



Augmented Reality (AR) as A Promotion Tool in Influencing Housing Purchase Intention

Fazdliel Aswad Ibrahim^{1,*}, Wong Boying¹, Mohd Wira Mohd Shafiei², Rafiza Abdul Razak¹, Nurfadzillah Ishak¹

¹ Faculty of Civil Engineering, Universiti Malaysia Perlis, Kampus Tetap Pauh Putra, 02600 Arau, Perlis, Malaysia

² School of Housing, Building and Planning, Universiti Sains Malaysia, 11800 USM, Pulau Pinang, Malaysia

ARTICLE INFO

Article history:

Received 26 September 2022

Received in revised form 2 January 2023

Accepted 30 January 2023

Available online 22 February 2023

Keywords:

Promotion tool; Augmented reality;
Behaviour; Intention to purchase;
Housing industry

ABSTRACT

Contemporary rapid technological transformation demands the most optimal marketing approach to ensure organisational survival in a highly competitive business environment. Numerous studies were conducted to focus on selecting appropriate promotion tools, such as e-marketing, social media, and extended reality (XR) applications, to be applied in the current marketing methods. Nonetheless, the technological advancement availability was not thoroughly harnessed by the property sector, which lagged in adopting the innovative marketing approach to promote relevant products. Furthermore, minimal research was performed to investigate the effects of augmented reality (AR) applications in the property sector to encourage consumer purchases. The current study aims to determine the relationship between AR applications and potential house buyers' purchase intention. Respondents were recruited based on the stipulated inclusion criteria, namely age and monthly income. A total of 130 survey booklets with housing design stimuli in the AR applications were distributed for self-completion. Resultantly, 100 completed booklets were returned. The findings revealed that AR applications possessed a significant moderate correlation with potential house buyers' purchase intention. The results contributed additional insights into the existing marketing and consumer behaviour literature and provided several implications on the AR application potential as a property developers' promotion tool.

1. Introduction

Housing is an important sector in providing the fundamental need for shelter in modern human life, due to the increasing demand from the rapid global population growth. The United Nations Human Settlements Programme [1] forecasted that 3 billion individuals or 40 per cent of the global population would require access to proper housing by 2030, wherein the demand is equivalent to 96,000 additional housing units established daily. Similarly, the Department of Statistical Malaysia [2] reported that over 32 million Malaysian citizens (80 per cent of the population) exhibited property

* Corresponding author.

E-mail address: fazdliel@unimap.edu.my

<https://doi.org/10.37934/araset.29.3.251259>

purchase intention in the future. Property developers play a significant role in providing adequate housing with an optimal marketing plan to ensure a high competitiveness level in attracting potential buyers. Simultaneously, most property developers would employ housing agents to assist them in evaluating the factors influencing buyer intention. Accordingly, purchasing a house requires buyers to undergo numerous complex procedures and embrace significant commitments by considering several essential factors, including financial status, living costs, and long-term investment [3, 4]. Thus, property developers should ensure the effectiveness of marketing communication tools in providing sufficient housing details to potential buyers.

Qing [5] discovered multitudinous platforms, instruments, and tools employed by housing developers in marketing communications. For example, conventional marketing communication tools, such as printed materials or brochures, are ubiquitous to provide necessary information on the selling properties, including floor plans, elevation views, locations, selling prices, and floor areas. As brochures are generally two-dimensional, a knowledge gap exists in buyers' perceptions of actual products when the tool is highly contingent on personal ability to discern object configurations [6]. Another popular promotion tool is the three-dimensional (3D) mock-up model. Despite ably providing a holistic view for the buyers, the model possesses several limitations, such as constrained housing information and a lack of consumers' actual involvement [7]. In this regard, buyers are compelled to visualise the product without a realistic observation, which would diminish the company authenticity and commitment levels in consumer perception. Figure 1 demonstrates examples of printed materials and three-dimensional mock-up models employed by property developers to represent selling properties.



