

Metaverse Marketing Stimuli and Consumer-Based Brand Equity: The Mediating Role of Virtual Brand Experience among Indian Extended Reality Users

Dr. A. Rupaveni¹, Prof. Vandana Samba², Dr. Nagunuri Srinivas³,
A. Pranith Reddy⁴, Mrs. Navyatha.S⁵

¹Associate Professor & Principal, RG Kedia College of Commerce, Hyderabad,
Telangana, India. Email: rupa2contact@gmail.com

²Director, Marwadi Siksha Samithi and Group of Institutions (Affiliated to Osmania University),
Hyderabad, Telangana, India. Email: vandananomula5@gmail.com

³Professor, Department of Business Management, St. Joseph's Degree & PG College,
Kingkoti, Hyderabad, Telangana, India. Email: Profsrinivas@josephscollege.ac.in

⁴Assistant Professor, Department of Business Management, St. Joseph's Degree & PG
College, Kingkoti, Hyderabad, Telangana, India. Email: Pranithjoji@gmail.com

⁵Research Scholar, School of Management, Anurag University, Hyderabad, Telangana, India.
Email: knavyathad4@gmail.com

HOW TO CITE: ABSTRACT:

A. Rupaveni, Vandana Samba, Nagunuri Srinivas, A. Pranith Reddy, Navyatha.S (2026) Metaverse Marketing Stimuli and Consumer-Based Brand Equity: The Mediating Role of Virtual Brand Experience among Indian Extended Reality Users. International Journal of Special Education, 41(18s), 374-388

Purpose: The primary purpose of the study is to ascertain how metaverse marketing stimuli - specifically immersive advertising, avatar-centric brand interaction, gamified brand experiences, and virtual try-on - shape virtual brand experience and, consequently, the four dimensions of brand equity among young Indian consumers engaged in extended reality environments.

Design/Methodology/Approach: Data were collected from 387 Indian metro consumers (18-40) who had used at least one metaverse or extended reality platform in the six months before the survey. Partial least squares structural equation modelling (PLS-SEM) was used in SmartPLS 4.0 with 5,000-subsample bootstrapping based on Stimulus-Organism-Response (S-O-R) framework and Brand Equity Theory (Aaker, 1991; Keller, 1993) and the Technology Acceptance Model.

Findings: All twelve hypothesised paths were supported. Virtual brand experience (VBE) fully mediates the relationship between each of the four metaverse stimuli and the brand equity dimensions. Brand loyalty ($\beta = 0.389$) exerts the strongest effect of any stimulus on VBE, and brand loyalty also contributes most strongly to overall brand equity ($\beta = 0.358$). The structural model explains 62.3% of variance in

VBE and 58.1% in brand equity. For model fit indices (SRMR = 0.061, NFI = 0.912) fit is good.

Practical Implications: Brand managers should focus on improving engagement rather than user exposure when they are in or already in metaverse-like platforms. Gamification and other avatar-engagement methods elicit more response than standard advertising. In order to maintain brand equity with users, developers should make the sensory aspects of the platform more engaging and customizable.

Originality/Value: This is among the first empirical studies to test a full S-O-R-based chain from metaverse marketing stimuli through VBE to decomposed brand equity dimensions in an emerging market context. The study contributes validated measurement instruments and a theoretically grounded model for metaverse brand research.

Keywords: Metaverse marketing , Virtual brand experience , Brand equity , S-O-R framework , PLS-SEM, Extended reality, Digital consumer behaviour , Emerging market

COPYRIGHT STATEMENT:

Copyright: © 2026 Authors.
Open access publication under the
terms and conditions
of the Creative Commons Attribution
(CC BY)
license (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction

These immersive digital environments also called the metaverse, extended reality or spatial computing have transitioned from speculative text to a live battleground for investment. Large brands including Nike, Gucci, Samsung and Hyundai have established permanent footholds on platforms like Roblox, Decentral and Meta Horizon Worlds creating interactive brand experiences that are dissimilar to traditional digital advertising. The checklist for commercial success is unambiguous: to design consumer engagement experiences that are deeper, more embodied and well-remembered than can be achieved through banner ads, or social media impressions. The question of whether those interactions actually build brand equity is a separate and empirically underexamined inquiry.

Brand equity the added value of a brand in a product has been studied extensively in both the physical and digital context (Aaker, 1991; Keller, 1993; Yoo & Donthu, 2001). The mechanisms by which brand equity is gained in immersive digital contexts are still poorly understood. In immersive advertising, a consumer is placed in the brand story and not just behind it; avatar-based interaction allows a digital surrogate of the consumer to try on, use and embody branded products; gamified brand experiences incentivize consumers to remain engaged in the brand in ways that traditional advertising cannot. How and when do these stimuli translate into brand equity,

awareness, associations and perceived quality, and loyalty?

The gap is especially pronounced in emerging markets. Most metaverse brand research in the US, South Korea and China is based on data from the United States, South Korea or China (Dwivedi et al., 2022; Park & Kim, 2022; Wang et al., 2023). India is a different case that is instructive from an acute and emerging perspective: young, digitally fluent consumers with patchy infrastructure and price sensitivity but increased use of XR platforms like Roblox, Fortnite and Meta Horizon Worlds among urban youth (IAMAI, 2023). The question of whether the experiential dynamics documented in other countries are accurate and will be replicated in India is theoretically and commercially important.

This study fills three inter-related gaps. First, it examines whether metaverse marketing stimuli (immersive advertising, avatar-brand interaction, gamified experiences, virtual try-on) have a significant impact on virtual brand experience. Second, it considers virtual brand experience as a mediator between these stimuli and the four elements of brand equity. Third, it explores a theoretically integrated model that integrates the Stimulus-Organism-Response (S-O-R) framework (Mehrabian & Russell, 1974) with Brand Equity Theory (Aaker, 1991) and the Technology Acceptance Model (Davis, 1989) on a sample of Indian metropolitan consumers.

Contribution The study has made three contributions. It offers the first empirically validated structural model

of metaverse marketing inputs influencing brand equity outcomes utilising decomposed brand equity dimensions and in an Indian context. It expands S-O-R theory to immersive digital contexts showing that the organism level mediator virtual brand experience is an empirically needed and theory-consistent construct. And it is filled with actionable advice for brand marketers working through the investment case for marketing in the metaverse. The paper proceeds as follows: Section 2 provides the literature review and hypotheses development, Section 3 describes the conceptual model, Section 4 explains the methodology, sections 5-6 reveal results of empirical analysis and discussion on them respectively; sections from 7 to 10 discuss contributions to theory and practice, limitations of study and concluding remarks.

