

Modeling the Effects of Digital Gamification on Brand Attractiveness and Churn Reduction: Evidence from Millennials in Malaysia

Chong En Si¹, Yu Hock Oo², Nor Azila Binti Mohd Noor³

¹Faculty of Management, Multimedia University, Selangor, Malaysia

²School of Management, Asia e University, Selangor, Malaysia

³School of Business Management, Universiti Utara Malaysia, Kedah, Malaysia

Correspondence: Chong En Si, Faculty of Management, Multimedia University, Malaysia.

Email: si.chongen@mmu.edu.my

Received: November 13, 2025

Accepted: March 13, 2026

Online Published: March 24, 2026

doi:10.11114/smc.v14i3.8176

URL: <https://doi.org/10.11114/smc.v14i3.8176>

Abstract

This study investigates how digitalised, gamified content strategies—Augmented Reality (AR), Mobile Apps (MA), Online Communities (OC), Social Media (SM), and Virtual Reality (VR)—influence Customer Churn Reduction (CCR) through the mediating role of Brand Attractiveness (BA) among Millennial retail consumers in Malaysia’s Klang Valley. A quantitative cross-sectional survey (n = 306) was analysed using PLS-SEM (SmartPLS 4), with reliability/validity checks, full-collinearity VIFs for common-method bias, 10,000-sample bootstrapping for inference and mediation, and PLS-predict for out-of-sample relevance. The results show that MA, OC and VR significantly enhance BA; SM shows a statistically significant but practically small effect, while AR is nonsignificant. BA, in turn, strongly predicts CCR, with mediation supported for MA, OC and VR (and negligible for SM), indicating that BA is the primary pathway to lowering churn. In conclusion, not all gamified technologies contribute equally; prioritising those that strengthen BA yields the most reliable route to reduced churn among Millennials. Retailers should allocate budgets toward high-impact touchpoints—particularly MA, OC and VR—use SM as a supportive channel rather than a primary churn lever and deploy AR only when usability and value are demonstrably clear; focusing design and investment on BA-centric experiences can translate into measurable retention gains.

Keywords: gamification, digitalisation, brand attractiveness, customer churn reduction, millennials, retail industry

1. Introduction

In today’s technology-driven marketplace, customer retention remains a critical challenge, especially in highly competitive retail environments. The retail sector in Malaysia particularly within Klang Valley struggles to retain Millennial customers, a demographic characterised by digital fluency and frequent brand-switching behaviour (Idris Sazali et al., 2023). Traditional retention strategies have become less effective for this cohort, prompting firms to adopt more innovative, experience-based approaches. Gamified digital elements such as Augmented Reality (AR), Mobile Apps (MA), Online Communities (OC), Social Media (SM), and Virtual Reality (VR) are increasingly employed to enhance consumer experiences and foster brand attachment (Sarkis et al., 2025; Siu et al., 2023; Tran et al., 2024).

Gamification as the integration of game-design features into non-game contexts has been widely used to increase engagement (Koivisto & Hamari, 2019; Xi & Hamari, 2019). These interactive features not only capture consumer interest but also strengthen brand relationships, which may reduce churn. Empirical findings show that gamification improves user experience, satisfaction, and loyalty (Rachmadanty et al., 2025; Punwatar & Vergheese, 2025), yet limited research has examined how specific digitalised content strategies directly influence churn within the Malaysian Millennial market (Sarkis et al., 2025; Siu et al., 2023; Tran et al., 2024).

Brand Attractiveness (BA) emerges as a key mediating mechanism in this context. A brand’s ability to appeal to and retain the attention of its target audience significantly shapes loyalty and retention outcomes (Desveaud et al., 2024; Karami, 2022). Within the Stimulus–Organism–Response (S-O-R) framework, digitalised contents function as the stimulus, brand attractiveness represents the organism, and customer churn reduction reflects the behavioural response. This framework offers a robust basis for examining how gamified digital strategies influence consumer decision-making.

Accordingly, this study investigates how five gamified digital content strategies (AR, MA, OC, SM, and VR) affect Brand Attractiveness and, in turn, influence Customer Churn Reduction among Millennials in Klang Valley.

