Investigating the Influence of Virtual Reality versus Conventional Two-Dimensional Advertising on Flow Experience and Purchase Intention Among Customers of Sports Products

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Abstract

Purpose: The recent advancements in technology have significantly transformed the way people interact with and perceive both physical and virtual environments. Virtual reality has emerged as a pivotal technology in this ongoing transformation. The purpose of this study was to identify the impact of virtual reality advertising on the flow experience and purchase intention of sports consumers and compare to Two-Dimensional Advertising.

Method: The present study is an applied and semi experimental research based on structural equation modeling. Statistical population included customers of Mammut sports products. Measurement tools included Kim and Ko (2019) flow Experience questionnaire and Kang et al (2018) purchase intention questionnaire. The reliability and validity of the questionnaires were assessed using Cronbach's alpha and the composite reliability index in PLS software. The virtual reality headset was also used to create the virtual reality experience. Finally, structural equations in PLS software were used to analyze the research data.

Results: The findings showed that the promotion of virtual reality through cognitive absorption, enjoyment and time distortion leads to the flow experience, ultimately indulging in the intention to purchase consumers' sports products.

Conclusion: Marketers should prioritize the development of engaging VR content that allows customers to experience products in realistic settings, particularly in the context of sports products, to drive sales. Additionally, as consumer behavior shifts towards online shopping post-COVID-19, investing in innovative VR technologies and content production will be crucial for brands seeking to capture and retain customer attention in a competitive market.

Keywords: Virtual Reality, Flow Experiences, Advertisements, Sport Product

Introduction

Technology of virtual reality is accelerating day by day and is significantly growing in various industries including education, medicine, tourism, sports, and retail. Virtual reality creates a virtual environment in front of the user's eyes, allowing the user to interact with the virtual environment based on head and body movements as if they were actually in that environment. In fact, virtual reality is referred to as an environment created by computer or mobile devices, in which the user feels they are in a real environment (Biocca, 1995). This technology is the science of combining human with information, a way to visualize, manipulate, and interact with an artificial world using computers and complex data derived from simpler technologies (computer science, 3D graphics, robotics, etc.) to create a digital environment in which users are fully immersed and can interact with (Guttentag, 2010). VR uses 3D technology to create an environment that users can interact with and explore, simulating a real-world setting in a digital space (Cowan and Ketron, 2019). According to marketing rules, virtual reality technology, significantly impacts customer experience, behavior, emotions, and overall customer purchasing processes (Lemon & Verhoef, 2016). Consequently, virtual reality technology has also entered the advertising and marketing domain, providing marketers with a new, creative, and innovative path for promoting products and brands (Adams, 2016). Additionally, Hsiao and Lin (2023) recommend that companies leverage virtual reality (VR) to enhance business performance and meet consumer needs by enriching the shopping experience and boosting purchase intentions. In this context, Rawson (2013) asserts that it is entirely feasible to develop a simulation and immersive experience for customers using virtual reality technology. virtual reality can provide a dynamic and enjoyable experience for customers (Ostrom et al., 2015). In this regard, one of the main functions of virtual reality is to create a flow experience for users. Researchers in various fields such as online education, computer games, and marketing are striving to focus customer attention and encourage customers to spend more time on learning or exploring a product by creating a flow experience (Kiili et al., 2012; Doğan et al, 2024). Obada (2013) also states that flow is one of the important and key structures for enhancing the customer relationship with the product in virtual environments. For instance, Sohail Jafari et al. (2024) demonstrated that fostering a flow experience for customers in a virtual environment like the Metaverse can enhance their intention to make purchases. In general, Consumers' behavioral intentions such as the chance of purchasing are influenced by flow experience (Chen & Lin, 2022; Whang et al., 2021). Therefore, researchers have recommended that creating a flow experience should be a priority when developing virtual environments for consumers. Flow experience is considered as a comprehensive sensation when individuals are fully engaged in an activity (Csikszentmihalyi, 1990). This research, in line with Kim and Ko (2019), considered three factors of enjoyment, cognitive absorption, and time distortion for the flow experience. The first definition presented by Csikszentmihalyi (1975) revealed that the flow experience is accompanied by a great deal of enjoyment. It can be said that enjoyment occurs as an internal entertainment in interaction with technology (Csikszentmihalyi, 2005). On the other hand, various research studies indicate that this factor is the most recurring factor in the flow experience (Domingo et al., 2012). They demonstrated that enjoyment has a positive impact on creating the flow experience and consequently increases the intention to purchase. Guo and Barnes (2009), in interviews with customers, concluded that an enjoyable experience is very likely to lead to creating a flow experience and purchasing in the virtual world. Another states that individuals experience during flow is time