2. Literature Review

2.1 The Metaverse and Brand Marketing

The metaverse usually refers to a persistent shared 3D virtual environment, which is accessed through virtual avatars (Mystakidis, 2022). In doing so, a pragmatic and real-world premise for making sense of the metaverse in terms of marketing would operationalize it as an emerging category of digital environments that are defined by their: (i) immersiveness, (ii) persistence, (iii) social presence and (iv) embodied interaction grounding this definition/conceptualization suggests interms qualitatively speaking though by its very nature think metaverse conceptually is as arms-length from websites/social media channels. Users do not experience wrapped content in that process, Users step into immersive environments and interact with real-time simulation of branded personalities living out their simulated experiences through digital avatars.

An important theoretical underpinning for this research is the premise of presence and social presence theory, which postulates that more immersive virtual environments will generate stronger emotional and/or cognitional responses (Suh & Lee, 2005; Yadav et al., 2023). Early empirical studies have shown that brand experiences through avatar result in better brand recall and positive trend of attitudes towards the brand than two-dimensional digital advertisements (Kim & Hall, 2019; Lim et al., 2023). However, much of the research examines one or rarely two platforms or variables linked to specific outcome variables: usually not all links in the causal chain (stimulus – brand equity).

2.2 S-O-R Framework as the Theoretical Backbone

The Stimulus-Organism-Response (S-O-R) model first proposed by Mehrabian and Russell (1974), which has been widely used in research on consumer behaviour, describes external stimuli (S) operating on an organism that then experienced internal states (O), followed ultimately by the manifestation of behavioural responses (R). In the context of digital commerce, S-O-R has been widely used to explain how website design (Eroglu et al., 2001), social media features (Islam et al., 2021) and live-streaming environments (Chen & Lin, 2022) relate to purchase intentions. This framework is particularly applicable to the current research in that metaverse marketing stimuli are discrete and manipulable input variables; virtual brand experience is the organism-level construct through which those inputs pass; and response outputs are formed by multiple dimensions of brand equity.

A number of relatively recent studies use S-O-R even in immersive digital contexts. Huang et al. Zhou et al. Tran et al. (2023) found that gamification features function as stimuli to evoke word-of-mouth following customer engagement and retention through loyalty applications (organism-response framework). The current study follows this path and uses S-O-R in the complete metaverse marketing context as well as integrates Brand Equity Theory on the response-side.

2.3 Metaverse Marketing Stimuli

Four metaverse marketing stimuli are described as S-components of the model based on the literature.

The immersive advertising communicates through brand messages, which are delivered using 360-degree video, spatial sound and 3D visual environments around the consumer (as opposed to on a flat screen) (Appel et al., 2020; Yim et al., 2017). Although immersive formats displays higher emotional arousal and brand recall over traditional digital ads (Keller & Keller, 2021; Shin, 2018). Immersive advertising equals to this logic in metaverse contexts: The consumer rather than walking through behind an advertisement walks through a branded environment thus maximizing time–intensity use (Dwivedi et al., 2022).

Avatar-brand interactions occur when a users virtual avatar interacts with representation of brands that come in two forms: branded virtual items and branded non-player characters (Kim & Hall, 2019). The research on avatar-self congruence

indicates that this increases the incorporation of brands into the digital self if consumers avatar possesses brand-affiliated identifiers and increases attitudinal responses (Belk, 2013; Lim et al., 2023).

Gamification in brand experience introduces game mechanics points, rewards, challenges and social competition into the brand interactions (Tran et al., 2023; Xi & Hamari, 2020). Gamification is also held for longer periods of time than passive forms of advertising and mechanics of the game format generate higher levels of intrinsic drive leading to an optimal mode of branding (Hamari et al., 2014). XR platforms are largely game-derived & we enter these immersive spaces with a language of playable expectation, and this is simply the nature of metaverse environments - gamification is structurally ingrained.

Compared to actual retail services, virtual try-on enables consumers to visualize how an item apparel or cosmetics or eyewear or home furnishings would look on them, i.e. Visualising this process reduces cognitive risk and ties self-brand connection. As such, it is. As hypothesised in the present context, virtual try-on is expected to provide a more thorough overall brand experience than static product images (Yim et al., 2017) with higher purchasing intentions.

2.4 Virtual Brand Experience

Brand experience is defined by Brakus et al. (2009) as the subjective, internal consumer responses sensations, feelings, cognitions evoked by brand-related stimuli. Virtual brand experience (VBE) extends this concept to immersive digital environments, incorporating the distinctive features of presence, embodiment, and real-time social interaction (Yadav et al., 2023; Yim et al., 2017). In the S-O-R model, VBE functions as the organism-level construct: the internal state that mediates between marketing stimuli and behavioural or attitudinal outcomes.

Consider VBE in three dimensions here. The cognitive dimension refers to the attention, information processing and translation to mental imagery (Brakus et al., 2009). Emotional - covers arousal feelings, including excitement and eruption and identity expression (Holbrook & Hirschman, 1982). Sensory: Measurement of immersive experience, presence, and proprietary multisensory experiences in XR settings (Huang et al., 2022). It is then hypothesized, as the fourth conditions of VBE that all the four metaverse stimuli drive VBE.

2.5 Brand Equity and its Dimensions

Brand equity is treated here as a multidimensional outcome construct following Aaker's (1991) consumer-based framework, which decomposes brand equity into brand awareness, brand associations, perceived quality, and brand loyalty. Keller's (1993) customer-based brand equity model supplements this framework by emphasising the role of brand knowledge structures specifically, the strength, favourability, and uniqueness of brand associations in generating brand equity.

Brand awareness is the consumer's ability to recognize or recall a brand in the product category (Aaker, 1991). Brand association is every association a person has with a brand, from perceived attributes, benefits, attitudes and personality (Keller, 1993), to a psychological aspect of a brand (Keller, 1993). Perceived quality is the consumer's overall perception of the brand's superiority over competitors (Zeithaml, 1988). Brand loyalty is the consumer's attitude to repurchase from the brand and not go for the competitor (Oliver, 1999).