2. Literature Review

2.1 Underpinning Theory

The Stimulus-Organism-Response (S-O-R) model underpins this study. The model posits that environmental stimuli affect an organism's internal states, which in turn influences behavioural responses. In this context, digitalised content strategies (stimuli) are expected to influence Brand Attractiveness (organism), leading to Customer Churn Reduction (response). Unlike prior S-O-R applications that model environmental stimuli at an aggregate level, this study operationalises digital gamification as multiple, technology-specific stimuli, allowing the S-O-R framework to capture heterogeneous psychological and behavioural responses across digital touchpoints. The S-O-R framework provides a comprehensive structure for analysing how interactive and immersive gamified digital experiences translate into consumer behavioural outcomes. By applying this model in Figure 1, the study captures the complex pathways through which digital engagement strategies impact customer retention among Millennials.

2.2 Augmented Reality (AR) and Brand Attractiveness

Augmented Reality (AR) has become increasingly relevant to brand attractiveness as it enhances consumer perceptions and strengthens brand-related outcomes. Caboni et al. (2024) show that AR experiential marketing significantly influences key brand equity dimensions, including brand awareness, associations, perceived quality, and loyalty, which are essential for forming favourable brand attitudes. In retail contexts, AR-based virtual try-ons enhance engagement; Rhee and Lee (2021) demonstrate that virtual fitting experiences increase purchase intentions and brand advocacy, indicating stronger brand attractiveness among millennial consumers.

From a theoretical standpoint, Prasad et al. (2022) apply the Stimulus–Organism–Response (S-O-R) framework to show that AR features (e.g., interactivity, vividness, media richness) function as stimuli that elevate experiential value and strengthen brand equity, thereby fostering stronger emotional bonds with brands. Recent studies further expand AR's psychological impact: Zeng et al. (2023) categorise AR and VR experiences into entertainment, aesthetic, educational, and real-escape types, showing significant effects on emotional and cognitive engagement, while Kim and Im (2023) find that AR try-on services alter millennial self-perceptions, deepening brand relationships through self-malleability.

Collectively, these studies indicate that AR enhances brand attractiveness by increasing experiential engagement, emotional connection, perceived closeness, and positive self-perception. Thus, the following hypothesis is proposed:

H1: Augmented Reality positively influences Brand Attractiveness.

2.3 Mobile Applications (MA) and Brand Attractiveness

Mobile applications have become a critical tool for enhancing customer engagement and strengthening brand attractiveness. Ho and Chung (2020) show that engagement with mobile apps significantly affects repurchase intentions, indicating that active user involvement fosters emotional connections and enhances perceived brand attractiveness. Supporting this mechanism, Boateng et al. (2020) demonstrate through attachment theory that experiential value and brand attachment mediate brand loyalty, which is closely linked to brand attractiveness.

Evidence across service contexts reinforces the strategic role of mobile applications in shaping brand outcomes. Boonsiritomachai and Sud-On (2020) find that hotel-branded mobile apps positively influence purchase intentions and word-of-mouth, suggesting that mobile apps enhance brand visibility and consumer trust—both essential components of brand attractiveness. Tiwari et al. (2021) further show that perceived “coolness” of mobile technology enhances emotional attachment and favourable brand perceptions, thus contributing to attractiveness.

Recent studies highlight the importance of service relationship quality and cognitive experiences within mobile interfaces. Ahn and Kwon (2021) demonstrate that multidimensional customer service relationships in mobile apps support favourable consumer behaviours, while Ahn (2021) finds that positive cognitive experiences within food-related mobile apps influence consumer attitudes and behaviour. These results suggest that social presence, service responsiveness, and cognitive engagement within mobile applications are key drivers of brand attractiveness.

Collectively, these findings indicate that mobile applications enhance brand attractiveness by improving engagement, emotional attachment, trust, and cognitive experiences. Thus, the following hypothesis is proposed:

H2: Mobile Applications positively influence Brand Attractiveness.

2.4 Online Communities (OC) and Brand Attractiveness

Online communities have gained scholarly attention for their role in enhancing brand attractiveness through consumer engagement, trust-building, and community dynamics. Using the Stimulus–Organism–Response (S-O-R) framework,

Chavadi et al. (2023) show that social media-based brand communities strengthen brand trust and brand equity, which subsequently drive consumer behavioural responses such as purchase intentions, indicating that community-driven interactions enhance perceived brand attractiveness via trust and value formation.