Fig. 1. Common Promotion tool in Housing Sector (a) Brochure (b) Exterior 3D Mock-up Model (c) Interior 3D Mock-up Model

High reliance on conventional promotion tools by property developers is owing to several factors in terms of technological aspects and capabilities to human resources and organisational or environmental constraints [8]. The underlying factors are concurrent with Koebel [9] who highlighted the housing industry as being highly resistant to required transformations and remaining stagnant in embracing technological innovations. Similarly, Qing [5] asserted that the current promotion tools adopted in the housing sector were insufficient to comprehensively disseminate the selling property information to the buyers. As such, contemporary technological advancement produces several pertinent instruments for property developers to promote their selling properties, such as extended reality (XR), artificial intelligence (AI), and 3D scanning [8]. The subsequent adoption of advanced and improved marketing communication tools is pivotal to attracting potential customers. Correspondingly, the present study sought to examine the XR application impact, particularly from augmented reality (AR), on potential house buyers' purchase intention. Ashurst (2000) [10] propounded that analyzing consumer feedback directly would be highly vital to reveal marketing challenges and relevant shortcomings, before contributing additional insights in terms of technological benefits to the housing sector.

2. Literature Review

Marketing communication is a common method to expand the existing business market through the process of transferring relevant messages regarding selling products to the targeted customers [11], which involves actions and reactions between the two parties. The term 'communication' refers to a bidirectional mechanism wherein product developers seek to promote products or services to customers through pertinent information dissemination while simultaneously gathering consumer feedback or reviews on the offered products or services [12]. Practically, business communication is a highly intricate process which encompasses numerous interacting factors. As portrayed in Figure 2, the product or service provider would implement a promotion tool to enable consumers effectively decode and interpret the conveyed message about a product or service provided by the enterprise.

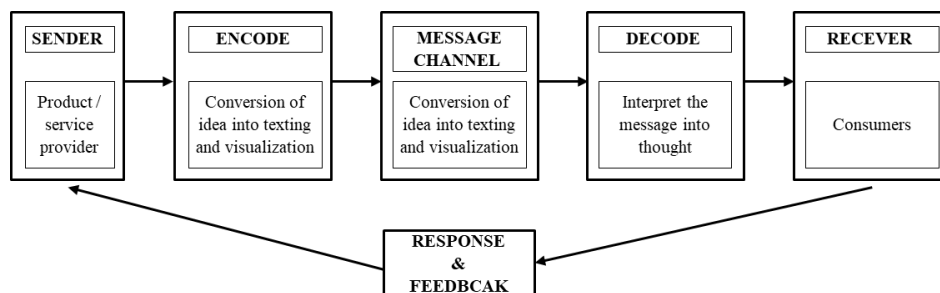


Fig. 2. Marketing Communication Process

Appropriate and effective adoption of promotion tools is a prerequisite for the product or service providers to convert consumer purchase intention into corporate profits [13]. The emergence of various technologies could be effective promotion tools as the innovative tools are equipped with advanced features to deliver comprehensive details about the products or services. Moreover, the variety of promotion tools to attract customers continues to increase, with non-conventional promotion methods evolving rapidly into a ubiquitous approach. Therefore, the constant alteration and development of existing promotion tools would necessitate subsequent transformations amongst product or service providers to effectively communicate and positively influence consumer purchase behaviour.

Over the years, the housing industry had demonstrated that it can respond to the needs of house buyers by applying new technological advances. For instance, Wang *et al.*, [14] had charted the various technologies adopted in the building facilities management since the emergence of the industry. The way housing industry adopted 3D building simulation in regards of indoor thermal comfort of building occupants further proved this contention [15]. As a resilient and matured industry, housing stakeholders can be rest assured that the supply side of housing industry will always keep abreast with the latest developments and change in demands of the house buyers. A seemingly endless zest in technology-based learning shows that learning capacity is deeply ingrained in the structure of the housing industry [16].

Due to communication technological advancements, various scholars assessing marketing and purchasing behaviour focused more on online platforms, such as e-marketing [17-19] and social media [20, 21]. Contrarily, past studies did not extensively appraise the marketing and purchasing behaviour in the housing sector despite the emergence of AR technology in the sector. In addition, several AR studies concentrated on other fields, such as warehouse operation [22] and built environment [23, 24] instead of housing. Notwithstanding, several researchers who investigated the AR application in motivating product purchasing behaviour, including cosmetics [25] and mobile

games [26], and the general AR research framework on user behaviour [27, 28] could be referred to by the current study.

