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Rebranded Reality: How AR Brand Experience impacts Brand Equity

Ksenija MITROVIĆ, Jelena SPAJIĆ*, Bojana MILIĆ, Dunja BOŠKOVIĆ, Danijela LALIĆ

Abstract: Augmented Reality (AR) enables a new approach to simulate the dematerialized aspects of brand experience and reach audiences in a novel and exciting way. This study aims to provide a better understanding of how brand experience and brand equity are established through consumers' AR experiences, facilitated by flow. Moreover, the study aims to examine AR effectiveness in supporting long-term branding strategies. To achieve this objective, 174 participants were exposed to an AR experience and accessed an online survey. The empirical data is processed and verified by partial least squares-structural equation modelling (PLS - SEM). The results of this study show that augmented reality attributes novelty, and interactivity positively affects flow. However, only when novelty affects flow, it becomes a serial mediator on brand experience and further on brand equity. More specifically, novelty through flow affects all factors of brand experience. Through sensory brand experience, flow affects all factors of brand equity, while through behavioural brand experience, it affects overall brand equity. The findings of this study add support to comprehensive theoretical knowledge of the concept of AR branding and provide a framework for effective integration of AR technology into brand strategy.

Keywords: AR branding; augmented reality; brand equity; brand experience; flow

1 INTRODUCTION

In today's rapidly evolving world, consumers live in a parallel existence where the real and the virtual seamlessly intertwine. Augmented Reality (AR) has revolutionized the way they perceive and engage with surroundings, and brands should exploit its potential to be present in the new realm. In the era of virtual experiences brands are actively occupying consumers' space to increase brand exposure [1]. AR technology has opened new opportunities for brands to extend their presence beyond the physical realm [2] and advance their interactions with consumers [3]. It augments the consumers' environment by superimposing virtual elements in real time, producing a unique and captivating experience [4]. Through such experience, brands can offer more detailed information and influence consumers' perceptions [3]. Due to ever-changing innovative technology consumer needs are also being reshaped. They expect a superior experience that goes above and beyond the features and benefits of the products consumed [5]. Hence, providing rich experiential benefits is a great way to shape comparative advantage and build brand equity [6]. Brand-consumer relationship is heightened when it is based on many experiences and exposures. Therefore, using brand experience to form a positive image in the minds of consumers is an accurate path for gaining consumers' loyalty. This study sought to discover whether AR technology can create such a compelling experience and the key brand outcomes which may arise as a result. In addition, it explores the ability of AR technology to achieve an optimal level of motivation and concentration, and its potential to enrich the overall brand experience and further brand equity. When consumers are completely engrossed and engaged in the activity, the way they experience brands is intensified. Rauschnabel et al. point to the lack of a comprehensive theory of AR branding and the need to examine the factors that encourage its wider usage [7]. The purpose of this study is to examine how brand experience is shaped via AR technology, which eventually leads to an enhanced brand equity. Prior studies have explored these effects in fragments, but none has provided a single framework that integrates these constructs in one cohesive model. Given the knowledge gap, this study attempts to determine whether AR is capable of influencing brand outcomes, with flow as a mediator.

2 LITERATURE REVIEW

2.1 The Present and the Future of AR Application in Marketing

Augmented reality (AR) includes a set of technologies that incorporate digital information and images into the user's physical reality, thus creating a new interface between the digital and real worlds [8]. It enables access to information that would not pshyically exist [9]. Instead of replacing the physical environment, AR augments it virtual and physical environments coexist [10]. Azuma [10] identified three key characteristics of AR technology: 1) Combining the real and virtual world offers a unique (novel) experience, specific to consumers' actions, 2) AR technology is interactive in real time, 3) Since it is registered in 3D, it provides a vivid visual experience. The adoption of digital information usage among consumers has resulted in the rise of new AR applications in various fields. We are witnessing a great change in the way consumers interact with and experience brands. Relevant literature review shows many positive implications of AR on different marketing indicators: it boosts brand engagement [1, 11, 12], influences brand attitude and inspiration [7], and facilitates making purchase decisions [1]. Also, AR creates captivating experience and strengthens overall brand outcomes [11]. It gives new possibilities to reach audiences in novel and exciting ways [2]. Hence, AR should be considered a valuable element in supporting long-term branding strategies, rather than an isolated one-time effort [13]. Considering the positive effects of the use of AR in the marketing context, it is important to theoretically and practically investigate how the application of AR technology changes and shapes consumer experience. Brand context, however, contains unexplored gaps [7]. Focusing on a more specific field of AR marketing, AR branding, would provide relevant observations that would lead to a wider and more effective implementation of AR technology into brand strategy.

2.2 Flow

Flow as a concept was first introduced by Csikszentmihalyi [14], representing a state of being fully immersed in the task, with the loss of time and space senses. When achieving an "optimal experience", consumers encounter a deep sense of focus [15], and they are fully engaged with the activity [16]. Its great importance in marketing is reflected in explaining consumer immersion in computer-mediated environments [4, 17]. Excitement over using new technologies, together with a challenge to adopting it, makes consumers experience engrossment free from distraction. Novel stimuli can inspire interest that leads to curiosity and tendency to make consumers deeply engrossed [16]. Initial encounters with new technology, such as AR, can promote a state of full cognitive immersion. Flow achieved through AR is seen as a temporarily unaware experience in which consumers engage in AR activity with total control, enjoyment, and concentration [17]. AR technology has been found useful in eliciting the state of flow [18] since augmentation of reality creates stronger immersion and goes beyond simply delivering informational context. Further, AR content serves as an additional pointer and immerses consumers deeper in the exploration [18]. Several studies examined consumer flow experience in the AR context [4, 11, 15, 17, 18]. Javornik [4] suggests that the flow facilitated by AR technology drives consumers' affective responses and behavioural intentions. In addition, consumer engagement and brand usage intent are generated [11]. Following Javornik's [8] invitation to explore the driving factors of consumer flow experience in the AR context, the positive influence of AR attributes on flow is examined in this paper. Furthermore, the conceptual model assumes that the net result will be reflected in enhanced brand outcomes.