distortion; This means that the person feels that time passes much faster than the actual state (Ozkara et al., 2017). Researchers such as Novak et al., (2000) have considered time distortion as one of the fundamental factors in the flow experience. However, in some cases, time distortion leads to negative feelings and regret for the user because they have not noticed the passage of time during drowning and have spent more time in the virtual world (Pace, 2004). At the end, Cognitive absorption is defined as a deep engagement with technology. It represents a kind of intrinsic motivation and occurs where behavior is inherently attractive and enjoyable, and the individual does not expect external rewards for performing that behavior (Agarwal & Karahanna, 2000). Chang et al., (2005) also demonstrated that the experience of cognitive absorption enhances the experience of flow and increases the likelihood of purchasing in a virtual environment.

Various studies have shown that the flow experience can influence customer purchasing behavior. Lee and Wu (2017) demonstrated that flow experience leading to immersion experience, satisfaction and impulse buying in online shoppers. Bogicevic et al (2019) also demonstrated that virtual reality can create a multi-faceted experience for potential tourists and increase their inclination to visit the destination. Kang et al (2018) also stated in the same field that flow experience in virtual environments increases purchase intention in real-world restaurant customers. In addition, Kim and Ko (2019) compared the effectiveness of virtual reality advertising with traditional 2D advertising by comparing the experience of watching a basketball game in virtual reality versus traditional 2D format. They demonstrated that virtual reality led to greater immersion and satisfaction among viewers compared to traditional viewing. Furthermore, recent studies indicate that virtual reality (VR) advertising outperforms traditional advertising methods. For instance, Kitsopoulou & Lappas (2023) showed that VR advertising contributes to positive attitudes toward advertising and the advertised brand, more than traditional advertising. They emphasized VR advertising is more effective for brands, due to its special features such as 3D effects, innovativeness, vividness, interactivity, personalization, telepresence, realism, and real-time interaction. Mishra et al. (2024) indicated that VR experience is a strong predictor of purchase intention. They suggested that marketers should positively influence consumer attitudes and behavioral intentions by facilitating unique experiences in virtual retailing. Borawska et al. (2023) demonstrated that the impact of advertising messages delivered in virtual reality is significantly greater than that of conventional advertising.

The growing market of virtual reality technology, along with reduced costs and advancements in hardware and software, has made this technology accessible to the general public. Given the importance and increasing applications of virtual reality, especially in creating immersive experiences crucial for marketing success, conducting research in the field of sports marketing to achieve optimal solutions and pave the way for further development of models in virtual reality technology and flow experiences is essential. Marketers are seeking methods to maximize customer attention and engagement. Furthermore, creating experiences for customers in retail environments has always been a challenge for sellers, as customers cannot physically experience the desired product. Virtual reality technology has provided marketers with the opportunity to immerse customers in a simulated environment, allowing them to experience the product in conditions close to reality and ultimately influence their purchasing behavior. Given the growing prevalence of online shopping, especially post-COVID-19, this study will provide valuable insights into how immersive advertising can create memorable experiences

that resonate with consumers. By identifying the mechanisms through which VR enhances flow and purchase intention, this research will not only contribute to academic literature but also offer practical implications for brands seeking to innovate their marketing strategies and effectively connect with their target audience. Based on conceptual model that mentioned below, the researchers aimed to answer the question: What is the impact of virtual reality advertising on creating flow experiences and purchase intention for sports products, and how does it compare to two-dimensional product advertising?