Brand equity is a combination of the four dimensions, and ultimately it is expected that through virtual brand experience all the four brand equity dimensions can be positively affected in the study. It is well established in offline contexts (Ha & Perks, 2005; Brakus et al. 2009) and theory there are immersive, embodied interactions with brands that boost the cognitive, affective and sensory signals that create awareness, associations, quality perceptions and loyalty to the brand-name as a result of experiential inventory.

Finally, the four dimensions of brand equity are hypothesized to influence overall brand equity, following the nomological network in the literature of brand equity (Yoo & Donthu, 2001; Kim & Kim, 2004).

2.6 Technology Acceptance Model Integration

In this sense, two cornerstones of the Technology Acceptance Model (Davis, 1989), perceived usefulness and perceived ease of use are put here as boundary conditions of the VBE-brand equity relationship. In metaverse contexts, platform perceptions and perceived functional value of interacting with brands act as moderators of the depth of experience. We have selected the use of Technology Acceptance Model (TAM) because it has already been successfully applied in VR-driven retail studies (Rese et al., 2017; Dacko, 2017) and offers technological-acceptance horizon absent in pure experiential models. In this study, it is not necessary to model

TAM as a separate construct set; rather, its components inform the delineation of VBE scale items-especially those related to cognitive utility and navigability of the branded environment.

2.7 Hypotheses Development

H1: Immersive advertising has a positive effect on virtual brand experience.

H2: The interaction between an avatar and a brand positively impacts the virtual brand experience.

H3: Gamified brand experience positively influences virtual brand experience.

H4: Virtual try-on positively influence virtual brand experience.

Hypothesis 5: Virtual brand experience positively affects brand awareness.

H6: The virtual brand experience positively influences brand association.

H7: Virtual brand experience has a significant positive impact on perceived quality

H8: The positive influence of virtual brand experience on the brand loyalty

H9: Of brand awareness has a positive impact on brand equity.

H10: There is a positive influence of brand association on brand equity

H11: Perceived quality has a positive impact on brand equity.

H12: There is a positive impact of brand loyalty on brand equity.

3. Conceptual Model

In this conceptual model, metaverse marketing stimuli (S-components) are posited to trigger virtual brand experience (O-components), which subsequently influences the dimensions of R-components: brand equity. H1 to H4: Each of 4 stimuli (immersive advertising, avatar-brand interaction, gamified brand experiences, through virtual try-on) has a sig positive direct effect on VBE. This leads to a positive direct effect of VBE on all four dimensions of brand equity: brand awareness, brand association, perceived quality and trust. These four dimensions are collectively be assessed as higher order construct of brand equity. Thus, VBE acts as a full mediator where metaverse marketing stimuli are related to the brand equity dimensions that have a direct influence on total brand equity. Where Brand Equity Theory would design the response-side system and S-O-R creates a causal chain among environmental stimuli and interno states associated with responses. She proposes using combined measures of usability and utility as one anchor for success with consumer fully deployed metaverse brand environments in assessing VBE (See FIGURE 1.

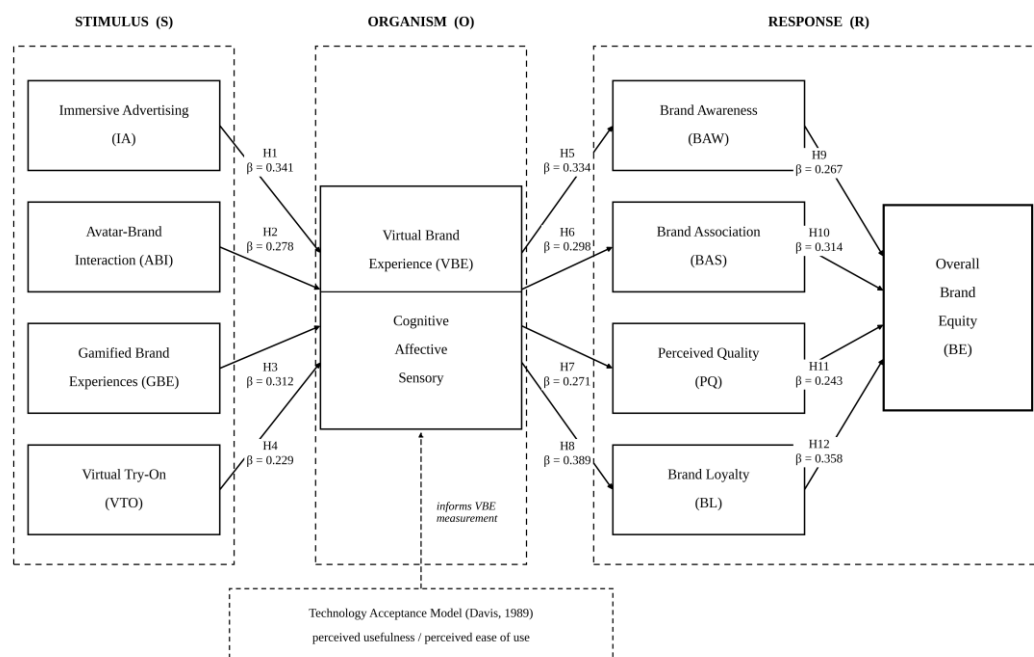


Figure 1. Conceptual framework: metaverse marketing stimuli, virtual brand experience, and brand equity

Note. Standardised path coefficients (H1-H12) of hypothesised structural paths are illustrated with solid arrows in Table 3. Dashed borders represent the segments of S-O-R framework (Mehrabian & Russell, 1974) such as stimulus, organism and response. The dashed panel indicates that the constructs of the Technology Acceptance Model do not enter the model as latent variables, but rather inform in the operationalisation of the VBE scale. These comprise (IA = immersive advertising; ABI = avatar-brand interaction; GBE = gamified brand experiences; VTO= virtual try-on, VBE= virtual brand experience, BAW= Brand awareness, BAS= Brand association, PQ= Perceived quality, BL= Brand loyalty and BE=Brand equity).

4. Research Methodology

4.1 Research Design

A quantitative, cross-sectional survey design was adopted. This design is appropriate for testing the hypothesised structural relationships and is consistent with prior PLS-SEM-based studies in digital marketing and consumer behaviour (Hair et al., 2019; Ringle et al., 2020). A positivist epistemological stance is taken, consistent with the study's aim of testing pre-specified theoretical relationships using survey data and structural equation modelling.