2.3 Brand Experience

Brand experience is conceptualized as a "subjective, internal consumer response"evoked by brand-related stimuli. It occurs when consumers search for, shop for, and consume brands [19]. Researchers give experience a key role in the brand building process [5, 19]. Brakus et al. [19] distinguish four dimensions of brand experience: Sensory dimension consists of tactile, visual, auditory, olfactory, and gustatory stimulations that consumers experience while interacting with a brand. The sensory dimension consists of shapes, colors, sounds, smells, and different designs. Affective dimension refers to all the emotions and sentiments that brands induce to consumers. Intellectual dimension captures the degree to which a brand triggers curiosity and problem-solving capabilities. Behavioural dimension presents the engagement in physical behavior and bodily experiences evoked by brand-related stimuli. A complete overall brand experience builds a foundation of consumer-brand relationship [19] and heightens brand equity [20]. It entices consumer decision-making [6] and increases satisfaction [19]. This study considers AR as an interactive virtual experience that transports consumers in the brand's world in an immersive manner. It is recognized as an experiential marketing tool that creates value for consumers [17]. AR has the potential to lead to building long-term relationships between consumers and brands and its strategic deployment has the ability to grow brand equity. Hence, it is important to explore its role in boosting brand experience that further enhances brand loyalty [19] and fosters brand awareness, brand associations and perceived quality [21].

2.4 Brand Equity

Brand equity is the ultimate goal of every brand and the core of all marketing efforts [22]. It reflects consumers' perception, emotions, and actions toward the brand, as a result of their learning from the experience with a brand - brand equity occurs when the knowledge of a brand affects consumers behavior [23]. Relevant literature recognizes brand experience as a significant antecedent of brand equity [6, 19-21], suggesting that it can enrich every construct of brand equity. This study examines the potential of AR technology in boosting these effects. Aaker [24] defines brand equity as "a set of brand assets and liabilities linked to a brand, its name, and symbol, that add to or subtract from the value provided by a product or service to a firm and/or to that firm's customers". Aaker [24] conceptualized brand equity in terms of brand awareness, brand associations, perceived quality, and brand loyalty. Brand awareness refers to consumers' capability to recall or recognize a brand. It is a guarantee of commitment and quality of the brand which encourages consideration. Moreover, brand awareness is the first step in developing brand preference [24]. Brand associations indicate image dimensions that are positive, favorable, and unique to a brand [22]. They include every element linked in memory to a brand [24]. According to Aaker [24] perceived quality is the perception of the overall quality or superiority of a brand offer, compared to alternatives. Brand loyalty reflects upon the customer's attachment to a particular brand [24]. When the results of exposing consumers to brand-related stimuli are positive, it is likely to expect them to repeat the usage and consequently become loyal [19]. Experiential information produces positive effects on all dimensions of brand equity [25]. Also, by provoking consumers' senses and emotions related to the brand, consumers exhibit enhanced brand loyalty [26]. When consumers continuously have positive experiences with a particular brand, they form positive associations in their memory, perceive the brand to be of high quality and consider it to be their first choice [21]. They recognize the brand more easily and evaluate its quality more positively when they experience sensory, affective, intellectual, and behavioural factors while consuming the brand [20]. The connection between consumers and brands grows when it is based on many experiences and exposures. Brand visuals, emotional interactions and cognitive thoughts enhance brand equity. Therefore, these elements should be carefully planned and integrated into brand strategy [6].

3 CONCEPTUAL MODEL

In the proposed model several constructs are connected to examine the potential of AR technology in heightening brand outcomes: AR attributes, flow, brand experience and brand equity. Reviewing relevant literature

led to proposing the relationship between these constructs and developing hypothesis that are presented in Fig. 1. Each proposed hypothesis is explained and examined in terms of the background knowledge, shaping the model that aims to add up to the theory of AR branding. AR is used as a stimulus in this study, reflected by three proposed attributes: interactivity, vividness, and novelty. To test the proposed model, this research follows the framework set by McLean & Wilson [12] and examines the influence of each attribute on flow. Arghashi & Yuksel [11] defined AR interactivity as the ability to control and manage the combination of real and virtual activities. Moreover, it is a powerful stimulus for achieving the state of flow that ultimately translates to higher levels of trust, attitude, and engagement towards AR. Barhorst et al. [27] proved that interactivity of the AR technology influences the state of flow more positively than a traditional shopping experience. Since AR enables interactions that include both virtual and real world, it is suggested that interactivity would immerse consumers deep in the activity and facilitate achieving a state of flow.

H_{1a}: Interactivity has a positive impact on flow.

AR vividness refers to a rich and clear representation of an image that consumers see when using AR features [12]. It enables clear visualization and influences positive responses from consumers [15]. Its ability to enrich the consumers'perspective evokes a deeper immersion and consequently the state of flow [27]. Consumers' experience of virtual environments stimulates imagination, fun and a feeling of enjoyment, increasing their participation [12, 15]. Therefore, it is assumed that vivid experience makes consumers more involved.

H_{1b}: Vividness has a positive impact on flow.

