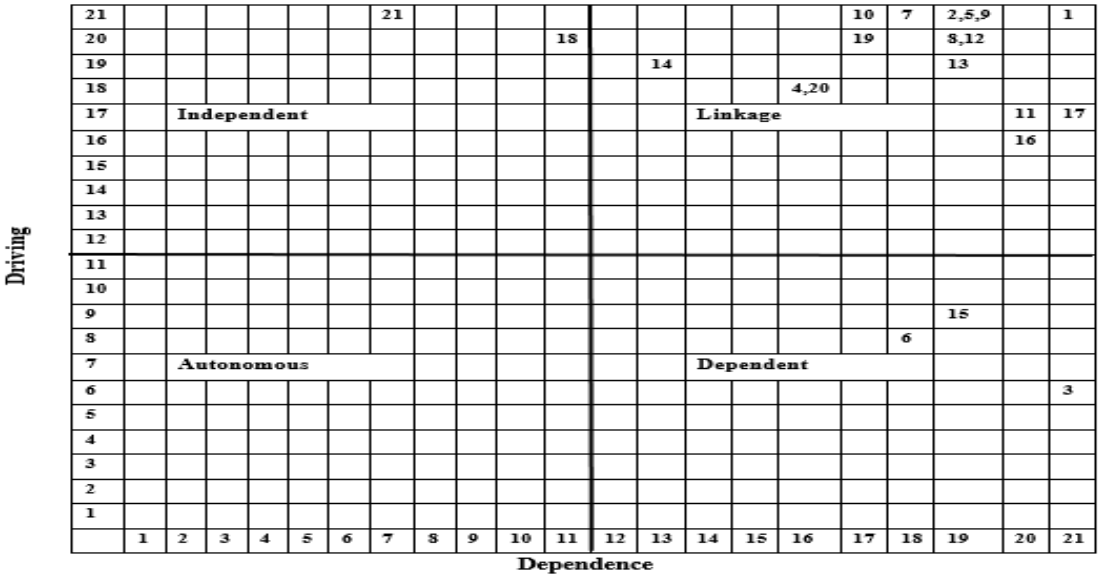

Figure 3: Driving-Dependence Diagram Generated Through MICMAC Analysis

The MICMAC findings, as shown in Figure 3, indicate that the barriers of switching to virtual real estate marketing, barriers 21 and 18 are classified as independent. The 1,2,4,5,7,8,9,10,11,12,13,14,16,17,19,20 barriers are classified as linkage. There are no barrier classified as autonomous. Dependent barriers are 3,6,15.
Overall results of study is shown Table13, results of literature review, results of ISM, results of MICMAC analysis.

Table 13: Results summary

Results of literature Review		Results of MICMAC Analysis				Results of ISM	Comment
Code	Determinants	Driving	Dependence	Effectiveness	Cluster	Level	
1	High cost software	21	21	0	Linkage	*I*	
2	High complexity	21	19	2	Linkage	*III*	
3	Lack of access to market data	6	21	-15	Dependent	*I*	
4	Lack of legal framework	18	16	2	Linkage	*V*	
5	Lack of understanding of smart technology	21	19	2	Dependent	*III*	
6	Lack of remote management control	8	19	-11	Dependent	*II*	
7	Lack of advanced automated technology	21	18	3	Linkage	*III*	
8	Lack of reliability of sales channel	20	20	0	Linkage	*III*	
9	High Incoherent human/machine interaction	21	19	2	Linkage	*III*	
10	Low technological efficiency	21	17	4	Linkage	*IV*	
11	Lack of trust in technology adoption	17	20	-3	Linkage	*III*	
12	Rigid institution	20	19	1	Linkage	*IV*	
13	Lack of investments in digital marketing	19	19	0	Linkage	*III*	
14	Lack of awareness of technology	19	13	6	Linkage	*VI*	
15	Undue delays in property registration	9	19	-10	Linkage	*II*	
16	Safety and privacy concerns	13	20	-7	Linkage	*III*	
17	Lack of trust in outsourcing	17	21	-4	Linkage	*I*	
18	Cultural barriers	20	11	9	Independent	*VII*	
19	Technological assess ability	20	17	3	Linkage	*IV*	
20	Volatile market conditions	18	16	2	Linkage	*IV*	
21	Lack of planning and management support	21	7	14	Independent	*VIII*	Key Factor

Table 13 show the results of analysis, "lack of planning and management support" *(21)* is the key factor.