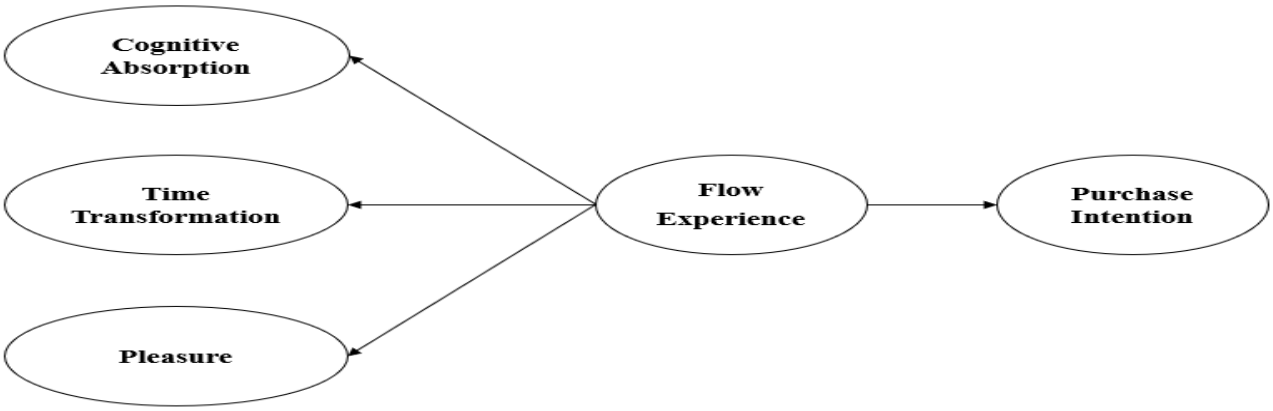

Fig. 1. Conceptual Model

Materials and methods

The present research was applied in terms of its objective and was of a semi-experimental nature. The statistical population consisted of the customers of Mammut sports products. Initially, samples were selected from male undergraduate students at the University of Tehran. Considering the number of questionnaire items (11 questions) and the fact that the sample size for conducting a structural equation modeling can range from 5 to 15 samples per question, a sample size of 90 individuals was considered. After selecting 90 individuals based on the inclusion criteria, the individuals were randomly divided into two groups: virtual reality advertising (45 individuals) and two-dimensional advertising (45 individuals). To create the virtual reality experience, a virtual reality headset from the Quilo brand was used. Additionally, after searching through 360-degree advertising films, a 360-degree clip of Mammut brand mountaineering apparel advertising was selected. Furthermore, the mentioned clip was examined and approved by three professors in the field of sports marketing and advertising. The measurement tools included the "flow experiences" questionnaire by Kim and Ko (2019), as well as the " Purchase Intention" questionnaire by Kang et al, (2018). Validity was evaluated by seven sports management professors, and its structural validity was confirmed through confirmatory factor analysis. The execution method involved the final selection of samples and their division into two groups: virtual reality and two-dimensional. Each sample from the virtual reality group was individually placed in the research room, where the researcher initially provided explanations about the advertisement and its content to the participant. Each participant was individually placed in the controlled research room, where the virtual reality advertisement of Mammut company was played through Quilo VR. After viewing the virtual reality clip, each participant was given the questionnaires. Additionally, for the two-dimensional group, the advertisement was traditionally played, and after its completion, the questionnaires were provided to them. Finally, structural equation modeling in PLS 3 software was used for data analysis.

Result

To perform structural equations in the situation of model comparison and low sample size, the use of the partial least squares (PLS) approach is suggested, so in this research, the use of Smart PLS software is the most appropriate option. At first, the validity and reliability of the questionnaire were examined according to Table No. 1.

Table 1. *The results related to the validity and reliability analyzes of the research variables*

	Cronbach's Alpha	Rho_A	Composite Reliability	Average Variance Extracted (AVE)
Cognitive Absorption	0.874	0.876	0.922	0.798
Time distortion	0.837	0.838	0.902	0.754
Enjoyment	0.879	0.881	0.926	0.806
Purchase Intention	0.834	0.835	0.923	0.858
Flow Experience	0.908	0.908	0.926	0.610

On the other hand, the data in the table show that the composite reliability for all variables is greater than 0.8 and the mean-variance for all variables is greater than 0.5. Also, Cronbach's alpha and Dillon-Goldstein's rho of variables are more than 0.7, which shows a relatively high degree of convergence (Chin, 1998). Then, in Table No. 2, factor load values were checked **Table 2.** *The result of the factor loadings*