AR is considered novel since the experience is user specific, and it is unique every time an individual augments the physical world [12]. Embedding virtual information in a consumption context is a novel experience, with the potential to cause new thrills each time the AR feature is used [1]. When consumers can visualize objects in a personally relevant context, they obtain novel information specific to their preferences and interests [12]. Since providing unique information every time makes consumers fully engrossed in the activity [27], the positive relationship of novelty on flow is suggested in the model.

H_{1c}: Novelty has a positive impact on flow.

Considering flow an interactive experience of the highest quality [14], the proposed model suggests its connection with all dimensions of brand experience. Hoffman & Novak [16] suggest that when consumers experience flow, they achieve increased learning, enhanced exploratory and participatory behavior, and positive subjective experiences. Augmentation of reality creates stronger immersion and goes beyond simply delivering informational context. Also, AR elements are used as an additional pointer that immerse consumers deeper in the exploration [18]. Consequently, consumers show a complete engagement with and immersion in an activity [16]. In this study it is assumed that the state of full engrossment enhances how consumers experience brands. The link between flow and brand experience has been demonstrated earlier [26], but there are no studies examining its relationship integrated in the virtual world. Following Shim et al. [26] suggestion that experiencing flow highly activates visual and auditory senses, facilitates brain activity, boosts enjoyment, and provokes brand-like action, the positive relationship between flow and four dimensions of brand experience is proposed.

H_{2a}: Flow has a positive influence on sensory brand experience.

H_{2b}: Flow has a positive influence on affective brand experience.

H_{2c}: Flow has a positive influence on behavioural brand experience.

H_{2d}: Flow has a positive influence on intellectual brand experience.

Considering brand experience a part of the very essence of a brand, there is a need for a mechanism that would provide the understanding of how delivering a superior brand experience enhances brand equity, and to explore the influence between different dimensions of both constructs. Brand equity reflected in terms of brand awareness, brand associations, perceived quality and brand loyalty [24] is used in this study. Relevant literature shows empirical evidence that a positive brand experience can significantly increase different dimensions of brand equity [6, 19-21]. This study proposes that superior brand experience can develop consumers' awareness, associations, perceptions of quality and loyalty.

H_{3a}: Sensory brand experience has a positive influence on brand awareness.

H_{3b}: Sensory brand experience has a positive influence on brand associations.

H_{3c}: Sensory brand experience has a positive influence on perceived quality.

H_{3d}: Sensory brand experience has a positive influence on brand loyalty.

H_{3e}: Sensory brand experience has a positive influence on overall brand equity.

H_{4a}: Affective brand experience has a positive influence on brand awareness.

H_{4b}: Affective brand experience has a positive influence on brand associations.

H_{4c}: Affective brand experience has a positive influence on perceived quality.

H_{4d}: Affective brand experience has a positive influence on brand loyalty.

H_{4e}: Affective brand experience has a positive influence on overall brand equity.

H_{5a}: Behavioural brand experience has a positive influence on brand awareness.

H_{5b}: Behavioural brand experience has a positive influence on brand associations.

H_{5c}: Behavioural brand experience has a positive influence on perceived quality.

H_{5d}: Behavioural brand experience has a positive influence on brand loyalty.

H_{5e}: Behavioural brand experience has a positive influence on overall brand equity.

H_{6a}: Intellectual brand experience has a positive influence on brand awareness.

H_{6b}: Intellectual brand experience has a positive influence on brand associations.

H_{6c}: Intellectual brand experience has a positive influence on perceived quality.

H_{6d}: Intellectual brand experience has a positive influence on brand loyalty.

H_{6e}: Intellectual brand experience has a positive influence on overall brand equity.