The AR technology could be transformed into the latest marketing practice in the housing industry, especially in promoting various housing units. The AR technology utilisation would render additional revenues for property developers and provide immersive experiences for potential house buyers in terms of neighbourhood views, house layouts, and design visualisation [29]. The AR attributes could thus increase the effectiveness to decode conveyed information and property design by consumers, while creating highly effective communication between housing developers and potential buyers. Summarily, applying AR technology as a promotion tool could significantly and positively influence consumer purchase behaviour.

3. Methodology

3.1 Research Instrumentation

Research instrumentation refers to tools employed as a medium to collect research data and produce the outcome of an investigated phenomenon. To study the influence of AR technology as a promotion tool in influencing housing consumer purchase intention, this study employed a survey method to gather relevant data through a set of questionnaires. The rationale for selecting the method was due to explanatory research [30] suitable in providing a standardised inquiry, in which the questions were asked identically to every respondent [31]. Furthermore, to ensure respondents' deeper understanding of the research topic, the current study developed a two-storey housing model via AR technology for the respondents to observe the house design through the AR applications.

Figure 3 illustrates the housing model in the AR application. The housing model served as a stimulus to create a captivating experience for the respondents by superimposing the elements of virtual nature [32]. Through the current approach, this study could generate a significant finding when the respondents could comprehend the questionnaires with a high clarity level. The survey booklet consisted of three main sections, namely respondent demographic profile, AR technology attractiveness as a promotion tool, and house buyers' purchase intention. All items in the second and third sections were assessed on a 5-point Likert scale, in which respondents were required to indicate personal agreement levels on each item ranging from 1 as "Strongly Disagree" to 5 as "Strongly Agree".



Fig. 3. Housing Model in AR Application

3.2 Population and Targeted Respondents

Population refers to the entire set of cases aimed to be investigated or inferred by the researcher [33, 34]. Correspondingly, the study population was the potential house buyers residing in Perlis, Malaysia. Meanwhile, the target respondents were individuals aged between 25 and 60 years old to ensure the significance of the study findings. According to Patino and Ferreira [35], the inclusion of criteria, such as demographics, would be crucial to ensuring sufficient finding validity. The rationales for respondent age as the inclusion criterion are listed below: example:

- i. The average of current selling or market price for a two-storey house is between RM 275,000 and RM 400,000. Based on the current housing loan interest rate, the monthly instalment is between RM 1,200 and RM 1,800 for 30 to 35 tenancy years.
- ii. Most Malaysian citizens completed their Diplomas or first Bachelor's degrees between 21 and 23 years old. Based on the leading private sector job portals in Malaysia, such as JobStreet, JobSeeker, and MYFutureJobs, with Public Services Commission for the government sector, diploma graduates' average salary is RM 1,500 while RM 2,200 for degree graduates.
- iii. Two to four employment years are the minimum requirement to acquire annual salary increments and financial stability, which ensures that house buyers secure a housing loan and ably commit to the monthly instalment.
- iv. The retirement age policy for government servants is between 55 and 60 years old, which is expected to be similar in the private sect

3.3 Data Collection

The present study executed the purposive sampling method to account for the stipulated sampling criteria [34]. A total of 130 survey booklets were distributed to the target respondents for self-completion, which allowed the collection of completed responses within a short period with clarifications provided by the researcher immediately to respondents' inquiries [34]. To ensure an adequate understanding of the research topic, respondents were briefed about the study objectives with ample opportunities to explore the housing model in the AR apps. Resultantly, 76.92% of the disseminated survey booklets were duly completed and returned, in which the response rate was satisfactory as the achievement was above the marginal threshold of 60% [36]. Subsequently, data screening and assumption tests were conducted to ensure collected responses were fit for data analysis via the Statistical Package for Social Science (SPSS) software. Pertinent checking on potential study assumption violations could achieve adequate data validity [37].

4. Results and Discussion

Table 1 demonstrates that 64.0% of the respondents were females, while the majority were Malay (83.0%) followed by Chinese (10.0%) and Indian (5.0%). The findings realistically reflected the Malaysian social structure where women were increasingly hired in various firms, with Malays as the largest ethnic group. Meanwhile, most respondents (55.0%) aged between 35 and 44 years old with 60% earning between RM 3,000 and RM 5,999. The results suggested that the respondents achieved sufficient monthly income to secure a housing loan. Moreover, above 50.0% of the respondents exhibited an interest in searching for a new house, thus positing that the number of potential house buyers was significant in explaining the findings.