Brand trust has been further identified as a key mechanism linking community participation to consumer outcomes. Kamalasena and Sirisena (2021) demonstrate that online community participation and electronic word-of-mouth (eWOM) influence purchase intentions through trust, suggesting that trust mediates the effect of community engagement on brand attractiveness. Similarly, Bao and Wang (2021) find that social presence and mechanisms of commitment and trust motivate participation in brand microblogs, reinforcing consumer–brand relationships and perceived brand attractiveness.

Other studies highlight the role of platform aesthetics, responsiveness, and influencer credibility within online communities. Chuah et al. (2021) show that visually appealing and responsive brand fan pages foster consumer engagement, loyalty, and resistance to negative information. Bonus et al. (2022) find that content attractiveness and influencer expertise enhance brand awareness and brand image, while Huaman-Ramirez and Merunka (2021) report that credible celebrity CEOs strengthen brand image and attractiveness through trust and perceived expertise in online settings.

Collectively, these findings indicate that online communities improve brand attractiveness by fostering engagement, trust, social presence, influencer credibility, and favourable brand perceptions. Thus, the following hypothesis is proposed:

H3: Online Communities positively influence Brand Attractiveness.

2.5 Social Media (SM) and Brand Attractiveness

Social media plays a central role in shaping brand attractiveness by enabling real-time, two-way interactions that enhance openness, trust, and consumer connection. Kapuściński et al. (2021) show that organisational responsiveness—including message tone and spokesperson gender—significantly influences perceived brand attractiveness, while Santiago and Serralha (2022) find that authentic content and strong engagement improve consumer brand evaluations. Together, these findings indicate that social media behaviours directly affect how attractive consumers perceive brands to be.

Influencer characteristics further contribute to brand attractiveness within social media environments. Santiago and Serralha (2022) report that influencer appearance, warmth, and similarity enhance perceived credibility, and Nugroho et al. (2022) demonstrate that influencers who are perceived as attractive, competent, and trustworthy strengthen brand image and increase millennial purchase likelihood. These results highlight that influencers not only promote products but also facilitate positive brand perceptions and consumer–brand connections.

Collectively, these studies suggest that brand-generated content, platform responsiveness, and influencer credibility jointly reinforce brand attractiveness. Based on this reasoning, the following hypothesis is proposed:

H4: Social Media positively influences Brand Attractiveness.

2.6 Virtual Reality (VR) and Brand Attractiveness

Virtual Reality (VR) has gained increasing research attention for its capacity to enhance brand attractiveness through immersive consumer experiences. In retail contexts, VR environments enable realistic and engaging shopping interactions that strengthen consumer–brand connections. Yuan et al. (2021) show that VR shopping flow significantly increases psychological ownership, with emotional attachment further reinforcing brand attractiveness, while Jin et al. (2021) demonstrate that VR environments heighten perceived store attractiveness even for unfamiliar brands, indicating VR's effectiveness in capturing consumer interest.

Customer experience is a key mechanism linking VR immersion to favourable brand outcomes. Rhee and Lee (2021) find that satisfaction with virtual fitting experiences promotes positive brand-related behaviours, supporting VR's role in elevating overall shopping satisfaction and attractiveness. Beyond retail, Pahlevi et al. (2021) show that virtual tourism experiences enhance destination appeal, suggesting that immersive environments can strengthen brand perceptions across sectors.

Sensory and emotional engagement further contribute to VR's impact on brand attractiveness. Escobar et al. (2021) demonstrate that sensory-rich virtual environments increase perceived product quality and desirability, while Lin (2022) finds that higher levels of virtual immersion in advertising enhance engagement and brand evaluations. These findings underline VR's ability to generate favourable brand perceptions through immersion, sensory stimulation, and emotional involvement.

Given Millennials' openness to technology and preference for experiential interactions, VR provides a compelling tool for retailers to elevate brand attractiveness. Thus, the following hypothesis is proposed:

H5: Virtual Reality positively influences Brand Attractiveness.