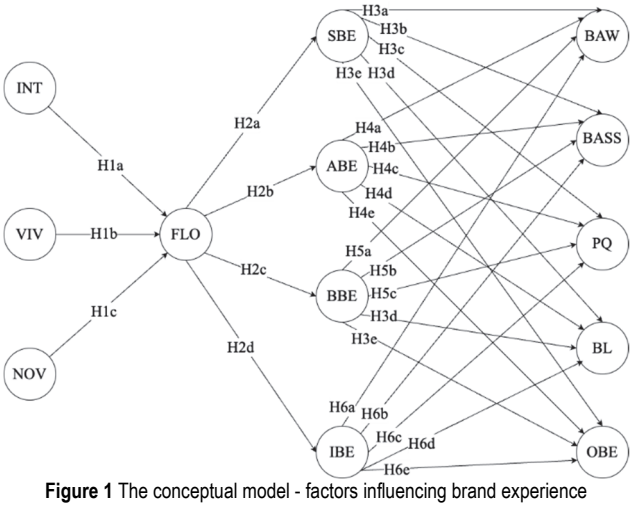

Figure 1 The conceptual model - factors influencing brand experience

4 RESEARCH METODOLOGY

The objective of this study is to explore the effectiveness of augmented marketing environments in boosting brand experience and brand equity, observed through mediation of flow. The study was conducted to test the effects of AR technology on brand equity and to identify the elements that enrich their relationship. First, one use case of AR technology was selected for presentation and testing among participants by Nike - Nike virtual view. The experience was selected because of the ease of access since it didn't require any additional installations or logging into social media profiles. Also, the case was chosen to be interesting to the target group, but also new and attractive. The participants were familiar with the selected product category. Once consumers become curious about how different product will look on their body or within their surroundings, they could try an AR feature and visualize it in 3D. Nike created an AR option on its website that lets shoppers preview the collection on 3D holograms. Consumers can select any size to see how the styles fit on a model, manipulate with it and purchase items. The study was conducted in April 2022 among 174 students at the University of Novi Sad in Serbia. The sample consists of first and second-year students of industrial engineering and management, who are tech-savvy and more opened to innovations [15]. The research was conducted one hour before the students' usual lectures. In the first phase of the study, a total of 319 students participated. After a brief introduction to AR technology and its usage in branding, the participants were shown a QR code. Scanning the QR code provided the participants with an AR experience. They were given sufficient time to explore the augmented world and interact with different brand elements. Following their experience, in the second phase of the study, the participants were given an online survey to complete. Ultimately, 174 participants completed the survey (54%). The final sample consisted of 76% female participants, 22% male participants, and 2% individuals who identify outside the male/female gender binary. As the participants were selected from the university student population, all of them were between 18 and 25 years old, and their highest degree was a high school diploma. Concerning personal earnings, 88% of the participants earned less than 300 American dollars, while 7% earned up to 550 American dollars, and 5% earned up to 800 American dollars. After exposure to AR experience, participants responded to items using 7-point Likert scales (1 = strongly disagree, 7 = strongly agree). The 42 items were adapted to fit the current context and measured: 1) AR attributes (interactivity, novelty, and vividness), 13 items; 2) Flow: 3 items; 3) Brand experience (sensory, affective, behavioural and intellectual): 12 items; Brand equity (brand awareness, brand associations, perceived quality, brand loyalty, and overall brand equity), 14 items. Several validated scales from prior literature were identified and modified for the proposed model [15, 19, 22]. The measurements items are presented in the Appendix 1. Partial least square structural equation modelling (PLS-SEM) was used to test the conceptual model. PLS-SEM is considered suitable for exploring or testing new models and paths for theory building based on existing findings [28].

5 RESULTS

PLS-SEM was identified as a statistical technique suitable for an analysis, for several reasons. Firstly, model complexity is not an issue for PLS-SEM. The proposed model consists of 11 constructs, and it could be considered quite complex in terms of observed paths in the model. Secondly, PLS-SEM can handle both formative and reflective measurement models, as well as single measure items. And finally, the normality of data is not assumed, since PLS-SEM can handle extreme skewness of data. In order to make most of these advantages, data must meet minimum sample size requirements. Hair's [29] sample size recommendations in PLS-SEM were followed: in order to achieve the statistical power of 80% and to obtain R^2 value of 0.25 at the significance level of 95%, for a total of 10 variables, the sample should consist from 59 observations. Partial least square structural equation modelling (PLS-SEM) was carried out using SmartPLS 4 software [30]. Structural model analysis was conducted in two steps. First, the measurement model was tested for validity, and in the second step the structural model was analyzed. A measurement model observes the relationships between constructs and its indicators. Measurement models with reflective constructs should be assessed for: convergent validity, internal consistency reliability and discriminant validity [29]. Convergent validity should be assessed by examining outer loadings and *AVE*. The minimum value for outer loading should be 0.70 [28]. The indicators that have not met this criterion were excluded from further analysis (SBE_3 = 0.068, ABE_2 = 0.190; BBE_3 = –0.788; IBE_2 = 0.461; BA_3 = –0.963). It is important to mention that all excluded items were negatively formulated questions that were recoded before the analysis. When it comes to *AVE*, Hair et al. [29] recommend 0.5 as a threshold value. The results in Tab. 1 suggest that all indicators explain at least 50% of variance of the construct. The measurement model is tested for internal consistency reliability by examining the Cronbach's α and *CR* values. Hair et al. [29] suggest that desired values for Cronbach's alpha should be greater than 0.70, while *CR* values should range between 0.70 and 0.90.

The results shown in Tab. 2 suggest that the smallest value for Cronbach's alpha is 0.739, while all *CR* values met the proposed criterion. Discriminant validity was assessed with HTMT and Fornell-Larcker criterion [29]. Hair et al. suggest that the upper value for HTMT should not be greater than 0.85 and 0.90 for conceptually similar constructs. The results showed that HTMT value for constructs Brand awareness and Brand association was above the recommended threshold value (HTMT BAW × BAS = 1.052). While analyzing the items of the two scales, we determined to use a new subscale that consists of items of BAW and BAS scales. The new construct was named Brand awareness and association (BWS) and it was used in further analysis. The results with new construct are presented in Tab. 2. These results indicate a slightly higher value for constructs BL × OBE. HTMT values were further tested with bootstrap analysis to check for confidence intervals of HTMT values [29]. These results indicate that none of the confidence intervals included the value of 1, so these results confirm that discriminant validity is met. Fornell-Larcker criterion compares the correlations between constructs with the square root of *AVE* value. Hair et al. [29] recommend that square root of *AVE* values of constructs should be greater than all correlations of observed construct. The results presented in Tab. 3 confirm that this criterion is fully met.

Table 1 Convergent validity and internal consistency reliability

Constructs	Items	Outer loadings	*AVE*	*α*	*CR*
Interactivity (INT)	INT_1	0.890	0.777	0.907	0.933
	INT_2	0.866			
	INT_3	0.917			
	INT_4	0.851			
Vividness (VIV)	VIV_1	0.868	0.782	0.930	0.947
	VIV_2	0.886			
	VIV_3	0.909			
	VIV_4	0.859			
	VIV_5	0.898			
Novelty (NOV)	NOV_1	0.884	0.792	0.913	0.938
	NOV_2	0.893			
	NOV_3	0.916			
	NOV_4	0.865			
Flow (FLO)	FLO_1	0.942	0.728	0.805	0.886
	FLO_2	0.948			
	FLO_3	0.631			
Sensory brand experience (SBE)	SBE_1	0.957	0.910	0.902	0.953
	SBE_2	0.951			
Affective brand experience (ABE)	ABE_1	0.967	0.925	0.920	0.961
	ABE_3	0.957			
Behavioural brand experience (BBE)	BBE_1	0.937	0.866	0.845	0.928
	BBE_2	0.924			
Intellectual brand experience (IBE)	IBE_1	0.907	0.818	0.778	0.900
	IBE_3	0.903			
Brand awareness (BAW)	BAW_1	0.865	0.692	0.861	0.900
	BAW_2	0.857			
Brand association (BAS)	BAS_1	0.812			
	BAS_2	0.792			
Percieved quality (PQ)	PQ_1	0.875	0.792	0.739	0.884
	PQ_2	0.905			
Brand loyalty (BL)	BL_1	0.884	0.829	0.897	0.936
	BL_2	0.949			
	BL_3	0.898			
Overall brand equity (OBE)	OBE_1	0.921	0.846	0.939	0.956
	OBE_2	0.956			
	OBE_3	0.936			
	OBE_4	0.862			