Sub Component	Item	Symbol	Factor Loading	Result

Cognitive Absorption	The complete focus was on the advertisement, and I paid attention to it.	q1	0.900	suitable
	I became deeply fascinated by this advertisement	q2	0.907	suitable
	I completely immersed myself in the advertising space.	q3	0.874	suitable
Time Distortion	While watching the advertisement, time seemed to pass much faster than reality.	q4	0.923	suitable
	I enjoyed the time when I was immersed in watching the advertisement.	q5	0.930	suitable
Enjoyment	It was an enjoyable experience.	q6	0.861	suitable
	This was an exciting experience.	q7	0.864	suitable
	This experience was an exciting entertainment for me.	q8	0.880	suitable
Purchase Intention	In the near future, I will buy from the Mammut brand	q9	0.929	suitable
	In the future, I will regularly purchase products from the Mammut brand	q10	0.909	suitable
	I intend to share positive experiences about this brand with my friends in the future.	q11	0.854	suiatble

The results of the above table show that the factor loadings of all items are more than 0.7 and therefore have good validity (Fornell & Larcker, 1981). Now, the effect of Flow experience on purchase intention is investigated in two-dimensional and three-dimensional situations mentioned in Table No. 3 and Figure No 1, 2.

Table 3. *Path coefficient values and t-values Hypotheses related to research model paths*

		Path coefficient	T Values	P Values
Two-dimensional	Flow Experience ----> Purchase Intention	0.674	7.618	0.001
Three-dimensional	Flow Experience ----> Purchase Intention	0.899	26.196	0.001

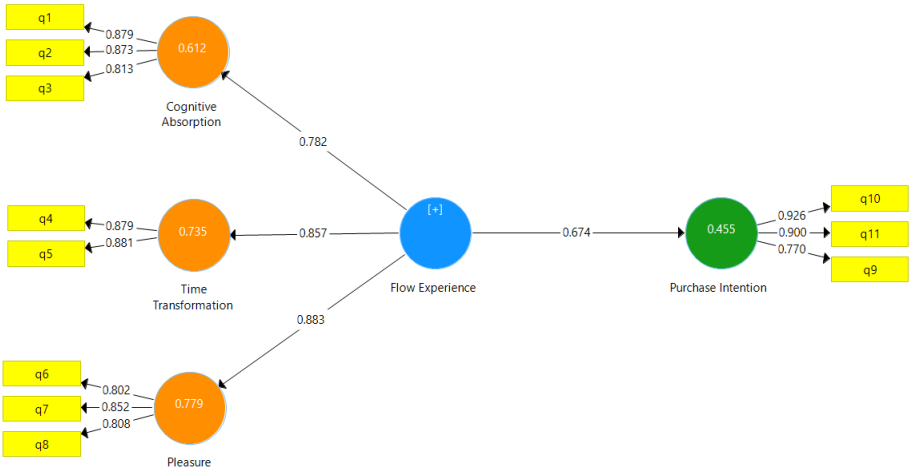

Figure 1. *The research model in the case of path coefficient and factor loadings (Two-dimensional)*

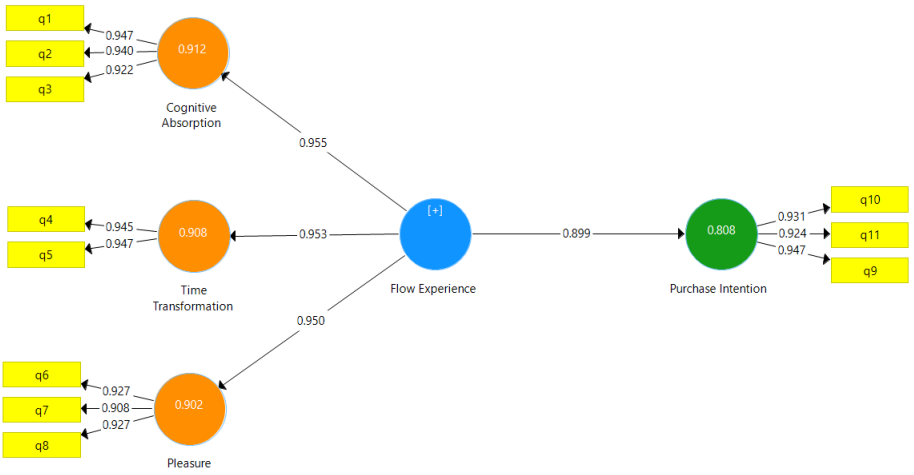

Figure 2. *The research model in the case of path coefficient and factor loadings (Three-dimensional)*