2.7 Brand Attractiveness and Customer Churn Reduction

In today's competitive retail environment, especially among Millennials, brand attractiveness has become a key determinant of customer churn reduction. Chuah et al. (2021) show that the attractiveness and agility of brand fan pages mediate customer engagement, reducing consumer resistance and sustaining interaction. Their findings indicate that while visual appeal is important, responsiveness to evolving customer preferences is critical for strengthening engagement and lowering churn risk among Millennials who expect dynamic, personalised, and interactive brand experiences.

Brand authenticity further supports churn reduction by reinforcing satisfaction and loyalty. Uysal and Okumuş (2022) demonstrate that consumer-based brand authenticity significantly enhances satisfaction and loyalty—two core predictors of reduced churn. Authentic brands perceived as transparent, genuine, and value-driven align closely with Millennial expectations, making authenticity essential for long-term churn mitigation.

Digital retail environments also amplify the role of perceived brand attractiveness in shaping churn behaviours. Ke et al. (2021) find that consumer reactions to suboptimal ratings strongly influence repurchase intentions, indicating that brand quality and attractiveness—often shaped by online feedback—directly affect churn. Given Millennials' high digital engagement, negative evaluations can rapidly alter brand perceptions, underscoring the need for proactive reputation management and consistent service delivery.

Collectively, these studies suggest that brand attractiveness reduces churn by enhancing engagement, authenticity-driven loyalty, and positive digital evaluations. Thus, the following hypothesis is proposed:

H6: Brand Attractiveness positively influences Customer Churn Reduction.

2.8 Mediating Role of Brand Attractiveness

Mediators are essential in behavioural models as they explain how independent variables influence dependent outcomes. Hair et al. (2022) note that mediation enhances explanatory power by uncovering indirect effects, while Memon et al. (2018) argue that incorporating mediators such as Brand Attractiveness clarifies how outcomes like Customer Churn Reduction occur. Mediation also aligns with the Stimulus–Organism–Response (S-O-R) framework, where stimuli (digital content strategies) influence consumer responses through psychological processes. Based on this, the following review examines Brand Attractiveness as a mediator across digital engagement strategies.

Augmented Reality (AR) is widely recognised as a transformative retail strategy. AR applications enhance customer experience through interactivity, immersion, and sensory engagement (Caboni et al., 2024; Yuan et al., 2021), which strengthen emotional connections and perceptions of brand attractiveness (Rhee & Lee, 2021; Prasad et al., 2022). AR brand experiences further promote brand relationships and loyalty (Zeng et al., 2023; Kim & Im, 2024). Thus, by increasing brand attractiveness, AR may indirectly reduce churn among Millennials who value immersive digital experiences.

Mobile applications (apps) function as key engagement platforms offering convenience, personalisation, and interactivity. Research shows that effective apps enhance engagement and loyalty (Ho & Chung, 2020; Boateng et al., 2020) and improve perceptions of brand innovativeness and reliability, strengthening brand attractiveness (Boonsiritomachai & Sud-On, 2020; Tiwari et al., 2021). Loyalty features such as rewards and gamification foster attachment and reduce churn (Ahn & Kwon, 2021; Ahn, 2021), suggesting that Brand Attractiveness mediates the relationship between app use and churn reduction.

Online communities enable consumers to share experiences and co-create brand value. Participation in such communities increases trust and perceived brand value (Chavadi et al., 2023; Kamalasena & Sirisena, 2021), while active involvement reinforces consumer–brand relationships and brand attractiveness (Bao & Wang, 2021). Consequently, Brand Attractiveness is expected to mediate the effect of community participation on churn.

Social Media has become central to brand communication, especially for Millennials. Influencer marketing and social content improve brand perceptions and trust (Chuah et al., 2021; Bonus et al., 2022), while authenticity and credibility enhance brand attractiveness (Huaman-Ramirez & Merunka, 2021; Grădinaru et al., 2022). Interactions with influencers and peers further strengthen consumer–brand relationships and reduce churn (Kapuściński et al., 2021; Santiago & Serralha, 2022; Nugroho et al., 2022). Therefore, Brand Attractiveness likely mediates the link between social media strategies and churn reduction.