4.4. Results

Real estate sector contribution global economy and important sector of any country, which play a key role in countries economic development. Like other sectors real estate sector also required technological transformation to compete globally. As technology is available in Pakistan but not used in real estate sector. It is the call of the day to use innovative technology in real estate which create ease and help to grow. The aim of this study is to identify the list of barriers which create hindrance in switching from traditional to virtual real estate marketing. We explore literature to generate list of barriers, ISM is used for development of model and MICMAC for the classification of barriers in to four scale centric quadrants. We analyzed literature and identify twenty-one barriers regarding topic. Then we established relationship among barriers, hierarchized barriers and provide understanding regarding relevant barriers.

We will examine the literature regarding our topic and identify the list of twenty-one barriers which create hindrance in switching from traditional to virtual real estate marketing. We analyze well-known databases containing scientific literature, e.g. JStor, Emerald, Elsevier (Science Direct), Willey Blackwell, sage etc. We use google as search engine to further explore the topic. Key words to search literature are real estate and digitalization, real estate and 3D technologies, barriers of virtual real estate, online real estate, innovation in real estate, new techniques in real estate, real estate and augmented reality, real estate and world economy, real estate and contribution, artificial intelligence in real estate, technology adoption, online platform for real estate marketing. Literature reviewed from year 2000 to 2022 and 350-400 articles were examined.

Results shows that High cost software (1), Lack of access of market data (3) and lack of trust in outsourcing (17) are lie at *level-I*. Lack of remote management control (6) and undue delay in property registration (15) lie on *level-II*. High complexity (2), Lack of understanding of smart technology (5), Lack of advance automated technology (7), Lack of reliability of sale channel (8), High incoherent human/machine interaction (9), Lack of trust in technology adoption (11), Lack of investment in digital marketing (13) and Safety and privacy concerns (16) are on *level-III*. Low technological efficiency (10), rigid institutions (12), Technological accessibility (19) and Volatile market conditions (20) are lie on fourth *level-VI*. Lack of legal framework (4) lies on *level-V* Lack of awareness of technology (14) lies on *level-VI*, cultural barriers (18) lie on *level-VII* .Lack of planning and management support (21) lies on *level-VIII* and key factor. After analyzing the ISM model it is demonstrated that factor 21 has play significant role in study.

Results of MICMAC shows that, Lack of remote management control (6) and undue delay in property registration (15) and Lack of access of market data (3) lie in dependent quadrant. These factors normally found at the top level of ISM model. Linkage Barriers are those factors having strong driving and dependence power. These are unstable factors fact that any impact on these factors will have impact on the other factors. In this study High cost software (1), Lack of trust in outsourcing (17), High complexity (2), Lack of understanding of smart technology (5), Lack of advance automated technology (7), Lack of reliability of sale channel (8), High incoherent human/machine interaction (9), Lack of trust in technology adoption (11), Lack of investment in digital marketing (13) and Safety and privacy concerns (16), Low technological efficiency (10), Rigid institutions (12), Technological accessibility (19) and Volatile market conditions (20), Lack of legal framework (4), Lack of awareness of technology (14), cultural barriers (18) are lie in linkage quadrant. These are unstable barriers and any action taken on these barriers will disturb or affect other barriers. These factors normally found in the middle of the ISM model. Independent Barriers are those factors that have weak dependence power but very strong driving power and also known as key factors in the model hierarchy. In this study factor (21) Lack of planning and management support is lie in independent quadrant and key factor of study which influence all other factors. This factor are at bottom of the ISM model and drive all other factors. This barrier is driving issues for the whole system. Results of both ISM and MICMAC are summarized in Table 13.

5. Discussion

The aim of this study is to analyze the barriers which create hindrance in switching from tridtional to virtual real estate marketing in pakistan. Achieve the objectives of study by using ISM and MICMAC. Results show that lack of planning and management support (21) is the key factor which lie in the bottom of ISM model and independent quadrant in MICMAC analysis and have strongest driving power. Cultural barriers (18), Lack of awareness of technology (14) and Lack of legal framework (4) are also important barriers lie in the bottom of ISM model, cultural barriers (18) lies in independent quadrant of MICMAC, Lack of awareness of technology (14) and Lack of legal framework (4) lies in the linkage quadrant of MICMAC.

5.1. Discussion on comparison of study with contemporary literature

Comparison of some studies which we found relevant with current study are illustrated in Table 14.