Table 2 Heterotrait-monotrait ratios (HTMT)

Constructs	INT	VIV	NOV	FLO	SBE	ABE	BBE	IBE	BWS	PQ	BL
Interactivity (INT)											
Vividness (VIV)	0.637										
Novelty (NOV)	0.220	0.329									
Flow (FLO)	0.418	0.501	0.779								
Sensory brand experience (SBE)	0.521	0.588	0.594	0.668							
Affective brand experience (ABE)	0.246	0.401	0.521	0.680	0.625						
Behavioural brand experience (BBE)	0.230	0.278	0.481	0.595	0.407	0.750					
Intellectual brand experience (IBE)	0.285	0.313	0.472	0.610	0.723	0.706	0.734				
Brand awareness and association (BWS)	0.413	0.323	0.131	0.178	0.328	0.081	0.113	0.105			
Percieved quality (PQ)	0.533	0.612	0.457	0.542	0.631	0.484	0.447	0.463	0.673		
Brand loyalty (BL)	0.202	0.267	0.255	0.385	0.517	0.449	0.489	0.509	0.157	0.503	
Overall brand equity (OBE)	0.293	0.321	0.275	0.357	0.546	0.464	0.598	0.549	0.174	0.470	0.885

Table 3 Fornell-larcker criterion

Constructs	INT	VIV	NOV	FLO	SBE	ABE	BBE	IBE	BWS	PQ	BL	OBE
Interactivity (INT)	0.881											
Vividness (VIV)	0.600	0.884										
Novelty (NOV)	0.226	0.314	0.890									
Flow (FLO)	0.412	0.465	0.690	0.853								
Sensory brand experience (SBE)	0.479	0.538	0.553	0.590	0.954							
Affective brand experience (ABE)	0.230	0.370	0.481	0.604	0.571	0.962						
Behavioural brand experience (BBE)	0.207	0.246	0.425	0.505	0.360	0.661	0.930					
Intellectual brand experience (IBE)	0.246	0.265	0.410	0.489	0.607	0.593	0.596	0.905				
Brand awareness and association (BWS)	0.376	0.309	0.126	0.156	0.312	0.085	0.086	0.075	0.832			
Percieved quality (PQ)	0.449	0.507	0.389	0.445	0.518	0.403	0.352	0.351	0.530	0.890		
Brand loyalty (BL)	0.200	0.249	0.241	0.322	0.467	0.414	0.437	0.428	0.142	0.410	0.910	
Overall brand equity (OBE)	0.279	0.295	0.260	0.302	0.506	0.436	0.537	0.470	0.165	0.385	0.822	0.920

A structural model observes the relationships between constructs in the model. The observed paths correspond to the established hypotheses. The structural model (Fig. 2) analysis was carried out with PLS algorithm and bootstrapping analysis (500 subsamples). Hair et al. [29] suggest that structural model should be controlled for collinearity. All VIF values are less than the most stringent criterion value, VIF < 3 (INT -> FLO = 1.566; VIV -> FLO = 1.649; NOV -> FLO = 1.112; FLO -> SBE, ABE, BBE, IBE = 1.000; SBE -> BWS, PQ, BL, OBE = 1.843; ABE -> BWS, PQ, BL, OBE = 2.321; BBE -> BWS, PQ, BL, OBE = 2.078; IBE -> BWS, PQ, BL, OBE = 2.160).

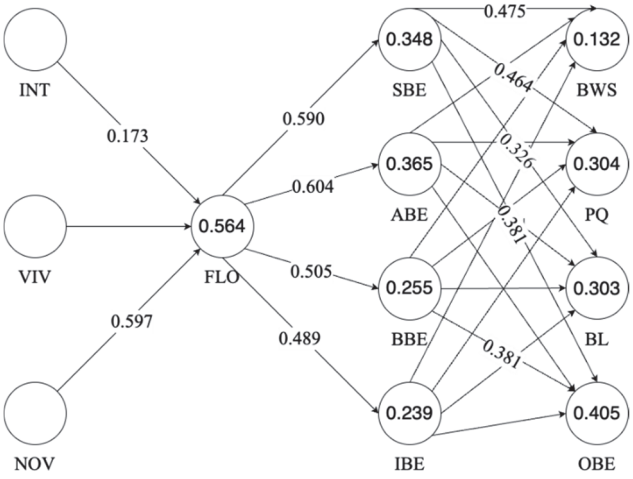

Figure 2 The structural model - Path coefficients (direct effects) and coefficients of determination

The proposed hypotheses were tested with path analysis. Hypotheses H_{1a}, H_{1c}, H_{2a}, H_{2b}, H_{2c}, H_{2d} were confirmed since these path coefficients were statistically significant. Since new construct named brand awareness and association was introduced in analysis, hypotheses H_{3a}, H_{3b}, H_{4a}, H_{4b}, H_{5a}, H_{5b}, H_{6a} and H_{6b} were rejected. Newly created paths and statistically significant path coefficients are presented in Tab. 4. The results show that only one new path created to BWS was statistically significant (SBE -> BWS). Aditionally, hypotheses H_{3c}, H_{3d}, H_{3e} and H_{5e} were confirmed. If we analyze the intensity of path coefficients in more detail, the strongest effect ($\beta > 0.5$) was obtained for paths NOV -> FLO and FLO -> SBE, ABE, BBE. Slightly weaker intensity ($\beta < 0.4$) was obtained for FLO -> IBE, SBE -> BWS, PQ, BL, OBE and BBE -> OBE. The effect of weakest intensity ($\beta < 0.2$) was obtained for path INT -> FLO.