Virtual Reality (VR) reshapes consumer–brand interactions by offering immersive shopping experiences that heighten emotional involvement and attachment (Jin et al., 2021; Pahlevi et al., 2021). Immersive VR environments enhance perceived brand attractiveness through interactive and sensory engagement (Escobar, Petit, & Velasco, 2021; Lin, 2022) and foster parasocial relationships and psychological ownership linked to loyalty and churn reduction (Yuan et al., 2023). Thus, Brand Attractiveness is expected to mediate the relationship between VR experiences and churn. Based on this evidence, it is anticipated that Brand Attractiveness mediates the impact of VR experiences on Customer Churn Reduction.

Thus, the following hypotheses are stated:

H7a: Brand Attractiveness mediates the relationship between Augmented Reality and Customer Churn Reduction.

H7b: Brand Attractiveness mediates the relationship between Mobile Apps and Customer Churn Reduction.

H7c: Brand Attractiveness mediates the relationship between Online Communities and Customer Churn Reduction.

H7d: Brand Attractiveness mediates the relationship between Social Media and Customer Churn Reduction.

H7e: Brand Attractiveness mediates the relationship between Virtual Reality and Customer Churn Reduction.

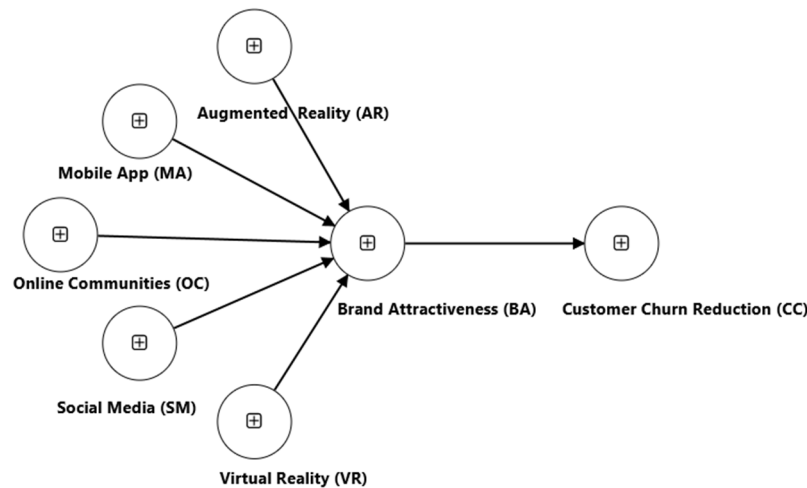


Figure 1. Research Framework

Note: All hypothesised relationships represent positive directional effects, indicated by (+).

3. Methodology

This study adopted a quantitative cross-sectional design to investigate the effects of digitalised content strategies on Brand Attractiveness and Customer Churn Reduction. A survey methodology was employed, which is suitable for efficiently gathering standardised data from a large sample (Creswell & Creswell, 2022). Grounded in the positivist paradigm, the study emphasised objectivity, hypothesis testing, and generalisability (Saunders et al., 2023).

Primary data were collected from Millennial consumers in Klang Valley, Malaysia using a structured questionnaire comprising demographic profiles, digitalised content constructs (Augmented Reality, Mobile Apps, Online Communities, Social Media, Virtual Reality), and the mediator (Brand Attractiveness) and dependent variable (Customer Churn Reduction). All constructs were measured on a five-point Likert scale (1 = strongly disagree; 5 = strongly agree) using items adapted from validated sources (Bruhn et al., 2012; Hamari et al., 2015; Sang & Cuong, 2024).

A pre-test involving 30 Millennial respondents was conducted to ensure clarity and reliability of the measures. Internal consistency was assessed using McDonald's Omega (ω), which is regarded as more robust than Cronbach's Alpha for heterogeneous loadings (Dunn et al., 2014; Hayes & Coutts, 2020). All constructs exceeded the recommended 0.70 threshold (Nunnally, 1978): AR ($\omega = 0.82$), Mobile Apps ($\omega = 0.80$), Online Communities ($\omega = 0.79$), Social Media ($\omega = 0.84$), VR ($\omega = 0.86$), Brand Attractiveness ($\omega = 0.88$), and Customer Churn Reduction ($\omega = 0.81$), confirming the instrument's suitability.