Table 1
 Demographic Profile of Respondents and Marketing Interest

Variable		N	Percentage (%)
GENDER	Male	36	36.0
	Female	64	64.0
ETHNICITY	Malay	83	83.0
	Chinese	10	10.0
	Indian	5	5.0
	Others	2	2.0
AGE (Years Old)	25 – 34	27	27.0
	35 – 44	55	55.0
	45 – 54	1	1.0
	55 - 60	1	1.0
MONTHLY INCOME (RM)	< 3,000	29	29.0
	3,000 – 5,999	60	60.0
	6,000 – 8,999	9	9.0
	≥ 9,000	2	2.0
SURVEYED FOR A NEW HOUSE	Yes	55	55.0
	No	45	45.0

To determine the AR application as a promotion tool in influencing potential house buyers' purchase intention, correlation analysis was performed by referring to the r-value of the Pearson product-moment correlation coefficient. The correlation coefficient magnitude was adapted from Schober and Schwarte [38] to interpret the relationship between the study variables. Table 2 outlines the correlation coefficient magnitudes for data interpretation. Meanwhile, Table 3 depicts a correlation analysis of the variables. The result revealed a significant correlation between AR technology as a promotion tool and housing purchase intention with a r-value of 0.682, thus indicating a moderate relationship consistent with past findings [25, 28, 39]. Resultantly, the AR technology utilisation significantly produced a positive influence on consumer purchase behaviour.

Table 2
 Demographic Profile of Respondents and Marketing Interest

Magnitude of Correlation Coefficient	Interpretation
0.00 – 0.10	Negligible Correlation
0.10 – 0.39	Weak Correlation
0.40 – 0.69	Moderate Correlation
0.70 – 0.89	Strong Correlation
0.90 – 1.00	Very Strong Correlation

Table 3
 Summary of Correlation between variables observed

Hypothesis	r value	Relationship	Result
AR as promotion tool influence intention to purchase among potential house buyers	.682	Moderate	accept

The study result indicated that AR technology possessed attractive attributes to enhance potential house buyers' purchase intention, which was in line with prior studies [40-42] emphasising the positive impact of promotion tool attractiveness in motivating consumer purchase behaviour. Hence, the current finding ascertained the role of the AR attributes in conveying evident messages about a property, such as overall design, floor layout, and interior space. By applying AR technology as a promotion tool, consumers could effectively visualise the actual product by virtually exploring

the house and surroundings. Concurrently, consumers could also evaluate the housing dimension and scale through intuitive and interactive modelling and simulation of the interior [43].

5. Conclusions

The contemporary business environment is becoming more competitive due to various challenges, including numerous competitors within the sector, constantly understanding complex consumer behaviour and fulfilling multiple consumer needs as prerequisite, unanticipated events, continuously incorporating changes to keep pace with the latest trends, and implementing the most optimal marketing management practices. With rapid technological advancements, enterprises are required to swiftly implement appropriate marketing strategies for business sustainability and survival. The most optimal method to achieve the aim is by adopting current marketing trends, such as the utilisation of pertinent mobile apps to promote products or services.

The property sector involved in selling housing units should apply the latest promotion strategies to be concurrent with Industrial Revolution 4.0 (IR 4.0) initiatives, which urged the sector to rapidly adopt innovation in respective business operations. Previous studies revealed that appropriate promotion strategies could significantly and positively influence consumer behaviour towards a particular product or service provider, which suggested that consumers would behave in specific manners in different circumstances.

Due to the significant positive correlation between the AR attributes and purchase intention, the current finding postulated that AR technology could be applied to effectively promote selling properties. The positive effect emanated from the feasibility that potential house buyers could holistically review the actual product virtually, which could provide more details compared to conventional promotion tools, such as brochures and three-dimensional mock-up models. As such, the AR application directly engages and provokes interactions amongst potential house buyers through the simulation of interior spaces and surrounding environments for exploration.

The present study contributed additional insights into the existing marketing and consumer behaviour literature, particularly in the housing sector. Furthermore, the findings contributed additional research evidence to the feasibility of the AR application. Practically, property developers could apply the technology as a pre-purchase evaluation tool to increase potential house buyers' acceptance and purchase intention. With the application, the technology would benefit property developers by reducing time consumption, increasing profitability, elevating investment return rates, and enhancing overall management effectiveness.