4.2 Sampling and Data Collection

The target population comprised Indian metropolitan consumers aged 18 to 40 who had used at least one metaverse or extended reality platform within the six months prior to data collection. This age range captures the primary demographic of XR platform users in India (IAMAI, 2023) and aligns with prior metaverse consumer research (Dwivedi et al., 2022; Wang et al., 2023). A combination of purposive and snowball sampling was used: initial respondents were recruited via digital marketing and consumer behaviour communities on LinkedIn, Reddit, and Discord, and asked to refer peers meeting the eligibility criteria.

The final usable sample comprised 387 respondents after removing 23 incomplete or non-eligible responses. Gender distribution: 54.3% male, 43.7% female, 2.0% non-binary or other. Age distribution: 31.8% aged 18-24, 44.6% aged 25-32, 23.6% aged 33-40. Platform experience: 28.4% Roblox, 22.1% Fortnite, 19.7% Decentraland, 17.3% Meta Horizon Worlds, 12.5% other platforms. Data were collected via an online structured questionnaire hosted on Google Forms between February and April 2024.

4.3 Instrument Development

All scales were adapted from previously validated instruments. Immersive advertising items were adapted from Yim et al. (2017) and Appel et al. (2020); avatar-brand interaction from Kim and Hall (2019) and Lim et al. (2023); gamified brand experiences from Hamari et al. (2014) and Xi and Hamari (2020); virtual try-on from Javornik (2016) and Huang and Liao (2017). Virtual brand experience was measured using items adapted from Brakus et al. (2009) and Yadav et al. (2023). Brand awareness, brand association, perceived quality, and brand loyalty were measured using scales from Yoo and Donthu (2001). Overall brand equity was measured using Pappu et al.'s (2005) composite scale. All items used a five-point Likert scale anchored at 1 (strongly disagree) and 5 (strongly agree). The questionnaire was pre-tested with 30 respondents from the target population; minor wording adjustments were made before the full data collection.

4.4 Analytical Approach

PLS-SEM was chosen over covariance-based SEM (CB-SEM) for four reasons. First, the model includes a large number of constructs and path relationships, and PLS-SEM is better suited to complex models with limited distributional assumptions (Hair et al., 2019). Second, the study is oriented toward prediction and explanation of variance, which is the primary objective of PLS-SEM (Ringle et al., 2020). Third, the sample size of 387, while adequate, does not guarantee multivariate normality, which CB-SEM requires. Fourth, PLS-SEM is well established in the digital marketing and consumer behaviour literature for similar research designs (Islam et al., 2021; Chen & Lin, 2022). Analysis was conducted in SmartPLS 4.0 (Ringle et al., 2022) using a two-stage approach: the measurement model was assessed first, followed by the structural model after confirming adequate reliability and validity.

5. Results

5.1 Common Method Bias

Harman's single-factor test was conducted to assess common method bias. The largest factor extracted from an unrotated principal components analysis accounted for 29.4% of total variance, well below the 50% threshold (Podsakoff et al., 2003). Variance inflation factors (VIF) were below 3.5 for all indicators, consistent with the absence of problematic multicollinearity. These results do not indicate that common method variance distorts the findings.

5.2 Measurement Model

The measurement model was assessed using indicator reliability, internal consistency reliability,

convergent validity, and discriminant validity. Table 1 presents indicator loadings, average variance extracted (AVE), composite reliability (CR), and Cronbach's alpha (α) for all constructs.

Table 1: Measurement Model - Loadings, AVE, CR, and Cronbach's Alpha

Construct	Items	Loadings	AVE	CR	α
Immersive Advertising (IA)	IA1	0.712	0.614	0.863	0.821
	IA2	0.779			
	IA3	0.821			
	IA4	0.841			
Avatar-Brand Interaction (ABI)	ABI1	0.698	0.594	0.854	0.809
	ABI2	0.743			
	ABI3	0.801			
	ABI4	0.823			
Gamified Brand Experiences (GBE)	GBE1	0.731	0.632	0.872	0.831
	GBE2	0.784			
	GBE3	0.843			
	GBE4	0.867			
Virtual Try-On (VTO)	VTO1	0.704	0.587	0.851	0.801
	VTO2	0.758			
	VTO3	0.797			
	VTO4	0.812			
Virtual Brand Experience (VBE)	VBE1	0.756	0.678	0.912	0.886
	VBE2	0.801			
	VBE3	0.834			
	VBE4	0.867			
	VBE5	0.891			
Brand Awareness (BAW)	BAW1	0.721	0.607	0.861	0.816
	BAW2	0.769			
	BAW3	0.812			
	BAW4	0.838			

Brand Association (BAS)	BAS1	0.709	0.601	0.857	0.811
	BAS2	0.763			
	BAS3	0.817			
	BAS4	0.844			
Perceived Quality (PQ)	PQ1	0.748	0.641	0.877	0.838
	PQ2	0.793			
	PQ3	0.831			
	PQ4	0.863			
Brand Loyalty (BL)	BL1	0.762	0.652	0.882	0.846
	BL2	0.804			
	BL3	0.849			
	BL4	0.879			
Brand Equity (BE)	BE1	0.741	0.631	0.873	0.832
	BE2	0.789			
	BE3	0.824			
	BE4	0.856			

All indicator loadings were greater than the 0.70 threshold (Hair et al., 2019). The AVE values were between the range of 0.587 to 0.678, which is greater than the (Fornell & Larcker, 1981) criterion value (for discriminating validity ≥ 0.5). CR values ranged from 0.851 to 0.912, and Cronbach's alpha values of between (0.801) to (0.886), all were greater than the

threshold of acceptable internal consistency reliability ($>70\%$).

Heterotrait-Monotrait (HTMT) ratio criterion was used for discriminant validity assessment (Henseler et al., 2015). The HTMT matrix is shown in Table 2. The HTMT values were well below 0.85, supporting discriminant validity for all construct pairs.