Millennials (born 1981–1996) were targeted due to their high digital engagement and relevance to retail contexts. Sample size determination using G*Power (Memon et al., 2020) with medium effect size ($f^2 = 0.15$), 0.80 power, and 0.05 significance indicated a minimum of 92 participants. However, following recommendations for larger samples in complex SEM models (Memon et al., 2020) and to enhance robustness, 306 valid responses were collected.

Respondents were recruited using convenience sampling among Millennials in Klang Valley. While probability sampling enhances generalisability, it is not always required for theory testing. Calder et al. (1981) argue that representativeness is less critical when theory development is the primary goal, and Hulland et al. (2017) note that in social science, theory generalisation often takes precedence over sampling generalisation. Accordingly, a non-probability sampling approach was deemed appropriate for this study.

Data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) via SmartPLS 4 (Ringle et al., 2022). PLS-SEM was selected for its suitability for predictive and explanatory research, ability to handle complex models with multiple constructs, and its minimal assumptions regarding multivariate normality (Hair et al., 2022), making it appropriate for survey-based data.

4. Result

As the data were collected from a single source, the potential for common method bias (CMB) was considered prior to the main analysis. In line with the recommendations of Kock and Lynn (2012) and Kock (2015), full collinearity testing was undertaken. This procedure involves regressing all latent constructs on a common variable and examining the resulting variance inflation factor (VIF) values. A VIF value of ≤ 5 , is indicative that CMB is not a significant concern. The analysis in Table 1 returned VIF values ranging from 1.615 to 3.994, all of which fall below the established thresholds, thereby suggesting that common method bias is unlikely to compromise the validity of the study's findings.

Table 1. Full Collinearity Testing

AR	VR	MA	OC	SM	BA	CC
3.994	3.763	1.615	1.836	1.673	2.409	2.029

Note: AR = Augmented Reality, VR = Virtual Reality, MA = Mobile Apps, OC = Online Communities, SM = Social Media, BA = Brand Attractiveness, CC = Customer Churn Reduction

4.1 Demographic Analysis

A total of 306 valid responses were collected for the study. These demographic characteristics in Table 2 reflect a diverse and representative sample of the Millennial population residing in Klang Valley, Malaysia.

Table 2. Demographic Profile

Demographic	Frequencies	Percentage (%)
Gender		
Male	162	52.9
Female	144	47.1
Race		
Malay	167	54.6
Chinese	115	37.6
Indian	17	5.6
Others	7	2.3
Marital Status		
Single	146	47.7
Married	156	51.0
Divorces	4	1.3
Education Level		
Secondary	7	2.3
Diploma	25	8.2
Bachelor Degree	157	51.3
Master Degree	95	31.0
Doctoral Degree	22	7.2
Employment Status		
Government Sector	44	14.4
Private Sector	218	71.2
Self-Employed	35	11.4
Unemployment	4	1.3
Retired	2	0.7
Housewife	3	1.0
Monthly Personal Income		
RM 2,000 or less	15	4.9
RM 2,001 to RM 4,000	57	18.6
RM 4,001 to RM 6,000	89	29.1
RM 6,001 to RM 8,000	53	17.3
RM 8,001 to RM 10,000	39	12.7
RM 10,001 and above	38	12.4
No Income	15	4.9

4.2 Measurement Model Assessment

The analysis began with an evaluation of the measurement model to establish reliability and validity, consistent with Hair et al. (2022) and Ramayah et al. (2018), as shown in Table 3 and Table 4. Structural model assessment was then conducted to test the hypothesised relationships.

Indicator reliability was first examined through outer loadings, all of which exceeded the recommended 0.50 threshold, indicating that the indicators reliably represented their respective constructs. Convergent validity was assessed using the Average Variance Extracted (AVE), which reflects the proportion of variance explained by the construct. Following

Fornell and Larcker's (1981) benchmark of ≥ 0.50 , all AVE values met the requirement, confirming that the latent variables adequately captured the variance of their indicators.

Internal consistency reliability was evaluated using Composite Reliability (CR) and Cronbach's Alpha. Both CR and Alpha values exceeded the 0.70 threshold, demonstrating strong reliability across all constructs.