Acknowledgement

The author would like to acknowledge the support from the Fundamental Research Grant Scheme (FRGS) under a grant number of FRGS/1/2019/SSI11/UNIMAP/02/1 from the Ministry of Higher Education Malaysia.

References

- [1] Habitat, United Nations. "World Cities Report 2016: Urbanization and Development—Emerging Futures." *Publisher: UN-Habitat* (2016).
- [2] DOSM, "LAUNCHING OF REPORT ON THE KEY FINDINGS POPULATION AND HOUSING CENSUS OF MALAYSIA 2020," Department of Statistics Malaysia, 02-Summer-2022. [Online]. Available: https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=117&bul_id=akliVWdla2g3Y2VubTVSMkxmYXp1UT09&menu_id=L0pheU43NWJwRWVSZklWdzQ4TlhUUT09. [Accessed: 26-Nov-2022].
- [3] Abdullah, Lizawati, Ilyana Bazlin Mohd Nor, Norhaslina Jumadi, and Huraizah Arshad. "First-time home buyers: Factors influencing decision making." (2012): 249-254.

- [4] Hjalmarsson, Erik, and Randi Hjalmarsson. "Efficiency in housing markets: Which home buyers know how to discount?." *Journal of Banking & Finance* 33, no. 11 (2009): 2150-2163. <https://doi.org/10.1016/j.jbankfin.2009.05.014>
- [5] Qing, Xia. "Application research on the marketing dissemination channel of real estate industry." In *2011 International Conference on Business Management and Electronic Information*, vol. 2, pp. 365-367. IEEE, 2011. <https://doi.org/10.1109/ICBMEI.2011.5917923>
- [6] Katsioloudis, Petros, Vukica Jovanovic, and Mildred Jones. "A comparative analysis of spatial visualization ability and drafting models for industrial and technology education students." *Journal of Technology Education* 26, no. 1 (2014). <https://doi.org/10.21061/jte.v26i1.a.6>
- [7] Agarwal, Siddhant. "Review on application of augmented reality in civil engineering." In *International Conference on Inter Disciplinary Research in Engineering and Technology*, vol. 68, p. 71. 2016.
- [8] Ullah, Fahim, Samad ME Sepasgozar, Muhammad Jamaluddin Thaheem, and Fadi Al-Turjman. "Barriers to the digitalisation and innovation of Australian Smart Real Estate: A managerial perspective on the technology non-adoption." *Environmental Technology & Innovation* 22 (2021): 101527. <https://doi.org/10.1016/j.eti.2021.101527>
- [9] Koebel, C. Theodore. "Sustaining sustainability: innovation in housing and the built environment." *Journal of Urban technology* 6, no. 3 (1999): 75-94. <https://doi.org/10.1080/10630739983597>
- [10] Ashurst, Adrian. "Customer Feedback." *Nursing And Residential Care* 2, no. 11 (2000): 554-554. <https://doi.org/10.12968/nrec.2000.2.11.7676>
- [11] Falát, Lukáš, and Martin Holubčík. "The influence of marketing communication on financial situation of the company—a case from automobile industry." *Procedia engineering* 192 (2017): 148-153. <https://doi.org/10.1016/j.proeng.2017.06.026>
- [12] Egan, John. "Marketing communications." *Marketing Communications* (2023): 1-416.