Ullah et al (2018) In order to solve the main issues of real estate stakeholders, this study uses the Big9 technologies and looks at the potential of several disruptive technologies in the real estate sector. A particular emphasis is placed on the regrets caused by informational gaps that can be filled by effectively utilising Big9 technology. As a result, the article defines Smart real estate (SRE) and examines the fundamental elements that transform conventional real estate into

SRE, with an emphasis on technology and online platforms. This article provides insights into the fundamentals of smart real estate management, which set it apart from conventional, rigid real estate management. It also discusses disruptive Big9 technologies and how they can be used to fill the information gap for consumers and address stakeholder needs. This study is different from our resarch on many grounds, this study focus on online plaforms and software in order to adopt technology in real state and make it smart real estate but this study didn't focus on in the presence of these technologies why these technologies are not been adopted n real estate sector, our study determine those barriers which create hindrance in switching on these technologies.

Table 14: Comparison of Present Studies with Previous Studies

Sr.	Source	Focus	Variable	Method	Country	Results
1	Present study	Identify barriers create hindranc0e towards virtual marketing	21	ISM	Pakistan	List of barriers and their hierarchal representations
2	(Ullah et al., 2018).	Improve adoption of technology in real estate	Online technologies, dissemination platform, Big9	Technology adoption model	Australia	Provide high quality information to real estate customers
3	(Sitek, 2019).	Barriers of innovation as risk in real estate	Innovation and sustainability in real estate market	Desk result analysis	Poland	Identify and evaluate innovation constraints
4	(Adegoke & Oladokun, 2021)	Virtual reality in real estate	Real estate agency practices	DEMATEL	Nigeria	Information to integrate virtual reality to get competitive advantage
5	(Pleyers & Poncin, 2020)	Non immersive real estate technologies	Non immersive virtual reality	Procedure/ researchers recruited participants	Belgium	Study hilight the advantages of using technology in real estate
6	(Hou & Wu 2020).	Technology for virtual real estate education	Real estate educational practices	Case study method	Hong Kong	A new teaching model integrated with VR technology to deliver a real estate

Sitek (2019) The study's objective is to identify and evaluate innovation constraints in Poland's construction industry as risk factors for the examined real estate market. According to a theory, the adoption of innovations on the real estate market enables better management of investments in innovations and, most importantly, reduces their risk. The analysis of the issue was motivated by actions intended to eliminate negative effects of human activity on the environment and promote implementation of innovations, such as the concept of sustainable development, in light of signals of ecological imbalance brought on by extremely intensive and irresponsible economic growth. Surveys were utilised to evaluate the work's objectives. The real estate market's long-term growth in the context of advantages and dangers. This study is different from our study on many aspects this study risk in innovative real estate market, according to this study innovation in real estate market will reduce the risk but didn't focus that why innovation is not been done. Our study identify those barriers which create risk in innovation in real estate marketing as per results of our study lack of planning and management support *(21)* is the key factor in virtual real estate marketing.

Adegoke & Oladokun (2021) the aim of this study to provide information with which the practice may be improved, this study intends to analyses the criteria employed in measuring the determinants of the use of virtual reality technology in real estate agency practice in Lagos. This study provide insights to Nigerian real estate agencies criteria of integrating the virtual reality in real estate to get competitive advantage. This study is different on many grounds from our study, this study focus that due to pandemic second wave cure is flatten because digital technology is not properly introduced in real estate sector. Our study focus on what are those barriers which create hindrance in switching from traditional to virtual real estate marketing.

Pleyers & Poncin (2020) studies have shown that virtual reality technologies can improve customer experience, their effectiveness in the real estate industry is still unknown. In order to view real estate products, this study investigates the effects of providing consumers with a non-immersive VR experience using a widely used technology. Participants accessed the website of a real estate agency that presented apartments through either static photos or interactive 360˚ visits. This study highlights the advantages of such technologies in enhancing customer experience and attitudes, particularly in the highly competitive real estate industry. This study is different from our study on many grounds, this

study focus that virtual reality will improve the customers experience in real estate but didn't focus why these technologies are not been used.

Starr, Saginor & Worzala (2020) this study shown that technology is rapidly redefining the industries, these technologies including cloud computing, internet services and artificial intelligence. This paper clarifies that due to disruptive technologies real estate sector need transformation and move from traditional methods to digital technologies. This study is different from our study on many grounds, this study focus on rapid technological innovation in industrial sector and real estate need to transform bust didn't focus on factors which cause hindrance in transformation of real estate sector.