Table 4 Path coefficients - direct effects (R^2 presented in constructs; path coefficients and *p*-Values presented on paths)

Hypotheses	Path	Path coefficient - β	*p*-Value	Decision
H_{1a}	INT -> FLO	0.173	0.045	Supported
H_{1b}	VIV -> FLO	0.173	0.058	Not supported
H_{1c}	NOV -> FLO	0.597	0.000	Supported
H_{2a}	FLO -> SBE	0.590	0.000	Supported
H_{2b}	FLO -> ABE	0.604	0.000	Supported
H_{2c}	FLO -> BBE	0.505	0.000	Supported
H_{2d}	FLO -> IBE	0.489	0.000	Supported
New path 1	SBE -> BWS	0.475	0.000	Significant
H_{3c}	SBE -> PQ	0.464	0.000	Supported
H_{3d}	SBE -> BL	0.326	0.012	Supported
H_{3e}	SBE -> OBE	0.381	0.004	Supported
New path 2	ABE -> BWS	–0.160	0.304	Not significant
H_{4c}	ABE -> PQ	0.057	0.694	Not supported
H_{4d}	ABE -> BL	0.010	0.939	Not supported
H_{4e}	ABE -> OBE	–0.093	0.455	Not supported
New path 3	BBE -> BWS	0.141	0.370	Not significant
H_{5c}	BBE -> PQ	0.196	0.177	Not supported
H_{5d}	BBE -> BL	0.277	0.064	Not supported
H_{5e}	BBE -> OBE	0.443	0.001	Supported
New path 4	IBE -> BWS	–0.202	0.193	Not significant
H_{6c}	IBE -> PQ	–0.081	0.551	Not supported
H_{6d}	IBE -> BL	0.060	0.696	Not supported
H_{6e}	IBE -> OBE	0.030	0.841	Not supported

The coefficient of determination R^2 refers to structural model's predictive ability (Fig. 2). The highest value was obtained for FLO (R^2 = 0,.564) and OBE (R^2 = 0.405). The lowest R^2 was identified for BWS (R^2 = 0.132) and IBE (R^2 = 0.239). Finally the model fit was assessed with SRMR value. Hair et al. [29] suggest that good model fit would indicate values less than the threshold of 0.08. SRMR value of the examined structural model was 0.073.

In order to get a better insight into the functioning of the structural model, total indirect effects were examined in order to analyze possible mediation paths (available in Appendix 2). The analysis of direct effects suggests that INT and NOV have a statistically significant positive effect on FLO. However, if we take a closer look at the total indirect effects, only NOV through FLO affects all constructs related to brand experience. Further on, NOV through FLO and further through SBE has statistically significant effect on all constructs related to brand equity. On the other hand, NOV through FLO and further through BBE has statistically significant effect on OBE.

6 CONCLUSION AND FUTURE WORK

This research explored academic knowledge on AR branding and examined the potential of the usage of AR technology in building brand equity. The findings provide empirical evidence that experiencing a state of flow while using AR technology results in enhanced sensory and behavioural brand experience, which further leads to higher levels of brand equity. We proposed that AR gives a potential to consumers to experience flow in an environment that integrates the physical and virtual world. Achieving an ideal state of motivation and focus has the propensity to enhance brand experience and consequently other brand outcomes. From a theoretical point of view, this study sought to advance the theory of AR branding. The proposed model has a merit of clarifying the relationship between AR attributes, flow, brand experience and brand equity. Prior studies have proposed these relationships in fragments, but none has simultaneously explored these constructs in a single framework. First, this study advances the literature on AR branding, revealing that when AR novelty affects flow, it becomes a serial mediator on brand experience and further on brand equity. Secondly, our model adds support to the previous findings that discovered a positive connection between flow and all dimensions of brand experience [26]. However, when flow is achieved through AR stimuli, it only affects sensory and behavioural brand experience. In accordance with Shim et al. [26], flow is identified as an important antecedent of brand experience with its ability to stimulate consumers' senses and evoke emotions related to the brand. Further, this leads to repeat positive behaviors for the brand. Our results demonstrate a positive influence of novelty on flow and further on sensory brand experience, suggesting the effectiveness of using aesthetic and sensory simulations to allocate marketing efforts. In addition to sensory brand experience, a positive relationship path is discovered also when flow generated by novelty impacts behavioural brand experience. Also, positive influence on overall brand equity has been found. To further contribute to the development of the theory on AR branding, this research presents a validation of the scales used in the conceptual model [15, 19, 22]. Following Aaker's [24] brand equity model we measured each brand equity dimension separately [25]. However, the analysis discovered that brand awareness and brand associations should be measured as one construct due to a lack of discriminant validity. Such an adapted model corresponds to [21, 22]. This research aims to influence using AR in creating brand experience to a wider extent, explaining its possibility to approach consumers in a novel way. It can assist marketers in embarking upon the new approach to boost their sensory and behavioural brand experience and take advantage of AR technology. Thus, the results of the study provide practical implications and guidelines for brand managers and marketers, helping them to understand the potential of AR technology in creating effective brand strategies. By moving consumers into the virtual world, brands must navigate the new environment. Further, the findings provide a framework for marketers in their implementation of branding strategy, highlighting the importance of stimulating senses with virtual elements. AR strength reflects in embedding virtual information in a specific consumption context [13] and brands now have the ability to be simultaneously present in consumers' physical and virtual realm. When consumers' sensory channels are exposed to a brand related stimulus, their perception about the brand is subconsciously activated. Therefore, brands need to strategically shape all sensory elements to provide a superior brand experience and create the idea of its quality. One of main distinctions of AR technology is presenting vivid displays of novel information that lure attention and higher levels of motivation to process information [26]. Brands should embrace this opportunity to reach its target audience in their personal space and become a part of their environment in an unobtrusive way. The limitations of this research stem from the applied methodology should be considered when interpreting the results. To test the proposed model, conducted research included exposing participants to an AR experience and answering a survey. Unlike experimental research, survey design has obstacles in controlling the participants and confirming the task completion. For future research the qualitative part as an extension to this research is suggested. Integrated quantitative and qualitative data give an overall conclusion and complete model validation. Also, it is suggested to conduct a quasi-experimental research that would give a deeper insight into the user experiences that the respondents have with the given brand. The aim of further research is to compare the outcomes of the experimental and control groups that will generate their AR and non-AR experiences. Limitations regarding application selection are twofold: first, having one application does not provide reliable results. Functionality and design of the applications could distort the results and affect the lower rating of AR attributes. Similarly, selection of a brand (in this case Nike) may affect the results regarding brand experience. Different dimensions of brand experience may be more significant in boosting brand equity. Future research could use other forms of AR and other brands to determine whether similar outcomes would occur and improve the applicability of the findings. Further limitation concerns the sample representativity. Even though students are likely to be part of a primary target group for branded AR experiences, a broader sample would provide more generalizable findings. Testing the proposed model with experimental design, diverse sample, and different brand selection would add to the extension of the study results.