The discriminant validity (HTMT) results in Table 4 exhibited values below the recommended threshold of 0.90. But the HTMT value between Virtual Reality and Augmented Reality was slightly higher at 0.918. Hence, the bootstrapped 90% confidence interval was examined and the analysis showed that the upper limit did not exceed 1, confirming that the overlap between these two constructs remains within acceptable boundaries. Together, all these results confirmed that the measurement model was reliable and valid.

Table 3. Measurement Model Assessment

Constructs	Items	Indicator Reliability	Convergent	Internal Consistency	
			Validity	Reliability	
		Outer Loadings	AVE	Composite Reliability	Cronbach's Alpha
		≥ 0.50	≥ 0.50	≥ 0.7	> 0.7
Augmented Reality	AR1	0.922	0.791	0.938	0.913
	AR2	0.905			
	AR3	0.844			
	AR4	0.885			
Mobile App	MA1	0.825	0.637	0.875	0.810
	MA2	0.834			
	MA3	0.752			
	MA4	0.779			
Online Communities	OC1	0.849	0.725	0.913	0.873
	OC2	0.876			
	OC3	0.813			
	OC4	0.866			
Social Media Platforms	SM1	0.865	0.659	0.885	0.827
	SM2	0.873			
	SM3	0.767			
	SM4	0.731			
Virtual Reality	VR1	0.926	0.836	0.953	0.935
	VR2	0.929			
	VR3	0.891			
	VR4	0.911			
Brand Attractiveness	BA1	0.911	0.867	0.970	0.962
	BA2	0.941			
	BA3	0.944			
	BA4	0.941			
	BA5	0.918			
Customer Churn Reduction	CC1	0.927	0.751	0.937	0.915
	CC2	0.919			
	CC3	0.922			
	CC4	0.845			
	CC5	0.700			

Table 4. Discriminant Validity (HTMT) Assessment

Construct	1	2	3	4	5	6	7
1. AR							
2. BA	0.433						
3. CC	0.386	0.729					
4. MA	0.533	0.543	0.534				
5. OC	0.595	0.553	0.415	0.466			
6. SM	0.496	0.480	0.436	0.592	0.647		
7. VR	0.918	0.463	0.334	0.471	0.552	0.409	

Note: AR = Augmented Reality, VR = Virtual Reality, MA = Mobile Apps, OC = Online Communities, SM = Social Media, BA = Brand Attractiveness, CC = Customer Churn Reduction.

4.3 Structural Model Assessment

The assessment of multivariate skewness and kurtosis indicated that the data did not satisfy the assumption of multivariate normality. Specifically, Mardia's multivariate skewness ($\beta = 11.2117$, $p < 0.05$) and kurtosis ($\beta = 84.4682$, $p < 0.05$) were both statistically significant, confirming substantial deviations from normality. In response to this violation, a bootstrapping procedure with 10,000 resamples was applied, in line with the recommendations of Becker et al. (2023), to estimate the path coefficients, standard errors, t-values, and p-values for the structural model (Hair et al., 2022).

4.3.1 Direct Relationships

The demographic profile of respondents reflects the diversity of Millennials residing in Klang Valley, Malaysia. The sample was relatively balanced by gender and represented varied ethnicities, education levels, employment sectors, and income categories. Such diversity strengthens the contextual relevance of the findings, particularly as Millennials are digitally native and highly receptive to technology-driven brand interactions (Idris Sazali et al., 2023). As all respondents fell within the Millennial cohort, the results are especially applicable to a segment that is economically influential and prone to brand switching in digital retail environments.

Table 5 shows mixed support for the hypothesised relationships. Mobile Apps ($\beta = 0.269$, $p < 0.05$), Online Communities ($\beta = 0.275$, $p < 0.05$), Social Media ($\beta = 0.117$, $p < 0.05$), and Virtual Reality ($\beta = 0.275$, $p < 0.05$) positively influenced Brand Attractiveness, supporting H2–H5. In contrast, Augmented Reality ($\beta = -0.135$, $p < 0.05$) demonstrated a significant negative effect, leading to the rejection of H1. Brand Attractiveness strongly influenced Customer Churn Reduction ($\beta = 0.687$, $p < 0.05$), supporting H6. The 95% bias-corrected confidence intervals confirmed significance, as none of the intervals straddled zero.