5.2. Discussion on Practical implications

Practical implications of this study are according to list of stakeholders. This study will contribute to real estate sector. Real estate needs to be improved in adoption of new innovative techniques and move from traditional to virtual real estate. This study is helpful for real estate developers as it provides deep insight regarding barriers in order to address them. This study is also useful for real estate investors to assure profitable investment in order to limiting financial risk. This study is useful for real estate marketers in order to efficiently promote and products and services of real estate sector. This study provide guideline to government. Moreover it will create priorities from government to take decision in order to overcome these barriers. This study provide different dimensions to researcher. Also provide future track to researchers for further investigate the topic. This study develop understanding for community at large.

5.3. Discussion on theoretical implications

The study contributed by determining the barriers that create hurdle in switching from traditional to virtual real estate marketing in Pakistan. These barriers are more specific and derived from available literature on the topic and further scrutinized by the experts of related sector. Refined barriers are helpful to create an understanding that what those barriers are creating hindrance in switching from traditional means to virtual. The contextual relationship between the barriers contributed more detailed and directed hierarchy to get better understanding. The theoretical study clear the direction to the top management through practical implications. As the hierarchy show categorized and level based specific panel of barriers that hinder to switch from traditional methods to virtual and previously ignored in literature.

5.4. Discussion on limitations

Like all studies there is some limitations in this study. The first limitation is, this study has not been tested using statistical and mathematical methods. There additional methods, such as regression, are available to examine the theory behind this study. Confirmatory factor analysis, correlation, etc.

Second limitation, the study's issues are found in the literature and the advice of some particular specialists who can be increased by including more experts and further literature.

Third limitation, this study's barriers can be tested by exchanging, removing, or increasing the barriers, if taken into account with a strong argument to increase knowledge. Only 21 factors gathered from literature, it is recommended for future that more factors should be included.

Fourth limitation, data is collected from 20 experts for future recommendation data should be collected from more experts and also from different real estate firms in order to get more authentic and up to date data or also other sources will be used in this investigation.

Fifth limitation, ISM and MICMAC are used to analyze data, for future recommendation different techniques are used to more clearly identify and clarify the barriers and their connection with other barriers. Finalized by specialists, however future research should consider more elements in more dimensions. The nature of the study and its findings open up new avenues for expanding knowledge in numerous areas and testing the study's theory using various statistical methods techniques. By choosing the many domains of the study.

Sixth limitation this study is conducted in Pakistan, future recommendation, the development of the investigation research can expand in numerous ways outside of Pakistani real estate sector of different countries.

5.5. Contribution of the study

This study provide list of barriers which create hindrance in switching from traditional to virtual real estate marketing from literature. This study contributes (i) a refines list of barriers; (ii) ISM model; (iii) MICMAC diagram; (iv) knowledge on the driving/dependence power of each determinant; (v) discussion on model and analysis reality in contrast to contemporary literature.

6. Conclusion

The key focus of this study is to identify the barriers which are the reason behind using traditional means instead of new technology in this era of smart technology especially in real estate sector of Pakistan. It is need of the day to create trust on new technologies to create sophisticated off-ground purchase of real estate property. Technology is present in Pakistan but people are unable to get benefit in real estate sector. Real estate sector have potential to grow and compete internationally but due to lack of technological adoption it cause disruption. This study aims to analyze the list of

barriers which create hindrance in switching from traditional to virtual real estate marketing. The results of the study can help as decision making and policy making tools for policy makers and top management of real estate sector. Different levels of hierarchy is developed in this study to examine the interaction among the barriers that hinder. The hierarchy of ISM model is used in this study, can help top management in recognizing the interaction between the barriers and organized them on the basis of their driving and dependence power. Outcomes are identified from literature, data concerning the paired relationships of outcomes are collected from experts. ISM is used for preparing model and hierarchizing barriers and MICMAC is used for verification of results and classification of barriers. Results of ISM shows that barriers which create hindrance in switching from traditional to virtual real estate marketing, factor 1, 3, and 17 occupy *Level I*; 6, 15 occupy *Level II; 2, 5, 7, 8, 9, 11, 13, 16 occupy Level III; 10, 12, 19, 20* occupy *Level IV; 4* occupy *Level V; 14* occupy *Level VI; 18* occupy *Level VII; 21 occupy Level VIII* shown in Figure 2. The MICMAC findings, as shown in Figure 3, indicate that the barriers of switching to virtual real estate marketing, barriers 21 and 18 are classified as independent. The 1,2,4,5,7,8,9,10,11,12,13,14,16,17,19,20 barriers are classified as linkage. There are no barrier classified as autonomous. Dependent barriers are 3,6,15. The purpose of this study is to identify the barriers which hinder from switching from traditional to virtual real estate marketing in Pakistan. *"Lack of planning and management support" (21)* this means there is lack of proper planning as planning play a vital role if there is no proper planning it is not possible to effective implementation of technology in real estate and management support is also very helpful otherwise it create hurdle in adoption of virtual technology in real estate sector.