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Contact information:

Ksenija MITROVIC, PhD student
University of Novi Sad, Faculty of Technical Sciences,
Trg Dositeja Obradovica 6, Novi Sad, Serbia
E-mail: ksenijam@uns.ac.rs

Jelena SPAJIĆ, PhD, Assistant Professor
(Corresponding author)
University of Novi Sad, Faculty of Technical Sciences,
Trg Dositeja Obradovica 6, Novi Sad, Serbia
E-mail: stankovicj@uns.ac.rs

Bojana MILIĆ, PhD, Teaching Assistant
University of Novi Sad, Faculty of Technical Sciences,
Trg Dositeja Obradovica 6, Novi Sad, Serbia
E-mail: bojana.milic@uns.ac.rs

Dunja BOŠKOVIĆ, PhD, Teaching Assistant
University of Novi Sad, Faculty of Technical Sciences,
Trg Dositeja Obradovica 6, Novi Sad, Serbia
E-mail: dunja.vujicic@uns.ac.rs

Danijela LALIĆ, PhD, Full Professor
University of Novi Sad, Faculty of Technical Sciences,
Trg Dositeja Obradovica 6, Novi Sad, Serbia
E-mail: danijelalalic@uns.ac.rs

Appendix 1 Measurement scales

Constructs	Items	Scale items	Authors
Interactivity (INT)	INT_1	I was in control of my navigation through this app.	Adapted from Yim at al., 2017
	INT_2	I had some control over the content of this app that I wanted to see.	
	INT_3	I was in control over the pace to watch products.	
	INT_4	This app had the ability to respond to my specific needs quickly	
Vividness (VIV)	VIV_1	It was clear.	Adapted from Yim et al., 2017
	VIV_2	It was detailed.	
	VIV_3	It was vivid.	
	VIV_4	It was sharp.	
	VIV_5	It was well defined.	
Novelty (NOV)	NOV_1	It was a new experience for me.	Adapted from Yim et al., 2017
	NOV_2	It was a unique experience.	
	NOV_3	It was a different experience.	
	NOV_4	It was an unusual experience.	
Flow (FLO)	FLO_1	I was deeply engrossed.	Adapted from Yim et al., 2017
	FLO_2	I was absorbed in the experience.	
	FLO_3	My attention was not focused on the experience.	
Sensory brand experience(SBE)	SBE_1	This brand makes a strong visual impression.	Adapted from Brakus et al., 2009
	SBE_2	I find this brand interesting in a sensory way.	
	SBE_3	This brand does not appeal to my senses.	
Affective brand experience (ABE)	ABE_1	This brand induces my feelings and sentiments.	Adapted from Brakus et al., 2009
	ABE_2	I do not have strong emotions for this brand.	
	ABE_3	This brand provokes emotions	
Behavioral brand experience (BBE)	BBE_1	I engage in physical actions and behaviors when I use this brand	Adapted from Brakus et al., 2009
	BBE_2	This brand results in bodily experiences	
	BBE_3	This brand is not action oriented.	
Intellectual brand experience (IBE)	IBE_1	I engage in a lot of thinking when I encounter this brand	Adapted from Brakus et al., 2009
	IBE_2	This brand does not make me think.	
	IBE_3	This brand stimulates my curiosity and problem solving	
Brand awareness (BAW)	BAW_1	I can recognize this brand among other competing brands.	Adapted from Yoo & Donthu, 2001
	BAW_2	I am aware of this brand.	
Brand association (BAS)	BAS_1	Some characteristics of this brand come to my mind quickly.	Adapted from Yoo & Donthu, 2001
	BAS_2	I can recall the symbol or logo of this brand.	
	BAS_3	I have difficulty in imagining X in my mind.	
Percieved quality (PQ)	PQ_1	The likely quality of this brand is extremely high.	Adapted from Yoo & Donthu, 2001
	PQ_2	The likelihood that this brand would be functional is very high.	
Brand loyalty (BL)	BL_1	I consider myself to be loyal to this brand.	Adapted from Yoo & Donthu, 2001
	BL_2	This brand would be my first choice.	
	BL_3	I will not buy other brands if this brand is available at the store.	
Overall brand equity (OBE)	OBE_1	It makes sense to buy this brand instead of any other brand, even if they are the same.	Adapted from Yoo & Donthu, 2001
	OBE_2	Even if another brand has the same features as this brand, I will prefer to buy this brand.	
	OBE_3	If there is another brand as good as this brand, I prefer to buy this brand.	
	OBE_4	If another brand is not different from this brand in any way, it seems smarter to purchase this brand.	