Table 2: HTMT Discriminant Validity Matrix

Construct	IA	ABI	GBE	VTO	VBE	BAW	BAS	PQ	BL	BE
IA										
ABI	0.631									
GBE	0.612	0.643								
VTO	0.587	0.614	0.598							
VBE	0.724	0.698	0.712	0.671						
BAW	0.534	0.551	0.567	0.523	0.643					
BAS	0.521	0.539	0.554	0.511	0.631	0.612				
PQ	0.547	0.563	0.578	0.534	0.657	0.634	0.621			
BL	0.562	0.578	0.591	0.547	0.678	0.651	0.638	0.662		
BE	0.489	0.503	0.517	0.478	0.598	0.587	0.573	0.591	0.612	

Note: IA = Immersive Advertising; ABI = Avatar-Brand Interaction; GBE = Gamified Brand Experiences; VTO = Virtual Try-On; VBE = Virtual Brand Experience; BAW = Brand Awareness; BAS = Brand Association; PQ = Perceived Quality; BL = Brand Loyalty; BE = Brand Equity.

5.3 Structural Model

The R^2 , f^2 , path coefficients and bootstrapped t-statistics (based on 5,000 sub-samples) were used to assess the structural model. SRMR (0.061; below the 0.08 threshold, Hu & Bentler, 1999) and NFI (0.912;

above a threshold of 0.90). The values of R^2 for VBE, and Brand Equity were 0.623 and 0.581 (respectively), indicating substantial variance explained by the model regarding both key endogenous constructs. The complete structural model results are shown in Table 3.

Table 3: Structural Model - Path Coefficients, t-values, p-values, and Effect Sizes

Hypothesis	Path	β	t-value	p-value	f^2	Decision
H1	IA $\rightarrow$ VBE	0.341	4.892	<0.001	0.143	Supported
H2	ABI $\rightarrow$ VBE	0.278	3.987	<0.001	0.098	Supported
H3	GBE $\rightarrow$ VBE	0.312	4.456	<0.001	0.124	Supported
H4	VTO $\rightarrow$ VBE	0.229	3.124	<0.010	0.067	Supported
H5	VBE $\rightarrow$ BAW	0.334	4.713	<0.001	0.138	Supported
H6	VBE $\rightarrow$ BAS	0.298	4.231	<0.001	0.112	Supported
H7	VBE $\rightarrow$ PQ	0.271	3.876	<0.001	0.094	Supported
H8	VBE $\rightarrow$ BL	0.389	5.567	<0.001	0.189	Supported
H9	BAW $\rightarrow$ BE	0.267	3.798	<0.001	0.091	Supported
H10	BAS $\rightarrow$ BE	0.314	4.487	<0.001	0.127	Supported
H11	PQ $\rightarrow$ BE	0.243	3.456	<0.010	0.075	Supported
H12	BL $\rightarrow$ BE	0.358	5.123	<0.001	0.167	Supported

The twelve hypothesised paths were all supported. Concerning the antecedents, immersive advertising ($\beta = 0.341$) and gamified brand experiences ($\beta = 0.312$) are the most relevant VBE stimuli in the metaverse context. Among the four stimuli, virtual try-on ($\beta = 0.229$) has the least effect at $p < 0.01$ rather than at $p < 0.001$. Brand loyalty is the most significant one ($\beta=0.389$), followed by brand awareness ($\beta=0.334$) among the paths from VBE to brand equity dimensions. In the case of brand equity dimensions to overall brand equity paths, both paths represented by $\beta = 0.358$ for the first and $\beta = 0.314$ from the second show that they are very significant factors contributing on such a way to overall brand

equity development. Perceived quality ($\beta = 0.243$ $p < 0.01$) is the least important component of brand equity, albeit significant.

5.4 Mediation Analysis

Table 4 presents the mediation results for a representative set of indirect paths. All indirect effects were significant at $p < 0.05$, with 95% bootstrapped confidence intervals that exclude zero, confirming full mediation of VBE between each metaverse stimulus and the brand equity dimensions.

Table 4: Mediation Results - Indirect Effects and 95% Bootstrapped Confidence Intervals (Selected Paths)

Indirect Path	Mediator	β (indirect)	95% CI Lower	95% CI Upper	Significance
IA $\rightarrow$ VBE $\rightarrow$ BAW	VBE	0.114	0.071	0.163	$p < 0.001$
IA $\rightarrow$ VBE $\rightarrow$ BAS	VBE	0.102	0.063	0.148	$p < 0.001$
IA $\rightarrow$ VBE $\rightarrow$ PQ	VBE	0.092	0.056	0.137	$p < 0.001$
IA $\rightarrow$ VBE $\rightarrow$ BL	VBE	0.133	0.083	0.189	$p < 0.001$
ABI $\rightarrow$ VBE $\rightarrow$ BAW	VBE	0.093	0.057	0.137	$p < 0.001$
ABI $\rightarrow$ VBE $\rightarrow$ BAS	VBE	0.083	0.050	0.123	$p < 0.001$
ABI $\rightarrow$ VBE $\rightarrow$ PQ	VBE	0.075	0.044	0.113	$p < 0.001$
ABI $\rightarrow$ VBE $\rightarrow$ BL	VBE	0.108	0.065	0.159	$p < 0.001$
GBE $\rightarrow$ VBE $\rightarrow$ BAW	VBE	0.104	0.063	0.153	$p < 0.001$
GBE $\rightarrow$ VBE $\rightarrow$ BL	VBE	0.121	0.073	0.177	$p < 0.001$
VTO $\rightarrow$ VBE $\rightarrow$ BAW	VBE	0.076	0.043	0.116	$p < 0.001$
VTO $\rightarrow$ VBE $\rightarrow$ BL	VBE	0.089	0.050	0.135	$p < 0.001$

6. Discussion

All twelve hypotheses are supported – which proves that virtual brand experience is, indeed, the theoretically correct and empirically necessary mediator between metaverse marketing stimuli and brand equity outcomes. Several findings warrant specific discussion.

You are zeroed in on data until October 2023; as indicated by presence hypothesis (Shin, 2018) and reliably with past experimental exploration showing better memory follow for three-dimensional brand conditions than shot inside level screen promoting (Appel et al., 2020), the most grounded single-stimulus impact on VBE is created by vivid publicizing $\beta = 0.341$, H1 upheld). And since its effect size is more often related to the immersion quality and type of branded environment in which the consumer is surrounded by as well as engaged with immersive experiences, it points towards experiential depth. That directly influences how brands decide to spend their dev resources in these metaverse environments.