- [13] Mariana Febrianti, R. Adjeng, Cyntia Nisa Assiva, Amberly Salsabila, Khoirunnisa Rojani Salsabila, Nadia Puspita Octarian, and Wynda Christina Sinaga. "The Role of Marketing Communication and Innovation on Consumer Purchase Intention (Case Study at Restaurant X in Bandung City)." *Review of International Geographical Education Online* 11, no. 3 (2021).
- [14] Wang, Dan, Terh Jing Khoo, and Zhangfei Kan. "Exploring the Application of Digital Data Management Approach for Facility Management in Shanghai's High-rise Buildings." *Progress in Energy and Environment* 13 (2020): 1-15.
- [15] Widiastuti, Ratih, Juliana Zaini, Mochamad Agung Wibowo, and Wahyu Caesarendra. "Indoor thermal performance analysis of vegetated wall based on CFD simulation." *CFD Letters* 12, no. 5 (2020): 82-90. <https://doi.org/10.37934/cfdl.12.5.8290>
- [16] Jaafar, Nurulaini, Siti Rohani Mohd Nor, Siti Mariam Norrulashikin, Nur Arina Bazilah Kamisan, and Ahmad Qushairi Mohamad. "Increase Students' Understanding of Mathematics Learning Using the Technology-Based Learning." *International Journal of Advanced Research in Future Ready Learning and Education* 28, no. 1 (2022): 24-29.
- [17] Chen, Nan, and Yunpeng Yang. "The impact of customer experience on consumer purchase intention in cross-border E-commerce—Taking network structural embeddedness as mediator variable." *Journal of Retailing and Consumer Services* 59 (2021): 102344. <https://doi.org/10.1016/j.jretconser.2020.102344>
- [18] Hewei, Tian, and Lee Youngsook. "Factors affecting continuous purchase intention of fashion products on social E-commerce: SOR model and the mediating effect." *Entertainment Computing* 41 (2022): 100474. <https://doi.org/10.1016/j.entcom.2021.100474>
- [19] Sholichah, Nur Laili, Andre Parvian Aristio, Lukman Junaedi, Yudha Andrian Saputra, and Stefanus Eko Wiratno. "Purchase intention through search engine marketing: E-marketplace provider in Indonesia." *Procedia Computer Science* 197 (2022): 445-452. <https://doi.org/10.1016/j.procs.2021.12.160>
- [20] Balakrishnan, Bamini KPD, Mohd Irwan Dahnil, and Wong Jiunn Yi. "The impact of social media marketing medium toward purchase intention and brand loyalty among generation Y." *Procedia-Social and Behavioral Sciences* 148 (2014): 177-185. <https://doi.org/10.1016/j.sbspro.2014.07.032>
- [21] Masuda, Hisashi, Spring H. Han, and Jungwoo Lee. "Impacts of influencer attributes on purchase intentions in social media influencer marketing: Mediating roles of characterizations." *Technological Forecasting and Social Change* 174 (2022): 121246. <https://doi.org/10.1016/j.techfore.2021.121246>
- [22] Stoltz, Marie-Hélène, Vaggelis Giannikas, Duncan McFarlane, James Strachan, Jumyung Um, and Rengarajan Srinivasan. "Augmented reality in warehouse operations: opportunities and barriers." *IFAC-PapersOnLine* 50, no. 1 (2017): 12979-12984. <https://doi.org/10.1016/j.ifacol.2017.08.1807>
- [23] Chi, Hung-Lin, Shih-Chung Kang, and Xiangyu Wang. "Research trends and opportunities of augmented reality applications in architecture, engineering, and construction." *Automation in construction* 33 (2013): 116-122. <https://doi.org/10.1016/j.autcon.2012.12.017>