The results of the above table showed that dirhams in both two-dimensional and three-dimensional situations will lead to the intention to purchase the product, and the analysis of the coefficients also shows that there is a difference between these two situations. In the next table (NO.4), with multi-group analysis, we will check whether this difference is statistically significant or not.

Table 4. *Comparison of two-dimensional and three-dimensional technology (Welch-Satterthwaite test)*

	Path coefficient	T Values	P Values
Flow Experience ----> Purchase Intention	0.224	2.313	0.026

The results of the Welch-Satterwhite test that mentioned in table NO.5, show that there is a significant difference between the two situations and that virtual reality has had a significant impact on the participants' purchase intention.

Table 5. *Research model fit indicators*

	Variable	Q^2	R^2	SRMR
Two-dimensional	Purchase Intention	0.314	0.442	0.098<0.1
Three-dimensional		0.663	0.808	0.098<0.1

According to the information in the table, the values obtained for the R^2 are in the medium to strong range and the Q^2 are in the strong range. Also, the SRMR value is less than 0.1, which indicates the appropriate quality of the research model (Cangur & Ercan, 2015). In the following, the image of the tested model of the research along with the path coefficient obtained for all paths of the model in Figures 3 and 4 have been represented.

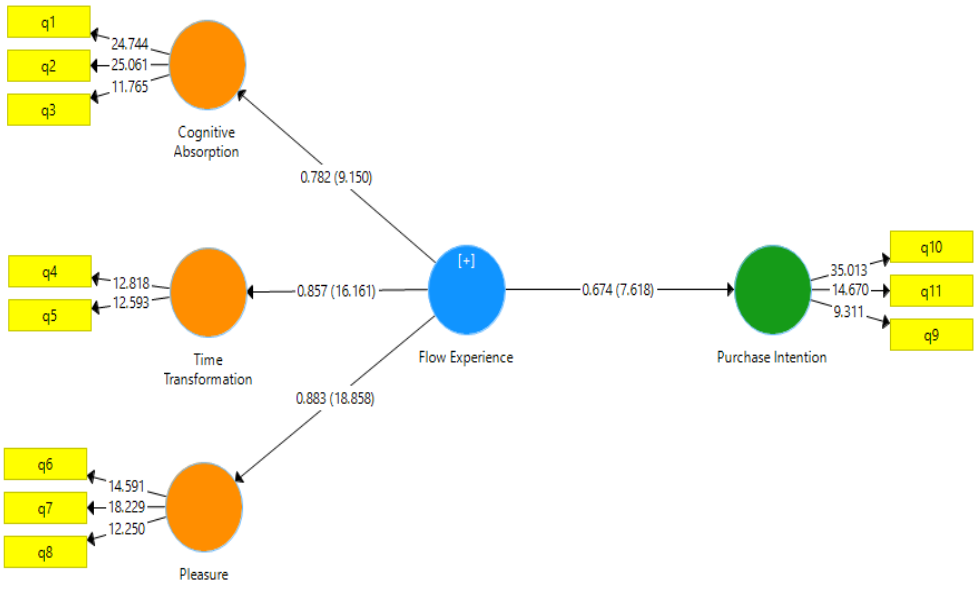

Figure 3. *The final research model in the case of path coefficient and T-Value (Two-dimensional)*