Appendix 2 Path coefficients - indirect effects

Path	Path coefficient - β	p-Value	Comment
INT -> FLO -> SBE	0.102	0.080	Not significant
INT -> FLO -> SBE -> BWS	0.048	0.092	Not significant
INT -> FLO -> SBE -> PQ	0.047	0.092	Not significant
INT -> FLO -> SBE -> BL	0.033	0.157	Not significant
INT -> FLO -> SBE -> OBE	0.039	0.133	Not significant
INT -> FLO -> ABE	0.104	0.063	Not significant
INT -> FLO -> ABE -> BWS	0.001	0.950	Not significant
INT -> FLO -> ABE -> PQ	0.006	0.780	Not significant
INT -> FLO -> ABE -> BL	–0.017	0.411	Not significant
INT -> FLO -> ABE -> OBE	–0.010	0.558	Not significant
INT -> FLO -> BBE	0.087	0.059	Not significant
INT -> FLO -> BBE -> BWS	0.012	0.479	Not significant
INT -> FLO -> BBE -> PQ	0.017	0.288	Not significant
INT -> FLO -> BBE -> BL	0.024	0.249	Not significant
INT -> FLO -> BBE -> OBE	0.039	0.140	Not significant
INT -> FLO -> IBE	0.085	0.096	Not significant
INT -> FLO -> IBE -> BWS	–0.017	0.416	Not significant
INT -> FLO -> IBE -> PQ	–0.007	0.416	Not significant
INT -> FLO -> IBE -> BL	0.005	0.749	Not significant
INT -> FLO -> IBE -> OBE	0.003	0.878	Not significant
VIV -> FLO -> SBE	0.102	0.085	Not significant
VIV -> FLO -> SBE -> BWS	0.049	0.100	Not significant
VIV -> FLO -> SBE -> PQ	0.047	0.100	Not significant
VIV -> FLO -> SBE -> BL	0.033	0.178	Not significant
VIV -> FLO -> SBE -> OBE	0.039	0.149	Not significant
VIV -> FLO -> ABE	0.105	0.062	Not significant
VIV -> FLO -> ABE -> BWS	–0.017	0.429	Not significant
VIV -> FLO -> ABE -> PQ	0.006	0.741	Not significant
VIV -> FLO -> ABE -> BL	0.001	0.947	Not significant
VIV -> FLO -> ABE -> OBE	–0.010	0.519	Not significant
VIV -> FLO -> BBE	0.088	0.078	Not significant
VIV -> FLO -> BBE -> BWS	0.012	0.510	Not significant
VIV -> FLO -> BBE -> PQ	0.017	0.367	Not significant
VIV -> FLO -> BBE -> BL	0.024	0.206	Not significant
VIV -> FLO -> BBE -> OBE	0.039	0.109	Not significant
VIV -> FLO -> IBE	0.085	0.089	Not significant
VIV -> FLO -> IBE -> BWS	–0.017	0.399	Not significant
VIV -> FLO -> IBE -> PQ	–0.007	0.662	Not significant
VIV -> FLO -> IBE -> BL	0.005	0.758	Not significant
VIV -> FLO -> IBE -> OBE	0.003	0.860	Not significant
NOV -> FLO -> SBE	0.352	0.000	Significant
NOV -> FLO -> SBE -> BWS	0.167	0.002	Significant
NOV -> FLO -> SBE -> PQ	0.163	0.001	Significant
NOV -> FLO -> SBE -> BL	0.115	0.023	Significant
NOV -> FLO -> SBE -> OBE	0.134	0.010	Significant
NOV -> FLO -> ABE	0.360	0.000	Significant
NOV -> FLO -> ABE -> BWS	–0.058	0.342	Not significant
NOV -> FLO -> ABE -> PQ	0.020	0.708	Not significant
NOV -> FLO -> ABE -> BL	0.004	0.941	Not significant
NOV -> FLO -> ABE -> OBE	–0.033	0.482	Not significant
NOV -> FLO -> BBE	–0.292	0.000	Significant
NOV -> FLO -> BBE -> BWS	0.043	0.413	Not significant
NOV -> FLO -> BBE -> PQ	0.059	0.241	Not significant
NOV -> FLO -> BBE -> BL	0.084	0.106	Not significant
NOV -> FLO -> BBE -> OBE	0.134	0.007	Significant
NOV -> FLO -> IBE	0.292	0.000	Significant
NOV -> FLO -> IBE -> BWS	–0.59	0.239	Not significant
NOV -> FLO -> IBE -> PQ	–0.024	0.586	Not significant
NOV -> FLO -> IBE -> BL	0.017	0.709	Not significant
NOV -> FLO -> IBE -> OBE	0.009	0.847	Not significant