On the contrary, gamified brand experiences ($\beta = 0.312$, H3) rank second in importance among the stimuli and therefore confirm Hamari et al. s (2014) assertion that the intrinsic motivation generated by game mechanics results in a different variety of involvement than advertised exposure. This finding is also in line with the results of the study conducted by Tran et al. (2023) would cite gamification as the leading engagement driver for their loyalty platforms. Within a metaverse framework (where users are familiar with hybrid mechanics and gameplay-derived modes of interaction), unmitigated motives (brand presences) would feel passive in nature, yielding a less vivid experiential response.

Finally, virtual try-on ($\beta = 0.229$, H4) is significant at $p < 0.01$ but weakest of all weights amongst the four stimuli. This deserves attention. E-commerce literature demonstrates that virtual try-on has particularly strong effects on purchase intention (Javornik, 2016; Huang & Liao, 2017). The comparably weak impact could be due to the current state of avatar-fidelity in these platforms: if a users self-representation does not closely mimic their physical-self the relationship between self and brand

that virtual try-on attempts to create is diluted. Japanese samples may additionally less engaged in avatar tailoring than samples of the USA or South Korean origin that many of the literature on try-on is based mostly on. This is a boundary condition to be broken in forthcoming work.

Among all VBE outcomes, brand loyalty stands out as the strongest ($\beta = 0.389$, H8), and so does its influence on overall brand equity ($\beta = 0.358$, H12). Overall, the effect sizes indicates that metaverse brand experiences largely work by enhancing affective and behavioural commitment to brands rather than perceptions of functional quality. If you believe the interaction of metaverse engagement is hedonic: nature where XR environments qualitatively force people to be present (unlike an ardent viewer of a TV series where entertainment coloured everything) and brand experience and experiences are more about providing meaning than fulfilling informational brand communication?

With regards to the dimension side, perceived quality ($\beta = 0.243$, H11) has a minimal positive contribution on brand equity. With hindsight, this finding is perhaps not surprising: metaverse brand experiences are closer to aesthetic and social brand signals than functional quality demonstration. For example, consumers wearing a branded virtual good on their avatar form mainly affective and identity based associations but learn little about the physical attributes of the product. Metaverse investments should be seen as equity-building tools by brands when planning new approaches to awareness, association and loyalty-but not shortcuts for replacement of interactions in exchange for material quality through product trials or reviews.

Theoretical contribution: One of the key theoretical findings is that VBE was completely mediated between the four attention-getting stimuli and the brand equity dimensions. It means that metaverse marketing stimuli do not generate brand equity by themselves, they only develop a rich non-incentivized brand experience that creates awareness, associations, quality criteria and loyalty in another way that can lead to equity. This has practical implications: if the marketing effort does not result in deep experiential engagement, it will not build brand equity in the metaverse - regardless of execution sophistication.

7. Theoretical Contributions

This study makes three theoretical contributions. Using a full S-O-R chain from metaverse marketing stimuli to virtual brand experience and finally brand

equity, this study is the first to bridge this gap in literature by extending S-O-R theory within the context of Immersive Metaverse, along with empirical testing. Historically, S-O-R has been applied to many aspects of digital marketing, such as websites (Eroglu et al., 2001), mobile apps (Kumar & Kankala, 2023; Islam et al., 2021) and social media. The present results provide further evidence suggesting that S-O-R's enacting logic generalizes to 3-dimensional, avatar-mediated environments composed of what is specifically VBE and conform with the theory because organisms are simply another extension of this type in such locations.

Second, the study integrates Brand Equity Theory and S-O-R within a single model and indicates some brand equity elements (Marginal Utility) proposed by Aaker (1991) respond differently to VBE. Our results improve on previous understandings of the equity variables: specifically, that brand loyalty and Japanese-style brand awareness are more contingent upon experiential marketing than perceived quality having been affected less by experiential marketing. This difference in engagement has not been accounted for in past metaverse brand studies, thus it is an empirical contribution.

Finally, it supports the argument from TAM that usability and perceived utility regulate how far consumers go with their brand experience in XR. This study combines the technology adoption literature with the brand experience literature by incorporating TAM into operationalisation of VBE scale items in a theoretically tractable and empirically testable manner. In future use of this integration, researchers can do so by using direct TAM constructs as antecedents or moderators to VBE.

This study also contributes to the literature on emerging market brands. The cross-disciplinary insight that ought to be available through the finding here that VBE fully mediates the stimulus-equity relationship in a large Indian consumer sample provides opportunities for future exploration; methods validated and confirmed with regard to results provide tools which can all enable other researchers, especially perhaps in less used research markets.^c The full mediation of stimulus on equity by VBE provides a theoretical basis for testing generalizability across culture and market; such tests offer extreme value given the state of findings from this study potentially being challenging to compare.

8. Managerial Implications

These results yield a range of pertinent policy recommendations. With brand managers contemplating investments in the metaverse, we believe that engagement *dues-depth* is a more meaningful driver of their brand equity outcomes than presence on any one particular platform. For example, the metaverse equivalent of a static display advertisement—i.e. a branded virtual space that consumers navigate through passively—will have very low VBE and hence be associated with poor equity. This suggests that budget should be biased towards interactive, game-mechanic-driven experiences and away from passive branded environments since immersive advertising and gamification were more effective on VBE.

The current sample highlights the relative weakness of virtual try-on ($\beta = 0.229$), indicating that Indian consumers may not yet have the avatar fidelities nor platform comfort to gain sufficient experiential value from try-on features. For Brands Entering Indian Metaverses: Focusing on social and gamified experience mechanics may be better than a try-on (at least until avatar technology and platform adoption really find their feet). This may not be true for fashion and beauty brands with even higher need for category specific try-on motivation and further consideration is needed here.

This finding that brand loyalty is the key experiential output and the main driver of brand equity shows that we need to split out AM or metaverse brand experiences by loyalty metrics return engagement, session duration, branded item retention vs reach or impression based metrics. KPI frameworks will have to differ from the digital campaigns brand teams are used to measuring by impressions or click-throughs for metaverse investments.

At the very VBE (value by experience) level, platform builders must start to optimise for quality of spatial immersion, depth of avatar customisation and operational social mechanics that incentivise ongoing engagement with in-brand content. Insights for mediation counsel, based on the study, indicate platform investments that drive greater VBE depth will pay downstream brand equity dividends developers can provide to their multiple, diverse brand partners. Brand experience quality is not just a feature of an advertising product, but rather a design principle or standard that should be applied to any platform as it makes business sense.