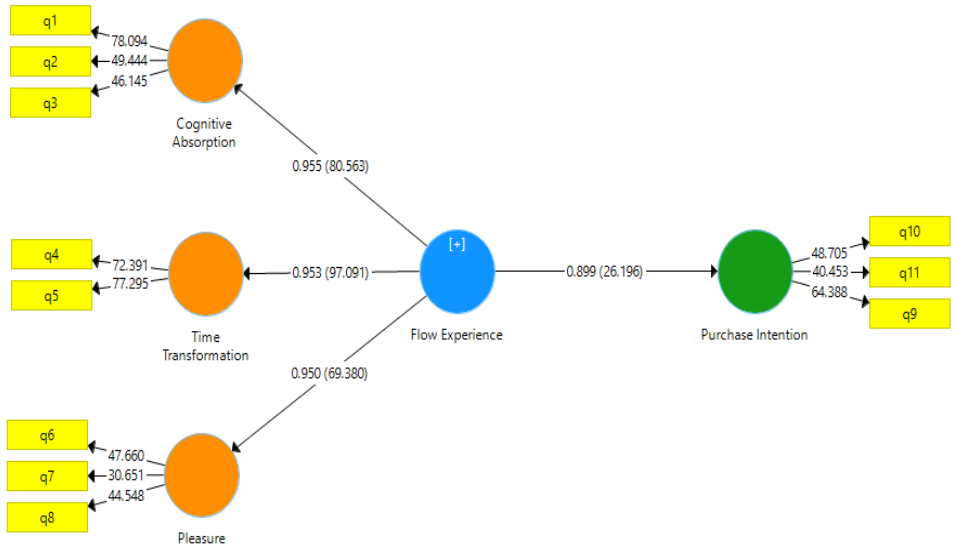

Figure 4. *The final research model in the case of path coefficient and T-Value (Three-dimensional)*

Discussion

The findings of this study highlight the significant role of enjoyment in fostering a flow experience among participants. After engaging with the virtual reality advertisement, participants reported feelings of enjoyment, excitement, and engagement. This aligns with Kiilia et al. (2012), who identified enjoyment as a critical factor in the flow experience. Their research emphasized that the uniqueness and specificity of enjoyment can further amplify the flow experience. Additionally, the results indicated that time distortion is a significant contributor to the flow experience. This finding corroborates the views of several researchers, including Skadberg and Kimmel (2004), who identified time distortion and enjoyment as fundamental elements of the flow experience. Their research on websites demonstrated that appealing visual features can induce time distortion, ultimately facilitating the flow experience. Similarly, Han et al. (2020)

affirmed that time distortion is crucial for enhancing the virtual reality experience. However, some studies have reported negative feelings and regret associated with time distortion (Pace, 2004), which contrasts with our findings. Given the short duration of our study (maximum of 5 minutes), it appears that time distortion in this context does not evoke negative feelings but rather contributes to a positive experience. Negative experiences related to time distortion are often observed in users who spend extended periods online. Thus, the presence of time distortion in virtual reality presents a unique opportunity for marketers to engage users more effectively, prolong their interaction with the content, and implement diverse advertising strategies to increase the likelihood of purchase. Marketers could create shorter, impactful advertisements that leave users wanting more, potentially leading to increased revisit rates. Additionally, incorporating gamification elements could help maintain user interest over extended periods.

Furthermore, cognitive absorption emerged as a significant factor in creating an overwhelming experience for customers. Cognitive absorption, defined as a state of deep engagement facilitated by technology (Agarwal and Karahanna, 2000), was supported by the findings of Lee and Brun (2006), who confirmed its impact on immersion. Participants demonstrated full attention to the advertisement while using virtual reality headsets, becoming completely captivated and immersed in the virtual environment. This underscores the importance of cognitive absorption, as participants were deeply engaged and motivated internally. To foster cognitive absorption, businesses should ensure that virtual reality advertisements are immersive and captivating. This could involve using high-quality visuals, sound, and interactive features that capture the user's attention. Providing a seamless user experience with minimal distractions will help deepen engagement and enhance absorption.

Faiola et al. (2013) also highlighted the essential nature of creating a flow experience within virtual reality environments. Their findings suggest that higher-quality immersive experiences lead to increased user immersion and favorable consumer behavior. Lee et al. (2020) further emphasized that appropriate levels of immersion can enhance user engagement with virtual reality. Numerous studies have explored the effect of immersive experiences on e-commerce websites and their influence on purchase intentions. For instance, Huang (2012) examined the online customer experience, demonstrating that immersive experiences created through interactive tools, online games, and visually appealing content significantly enhance purchase intentions. Similarly, Shu et al. (2017) found that immersive experiences in online shopping environments positively influence consumer purchasing behavior. Woo et al. (2014) also noted that immersive experiences can shift user attitudes toward desired services, encouraging purchases. Collectively, these findings underscore the crucial role of immersive experiences in shaping customer behavior.