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Annexures I (Survey 1)
What Hinders to Switch from Traditional to Virtual Real Estate Marketing in Pakistan?
Verification of highly relevant factors

If you are agreed to participate please fill the following table. You are requested to evaluate as to whether the factors is relevant, important and necessary. If your answer is yes, please write "Y" otherwise write "N" in blank column. You may suggest to add, delete, alter, merge or change any factor at the space provided under table.

Sr.no.	Factors	Description	Yes/No
1	High cost software	Every software development is unique and demand a diverse skills technology and expertise which large amount for development.	
2	High complexity	It indicate the needed technological capability to understand the technology.	
3	Lack of access to market data	Poor methods of digitally sharing information to integrate technology infrastructure	
4	Lack of legal framework	No proper legal frameworks or regulatory acts supporting the adoption	
5	Lack of understanding of smart technology	Poor understanding of smart/electronic technology.	
6	Lack of independent online portals	Lack of ability to create and manage independent online portals supporting robotic	
7	Lack of remote management control	Remote management means managing network from a remote location. There is poor planning regarding this.	
8	Lack of advanced automated technology	No awareness and usage of advanced automated technology, robotics, etc	
9	Lack of reliability of sales channel	Traditional/outdated sale or delivery network are used.	
10	High Incoherent human/machine interaction	Lack of multidisciplinary focus on Disorganizes human and machine interactions	
11	Lack of updated and accessible information	No upgraded and accessible information about current situation.	
12	Low technological efficiency	Didn't get maximum benefit from available technology.	
13	Lack of trust in technology adoption	Trust is important factor in adoption and use of innovative technology to take maximum advantage from available technology.	
14	Rigid institution	Resistance against acceptance of new technology in real estate sector.	
15	Lack of investments in digital marketing	Lack of organizational willingness to invest in digital marketing.	
16	Lack of awareness of technology	No awareness of improvement in real estate using advance technology.	
17	Undue delays in property registration	Slow procedures and improper time management in property registration	
18	Safety and privacy concerns	Customers concern regarding their privacy and security of data.	
20	Lack of trust in outsourcing	Outsourcing meaning a contract in which other organizational person will manage some assigned functions. Lack of trust in outsourcing the organizational data due to competitive advantage or no personal interest of third party.	
21	Cultural barriers	Issues raised by cultural difference.	
22	Technological assess ability	No proper access towards upgraded technology	
23	Volatile market conditions	Fluctuation in market situation	
24	Lack of planning and management support	No proper future planning by organization	

Annexure II (Survey 2)

What Hinders to Switch from Traditional to Virtual Real Estate Marketing in Pakistan?

Section 2: Research Questionnaire

1. Fill only white cells.
2. Contextual relationship " leads to"
3. What to enter in the white cells?

- Enter V when the row influences the column.
- Enter A when the column influences the row.
- Enter O when there is no relation between the row and the column.
- Enter X when row and column influence each other.

4. Definitions/ description of each barrier is given in annexure for ready reference off respondents.

Code	Factors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	High cost software																					
2	High complexity																					
3	Lack of access to market data																					
4	Lack of legal framework																					
5	Lack of understanding of smart technology																					
6	Lack of remote management control																					
7	Lack of advanced automated technology																					
8	Lack of reliability of sales channel																					
9	High Incoherent human/machine interaction																					
10	Low technological efficiency																					
11	Lack of trust in technology adoption																					
12	Rigid institution																					
13	Lack of investments in digital marketing																					
14	Lack of awareness of technology																					
15	Undue delays in property registration																					
16	Safety and privacy concerns																					
17	Lack of trust in outsourcing																					
18	Cultural barriers																					
19	Technological assess ability																					
20	Volatile market conditions																					
21	Lack of planning and management support																					

Annexure:

Sr.	Factors	Description
1	High cost software	Every software development is unique and demand a diverse skills technology and expertise which large amount for development.
2	High complexity	It indicate the needed technological capability to understand the technology.
3	Lack of access to market data	Poor methods of digitally sharing information to integrate technology with existing infrastructure
4	Lack of legal framework	No proper legal frameworks or regulatory acts supporting the adoption of the selected technology
5	Lack of understanding and acceptability of technology	Poor understanding of smart/electronic technology.
6	Lack of remote management control	Remote management means managing network from a remote location. There is poor planning regarding this.
7	Lack of advanced automated technology	No awareness and usage of advanced automated technology, robotics, and 3D technologies and so on.
8	Lack of reliability of sales channel	Traditional/outdated sale or delivery network are used.
9	High Incoherent human/machine interaction	Lack of multidisciplinary focus on Disorganizes human and machine interactions
10	Low technological efficiency	Didn't get maximum benefit from available technology.
11	Lack of trust in technology adoption	Trust is important factor in adoption and use of innovative technology to take maximum advantage from available technology.
12	Rigid institution	Resistance against acceptance of new technology in real estate sector.
13	Lack of investments in digital marketing	Lack of organizational willingness to invest in digital marketing.
14	Lack of awareness of technology	No awareness of improvement in real estate using advance technology.
15	Undue delays in property registration	Slow procedures and improper time management in property registration
16	Safety and privacy concerns	Customers concern regarding their privacy and security of data.
17	Lack of trust in outsourcing	Outsourcing meaning a contract in which other organizational person will manage some assigned functions. Lack of trust in outsourcing the organizational data due to competitive advantage or no personal interest of third party.
18	Cultural barriers	Issues raised by cultural difference.
19	Technological assess ability	No proper access towards upgraded technology
20	Volatile market conditions	Fluctuation in market situation
21	Lack of planning and management support	No proper future planning by organization

Annexure III (Profiles of panel of experts)

List of first panel

Sr.	Designation	Qualification	Experience	Institution
1	Assistant Professor	Ph.D	8 years	GC University Lahore
2	Assistant Professor	Ph.D	6 years	University of Lahore
3	Assistant Professor	Ph.D	7 years	GC University Lahore
4	Assistant professor	Ph.D	15 years	GC University Lahore
5	Manager	Ph.D	7 years	Education University
6	Assistant Professor	Ph.D	13 years	University of the Punjab, Lahore
7	Associate Professor	Ph.D	12 years	University of the Punjab Lahore
8	Lecturer	MS	7 years	University of Central Punjab
9	Adjunct faculty at LUMS	Ph.D	7 years	LUMS and LCWU
10	Lecturer	MS Management	16 years	PGC
11	Lecturer	MSc Engineering	12 years	University of the Punjab
12	Manager Sales and Marketing	Ph.D	6 years	Superior university
13	Assistant professor	M.Phil	12 years	Kinnaird college
14	University Lecturer	MPhil in	10 years	University of Lahore

List of second panel

Sr.	Designation	Organization	Experience	Are of expertise
1	Asst. Professor	Punjab University LHR.	5-10 years	Researcher
2	Lecturer	UCP	5-10 years	Researcher
3	Asst. Professor	Punjab University LHR.	10-15 years	Researcher
4	Asst. Professor	UCP	10-15 years	Researcher
5	Teaching assistant	UET, KSK	5-10 years	Researcher
6	Senior Business development manager	Zameen.com	5-10 years	Real estate sector
7	Deputy director	LDA	10-15 years	Government regulatory authority
8	General manager	Al Noor Builders, Developers and planners	5-10 years	Real estate sector
9	Investor/partner	Park View Society Lahore.	Above 15 years	Real estate sector
10	Sales manager	SRC	5-10 years	Public at large
11	Director	Al-Ahad estate & builders	5-10 years	Real estate sector
12	Deputy director	LDA	Above 15 years	Government regulatory authority
13	Manager sales & marketing	Smart Land Aligners	5-10 years	Real estate sector
14	Executive senior business development manager	Zameen.com	10-15 years	Real estate sector
15	BDM	Zameen.com	5-10 years	Real estate sector
16	Sales & marketing manager	Immarat.pk	Above 15 years	Real estate sector
17	SBDM	Zameen.com	5-10 years	Real estate sector
18	Partner in Ownership	Punjab real estate	5-10 years	Real estate sector
19	Businessman	Property Dealer	5-10 years	Real estate sector
20	Deputy director	LDA , TEPA	10-15 years	Government regulatory authority