- [24] Wang, Xiangyu, Mi Jeong Kim, Peter ED Love, and Shih-Chung Kang. "Augmented Reality in built environment: Classification and implications for future research." *Automation in construction* 32 (2013): 1-13. <https://doi.org/10.1016/j.autcon.2012.11.021>
- [25] Whang, Jeong Bin, Ji Hee Song, Boreum Choi, and Jong-Ho Lee. "The effect of Augmented Reality on purchase intention of beauty products: The roles of consumers' control." *Journal of Business Research* 133 (2021): 275-284. <https://doi.org/10.1016/j.jbusres.2021.04.057>
- [26] Faqih, Khaled MS. "Factors influencing the behavioral intention to adopt a technological innovation from a developing country context: The case of mobile augmented reality games." *Technology in Society* 69 (2022): 101958. <https://doi.org/10.1016/j.techsoc.2022.101958>
- [27] Hung, Shiu-Wan, Che-Wei Chang, and Yu-Chen Ma. "A new reality: Exploring continuance intention to use mobile augmented reality for entertainment purposes." *Technology in Society* 67 (2021): 101757. <https://doi.org/10.1016/j.techsoc.2021.101757>
- [28] Hsu, Sheila Hsuan-Yu, Hung-Tai Tsou, and Ja-Shen Chen. "'Yes, we do. Why not use augmented reality?'" customer responses to experiential presentations of AR-based applications." *Journal of Retailing and Consumer Services* 62 (2021): 102649. <https://doi.org/10.1016/j.jretconser.2021.102649>
- [29] Ullah, Fahim, P. Samad Sepasgozar, and Tauha Hussain Ali. "Real estate stakeholders technology acceptance model (RESTAM): User-focused big9 disruptive technologies for smart real estate management." In *Proceedings of the 2nd International Conference on Sustainable Development in Civil Engineering (ICSDC 2019), Jamshoro, Pakistan*, pp. 5-7. 2019.
- [30] Jain, Neha. "Survey versus interviews: Comparing data collection tools for exploratory research." *The Qualitative Report* 26, no. 2 (2021): 541-554. <https://doi.org/10.46743/2160-3715/2021.4492>
- [31] Brace, Ian. *Questionnaire design: How to plan, structure and write survey material for effective market research*. Kogan Page Publishers, 2018.
- [32] Kazmi, Syed Hasnain Alam, Rizwan Raheem Ahmed, Kamran Ahmed Soomro, Alharthi Rami Hashem E, Hameed Akhtar, and Vishnu Parmar. "Role of augmented reality in changing consumer behavior and decision making: Case of Pakistan." *Sustainability* 13, no. 24 (2021): 14064. <https://doi.org/10.3390/su132414064>
- [33] Saunders, Mark, Philip Lewis, and Adrian Thornhill. "Research methods for business students (6. utg.)." *Harlow: Pearson* (2012).
- [34] Sekaran, Uma, and Roger Bougie. "Research methods for business: a skill-building approach." (2016).
- [35] Patino, Cecilia Maria, and Juliana Carvalho Ferreira. "Inclusion and exclusion criteria in research studies: definitions and why they matter." *Jornal Brasileiro de Pneumologia* 44 (2018): 84-84. <https://doi.org/10.1590/s1806-37562018000000088>
- [36] Hendra, Richard, and Aaron Hill. "Rethinking response rates: new evidence of little relationship between survey response rates and nonresponse bias." *Evaluation review* 43, no. 5 (2019): 307-330. <https://doi.org/10.1177/0193841X18807719>
- [37] Hoekstra, Rink, Henk AL Kiers, and Addie Johnson. "Are assumptions of well-known statistical techniques checked, and why (not)?" *Frontiers in psychology* 3 (2012): 137. <https://doi.org/10.3389/fpsyg.2012.00137>
- [38] Schober, Patrick, Christa Boer, and Lothar A. Schwarte. "Correlation Coefficients: Appropriate Use and Interpretatio, Anesthesia & Analgesia." (2018): 1763-1768. <https://doi.org/10.1213/ANE.0000000000002864>
- [39] Jung, Timothy Hyungsoo, Sujin Bae, Natasha Moorhouse, and Ohbyung Kwon. "The impact of user perceptions of AR on purchase intention of location-based AR navigation systems." *Journal of retailing and consumer services* 61 (2021): 102575. <https://doi.org/10.1016/j.jretconser.2021.102575>
- [40] Kovanovienė, Viktorija, Raminta Mačytė, Rasa Petkevičiūtė, and Greta Zaikauskaitė. "The influence of marketing tools on consumer behavior and its assessment." In *14th prof. Vladas Gronskas International scientific conference*, pp. 42-48. 2020. <https://doi.org/10.15388/OpenSeries.2019.18402>
- [41] Sama, Ramzan. "Impact of media advertisements on consumer behaviour." *Journal of Creative Communications* 14, no. 1 (2019): 54-68. <https://doi.org/10.1177/0973258618822624>
- [42] Wu, Cheng-Lung, and Ngai Ki Ma. "The impact of customised mobile marketing on passenger shopping behaviour in the airport terminal." *Journal of Retailing and Consumer Services* 66 (2022): 102941. <https://doi.org/10.1016/j.jretconser.2022.102941>
- [43] Bouchlaghem, Dino, Huiping Shang, Jennifer Whyte, and Abdulkadir Ganah. "Visualisation in architecture, engineering and construction (AEC)." *Automation in construction* 14, no. 3 (2005): 287-295. <https://doi.org/10.1016/j.autcon.2004.08.012>