Marketers should focus on creating engaging and enjoyable content in virtual reality advertisements to increase flow experiences. This can involve using interactive elements, storytelling techniques, and visually appealing graphics to enhance the overall enjoyment of the experience. Conducting user testing to refine these elements can ensure that the advertisements resonate well with the target audience.

Moreover, the results indicated that virtual reality advertising was more effective than conventional 2D advertising in fostering a sense of presence and, consequently, purchase intention. Kim et al. (2019) found that virtual reality technology could create a captivating experience for NBA audiences, consistent with our findings. They noted that participants

engaging with virtual reality reported higher satisfaction levels than those viewing 2D representations. This suggests that utilizing virtual reality technology for sports viewing can enhance excitement and presence, creating a unique experience comparable to being physically present at the event. Brands should consider prioritizing virtual reality advertising in their marketing strategies, especially for sports products. This may involve allocating a larger portion of the budget to VR campaigns and experimenting with different formats, such as live events or virtual showrooms, to enhance the sense of presence and excitement among consumers.

Conclusion

It appears that the flow experience is the most significant factor that marketers strive to achieve in virtual environments, as its attainment can influence customer purchasing behavior. Ajzen (1991) also believes that the floe experience can alter customer behavior, thus being a vital factor for the success of marketers. When a customer experiences immersion, aside from enjoyment, they exhibit complete focus on the advertisement and spend more time in the virtual environment, influencing their behavioral objectives and providing marketers with an opportunity to have a more effective impact on the customer. In recent years, when mass advertising has lost its effectiveness and individuals are less inclined to pay attention to advertisements (Sleimanski, 2009), virtual reality can effectively address this challenge. The power of virtual reality immersion is one of the most significant strengths of this technology for immersing customers in advertisements, enhancing their enjoyment and focus, which are key objectives for marketers. One of the recent challenges for marketers is the inability to create an experience in the store or at the customer's home, especially for sports products that require the customer to experience them in a sports or natural environment. Virtual reality has provided marketers with the opportunity to create a realistic and enjoyable experience for customers in small environments such as stores and homes, thereby increasing the chance of product sales. This technology can be effectively utilized by sports teams; fans can immerse themselves in a club, be close to their favorite players, inside a store, or within a stadium using this technology and provide fans with an enjoyable immersive experience, ultimately increasing club product sales. Additionally, given the COVID-19 pandemic, stores and brands prefer to sell their products electronically and virtually. In this context, virtual reality can play a fundamental role as a new technology, providing customers with an enjoyable virtual experience and consequently increasing the chance of purchase. In this regard, Kim (2020) suggested that during the COVID-19 pandemic, digital sales should be pursued, and the use of virtual reality technology is crucial for creating an immersive experience and engaging customers, ultimately leading to their purchase. Additionally, it seems that with changes in customer behavior during the COVID-19 pandemic, online store sales will flourish in the future more than ever before, and there will be an increased inclination for brands and stores to use this technology. Therefore, it is recommended that given the future of this technology, innovation and content production startups should enter this field to shape a new approach to marketing in Iran, especially in sports teams and product sales. Moreover, based on research results, it is suggested that greater importance be placed on the produced content for virtual reality use, and apart from the fundamental principles of three-dimensionality, the enjoyment component should be employed. In fact, if the content can immerse the customer in the desired advertisement, it can effectively impact their purchase intent.

One of the primary limitations of this study was the inability to utilize a high-quality virtual reality headset, primarily due to its prohibitive

cost. Additionally, constraints related to time prevented the incorporation of other sensory elements into the virtual reality advertisements. Furthermore, the research was limited to male participants, as access to a more diverse sample was restricted. To enhance future studies, it is recommended that researchers employ the HTC virtual reality headset and explore the integration of additional sensory experiences, such as high-fidelity audio and tactile feedback (e.g., temperature variations related to the advertisement). Moreover, considering gender as a moderating variable in future research could provide valuable insights and contribute to a more comprehensive understanding of the effects of virtual reality advertising.

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