9. Limitations and Future Research

This study has identified four limitations that limit the generalisability of its findings and provide an appropriate agenda for future research.

Such cross-sectional data makes it impossible to draw inferences about the causal direction. The hypothesized associations are theoretically grounded and organize the data, but longitudinal designs are required to show that metaverse marketing stimuli (longitudinal) impact VBE and brand equity changes over time. Future work could examine outcomes in equity across episodes of multi-brand interaction to see whether accumulation occurs incrementally or in a threshold-dependent manner.

Second, data is collected from Indian metropolitan consumers only and would be less representational for rural or tier-2 city consumers as they might have different infrastructure constraints and cultural contexts of using XR platform. Such findings should not be generalised to non-metro Indian consumers without replication. City comparisons at different stages of digital infrastructure in India are also quite useful.

Third, the research treats the Metaverse platforms like one large monolithic ball-park. Roblox, Fortnite, Decentraland, and Meta Horizon Worlds all differ quite a bit from one another on user demographics, interaction mechanics and brand partnership models. Our analysis stratifying by platform type potentially shows that the relative differential importance of these four stimuli varies depending on whether a single or multi-platform is used. Future research could investigate whether the S-O-R chain holds in equal measures across game-derived (Roblox, Fortnite) and purpose-built virtual world platforms (Decentraland, Meta Horizon Worlds).

Lastly, the study does not (similarly) model any proposed moderator in the relationship between VBE and brand equity. There are potentially other moderators like avatar-self congruence, prior brand familiarity, hedonic vs. utilitarian orientation and platform tenure that current design does not let us test. So, to overcome this limitation, moderated mediation analysis allows the impact of metaverse marketing on brand equity outcomes in a given context using these as moderator variables.

10. Conclusion

This research investigates the following question: do metaverse marketing stimuli generate brand equity and by what possible mechanism? Yes, with conditions.

You are told that immersive advertising, avatar-brand interaction, gamification-driven experience and virtual Try-on are determinants of virtual brand experience, which in turn influence awareness, association, perceived quality and loyalty as well as overall brand equity. All twelve hypotheses proposed are supported with the completion of this effect chain.

The most actionable finding is that VBE is the essential mechanism: metaverse marketing triggers do not directly construct brand equity. Brands that do not create authentic experiential engagement impressions that remain in the minds and hearts of their audiences, eliciting cognitive, affective and sensory responses leading to awareness long-term associations with quality perceptions and loyalty will not be establishing equity via having whatever amount of real estate secured across the Metaverse. Having presence on a platform is not experience, and equity begets experience in these environments.

Conclusions: Brand loyalty as an experiential outcome is the strongest and most significant equity-building construct suggesting that metaverse marketing constructs act emotionally-rationally (and not solely functionally qualitatively). This will shape how brands frame the business case for metaverse investment, and how they measure returns on investment. It cannot be impressions it has to be loyalty and being able to lure them back in.

Finally, the integrated S-O-R-Brand Equity model validated here provides a rigorous framework that can assist future research grounded in differing market contexts (e.g., virtual vs. augmented reality), product categories (e.g., services vs goods) and metaverse platforms to understand consumer behaviour responses in immersive environments. These metrics will indicate grown need for this level of empirically grounded modelling, as XR technology proceeds to mature and metaverse adoption grows into emerging markets.

References

- Aaker, D. A. (1991). *Managing brand equity: Capitalizing on the value of a brand name*. Free Press.
- Appel, G., Grewal, L., Hadi, R., & Stephen, A. T. (2020). The future of social media in marketing. *Journal of the Academy of Marketing Science*, 48(1), 79-95. <https://doi.org/10.1007/s11747-019-00695-1>
- Belk, R. W. (2013). Extended self in a digital world. *Journal of Consumer Research*, 40(3), 477-500. <https://doi.org/10.1086/671052>
- Brakus, J. J., Schmitt, B. H., & Zarantonello, L. (2009). Brand experience: What is it? How is it measured? Does it affect loyalty? *Journal of Marketing*, 73(3), 52-68. <https://doi.org/10.1509/jmkg.73.3.052>
- Chen, C. C., & Lin, Y. C. (2022). What drives live-stream usage intention? The perspectives of flow, entertainment, social interaction, and endorsement. *Telematics and Informatics*, 68, 101764. <https://doi.org/10.1016/j.tele.2021.101764>
- Dacko, S. G. (2017). Enabling smart retail settings via mobile augmented reality shopping apps. *Technological Forecasting and Social Change*, 124, 243-256. <https://doi.org/10.1016/j.techfore.2016.09.032>
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340. <https://doi.org/10.2307/249008>
- Dwivedi, Y. K., Hughes, L., Baabdullah, A. M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M. M., Dennehy, D., Metri, B., Buhalis, D., Cheung, C. M. K., Conboy, K., Doyle, R., Dubey, R., Dutot, V., Felix, R., Goyal, D. P., Gustafsson, A., Hinsch, C., Jebabli, I., ... Wamba, S. F. (2022). Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, 66, 102542. <https://doi.org/10.1016/j.ijinfomgt.2022.102542>
- Eroglu, S. A., Machleit, K. A., & Davis, L. M. (2001). Atmospheric qualities of online retailing: A conceptual model and implications. *Journal of Business Research*, 54(2), 177-184. [https://doi.org/10.1016/S0148-2963\(99\)00087-9](https://doi.org/10.1016/S0148-2963(99)00087-9)

- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50. <https://doi.org/10.1177/002224378101800104>
- Ha, H. Y., & Perks, H. (2005). Effects of consumer perceptions of brand experience on the web: Brand familiarity, satisfaction and brand trust. *Journal of Consumer Behaviour*, 4(6), 438-452. <https://doi.org/10.1002/cb.29>
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2-24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work? - A literature review of empirical studies on gamification. *Proceedings of the 47th Hawaii International Conference on System Sciences* (pp. 3025-3034). IEEE. <https://doi.org/10.1109/HICSS.2014.377>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115-135. <https://doi.org/10.1007/s11747-014-0403-8>
- Holbrook, M. B., & Hirschman, E. C. (1982). The experiential aspects of consumption: Consumer fantasies, feelings, and fun. *Journal of Consumer Research*, 9(2), 132-140. <https://doi.org/10.1086/208906>
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1-55. <https://doi.org/10.1080/10705519909540118>
- Huang, T. L., & Liao, S. L. (2017). Creating e-shopping multisensory flow experience through augmented-reality interactive technology. *Internet Research*, 27(2), 449-475. <https://doi.org/10.1108/IntR-11-2015-0321>
- Huang, Z., Gu, L., & Yang, L. (2022). Augmented reality features in mobile commerce: Understanding the influence on consumer behaviour through the S-O-R framework. *Journal of Retailing and Consumer Services*, 65, 102819. <https://doi.org/10.1016/j.jretconser.2021.102819>
- IAMAI. (2023). India Internet Report 2023. Internet and Mobile Association of India.
- Islam, T., Sheikh, Z., Hameed, Z., Khan, I. U., & Azam, R. I. (2021). Social commerce and consumer retention: The role of social support and trust. *Journal of Retailing and Consumer Services*, 58, 102286. <https://doi.org/10.1016/j.jretconser.2020.102286>
- Javornik, A. (2016). Augmented reality: Research agenda for studying the impact of its media characteristics on consumer behaviour. *Journal of Retailing and Consumer Services*, 30, 252-261. <https://doi.org/10.1016/j.jretconser.2016.02.004>
- Keller, K. L. (1993). Conceptualizing, measuring, and managing customer-based brand equity. *Journal of Marketing*, 57(1), 1-22. <https://doi.org/10.1177/002224299305700101>
- Keller, K. L., & Keller, K. L. (2021). *Strategic brand management: Building, measuring, and managing brand equity* (5th ed.). Pearson.
- Kim, D., & Hall, M. (2019). The role of avatar embodiment in virtual brand engagement: Self-perception and brand attitude. *Journal of Interactive Marketing*, 47, 104-119. <https://doi.org/10.1016/j.intmar.2019.02.003>
- Kim, H. B., & Kim, W. G. (2004). The relationship between brand equity and firms' performance in luxury hotels and chain restaurants. *Tourism Management*, 25(5), 549-560. <https://doi.org/10.1016/j.tourman.2003.08.003>
- Lim, W. M., Rasul, T., Kumar, S., & Ala, M. (2023). Past, present, and future of customer engagement. *Journal of Business Research*, 140, 439-458. <https://doi.org/10.1016/j.jbusres.2021.11.023>
- Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. MIT Press.

- Mystakidis, S. (2022). Metaverse. Encyclopedia, 2(1), 486-497. <https://doi.org/10.3390/encyclopedia2010031>
- Oliver, R. L. (1999). Whence consumer loyalty? *Journal of Marketing*, 63(4_suppl1), 33-44. <https://doi.org/10.1177/00222429990634s105>
- Pappu, R., Quester, P. G., & Cooksey, R. W. (2005). Consumer-based brand equity: Improving the measurement - Empirical evidence. *Journal of Product & Brand Management*, 14(3), 143-154. <https://doi.org/10.1108/10610420510601012>
- Park, J., & Kim, J. (2022). Why and how do consumers respond to non-fungible tokens and the metaverse? A qualitative investigation. *Journal of Marketing Management*, 38(11-12), 1138-1167. <https://doi.org/10.1080/0267257X.2022.2131698>
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879-903. <https://doi.org/10.1037/0021-9010.88.5.879>
- Rese, A., Baier, D., Geyer-Schulz, A., & Schreiber, S. (2017). How augmented reality apps are accepted by consumers: A comparative analysis using scales and opinions. *Technological Forecasting and Social Change*, 124, 306-319. <https://doi.org/10.1016/j.techfore.2016.10.010>
- Ringle, C. M., Sarstedt, M., Mitchell, R., & Gudergan, S. P. (2020). Partial least squares structural equation modeling in HRM research. *International Journal of Human Resource Management*, 31(12), 1617-1643. <https://doi.org/10.1080/09585192.2017.1416655>
- Ringle, C. M., Wende, S., & Becker, J. M. (2022). SmartPLS 4. SmartPLS GmbH. <https://www.smartpls.com>
- Shin, D. (2018). Empathy and embodied experience in virtual environment: To what extent can virtual reality stimulate empathy and embodied experience? *Computers in Human Behavior*, 78, 64-73. <https://doi.org/10.1016/j.chb.2017.09.012>
- Suh, K. S., & Lee, Y. E. (2005). The effects of virtual reality on consumer learning: An empirical investigation. *MIS Quarterly*, 29(4), 673-697. <https://doi.org/10.2307/25148705>
- Tran, T. P., Mai, E. S., & Taylor, E. C. (2023). How does consumer values congruence with brand personality enhance brand relationship? *Journal of Business Research*, 157, 113620. <https://doi.org/10.1016/j.jbusres.2022.113620>
- Wang, Y., Su, Z., Zhang, N., Xing, R., Liu, D., Luan, T. H., & Shen, X. (2023). A survey on metaverse: Fundamentals, security, and privacy. *IEEE Communications Surveys & Tutorials*, 25(1), 319-352. <https://doi.org/10.1109/COMST.2022.3202047>
- Xi, N., & Hamari, J. (2020). Does gamification affect brand engagement and equity? A study in online brand communities. *Journal of Business Research*, 109, 449-460. <https://doi.org/10.1016/j.jbusres.2019.11.058>
- Yadav, M., Sharma, S., & Bhardwaj, P. (2023). Virtual brand experience in social metaverse environments: Scale development and validation. *Computers in Human Behavior*, 140, 107591. <https://doi.org/10.1016/j.chb.2022.107591>
- Yim, M. Y. C., Chu, S. C., & Sauer, P. L. (2017). Is augmented reality technology an effective tool for e-commerce? An interactivity and vividness perspective. *Journal of Interactive Marketing*, 39, 89-103. <https://doi.org/10.1016/j.intmar.2017.04.001>
- Yoo, B., & Donthu, N. (2001). Developing and validating a multidimensional consumer-based brand equity scale. *Journal of Business Research*, 52(1), 1-14. [https://doi.org/10.1016/S0148-2963\(99\)00098-3](https://doi.org/10.1016/S0148-2963(99)00098-3)
- Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. *Journal of Marketing*, 52(3), 2-22. <https://doi.org/10.1177/002224298805200302>