Effect sizes (f^2) were interpreted using Chin's (2010) thresholds (0.02 = small; 0.15 = medium; 0.35 = large). Brand Attractiveness exhibited a large effect on Customer Churn Reduction ($f^2 = 0.896$). Mobile Apps ($f^2 = 0.081$), Online Communities ($f^2 = 0.072$), and Virtual Reality ($f^2 = 0.034$) showed small effects, whereas Augmented Reality ($f^2 = 0.008$) and Social Media ($f^2 = 0.013$) demonstrated no meaningful effect. Collinearity was not problematic, as VIF values ranged from 1.457 to 3.893, well below the recommended threshold of 5 (Kock, 2015; Hair et al., 2022).

Although Social Media had a statistically significant positive effect, its effect size ($f^2 = 0.013$) fell below the 0.02 benchmark, indicating limited practical impact (Chin, 2010). This suggests that while Social Media enhances brand perceptions among Millennials, its contribution is modest relative to other digital strategies. Similarly, the small effects of Mobile Apps, Online Communities, and Virtual Reality remain theoretically meaningful, as small effects are common in behavioural research and still provide valuable insights when interpreted collectively (Hair et al., 2022). The overall model performance remains strong, as reflected in both explanatory and predictive metrics.

The R^2 values showed that the model explained 38.7% of the variance in Brand Attractiveness and 47.3% in Customer Churn Reduction, indicating moderate explanatory power (Hair et al., 2022). Q^2 Predict values of 0.357 (Brand Attractiveness) and 0.224 (Customer Churn Reduction) indicated large and medium predictive relevance, respectively. These results confirm that the model is not only theoretically sound but also possesses meaningful predictive capability, reinforcing its empirical relevance.

Table 5. Hypothesis Testing (Direct Effects)

Hypothesis	Std Beta	t-values	p-values	BCI LL	BCI UL	f^2	VIF	Effect Size	Results
H1	-0.135	1.659	0.049	-0.267	-0.000	0.008	3.893	No effect	Unsupport
H2	0.269	4.336	0.000	0.165	0.368	0.081	1.457	Small	Support
H3	0.275	3.600	0.000	0.151	0.400	0.072	1.709	Small	Support
H4	0.117	1.701	0.044	0.004	0.228	0.013	1.646	No effect	Support
H5	0.275	3.438	0.000	0.140	0.400	0.034	3.578	Small	Support
H6	0.687	17.690	0.000	0.611	0.743	0.896	1.000	Strong	Support

Note: We use a 95% confidence interval with a bootstrapping of 10,000.

4.3.2 Indirect Relationships

Mediation analysis was conducted to examine the mediating role of Brand Attractiveness in the relationships between digitalised content strategies and Customer Churn Reduction. As shown in Table 6 and Figure 2, significant mediation effects were found for Mobile Apps ($\beta = 0.185$, $p < 0.05$), Online Communities ($\beta = 0.189$, $p < 0.05$), Social Media ($\beta = 0.080$, $p < 0.05$), and Virtual Reality ($\beta = 0.189$, $p < 0.05$), supporting hypotheses H7b to H7e. However, no support was found for the mediation involving Augmented Reality (H7a: $\beta = -0.093$, $p < 0.05$), as the negative coefficient was contrary to the hypothesised positive direction.

The mediation analysis further confirmed the important role of Brand Attractiveness as a mechanism linking digitalised content strategies to Customer Churn Reduction. Although the effect sizes (v^2) were small, ranging from 0.034 to 0.036, they align with the guidelines set by Preacher and Kelley (2011), and Kenny (2025), where 0.01 is considered a small

but meaningful effect. In social science and marketing research, small mediation effects are common due to the complex and multifaceted nature of consumer behaviour, particularly in technology-driven contexts (Hair et al., 2022).

Table 6. Hypothesis Testing Mediating Effect

Hypothesis	Std Beta	t-values	p-values	BCI LL	BCI UL	v ²	Effect Size	Results
H7a	-0.093	1.654	0.049	-0.183	-0.000	0.010	Small	Unsupport
H7b	0.185	3.976	0.000	0.109	0.261	0.034	Small	Support
H7c	0.189	3.668	0.000	0.104	0.272	0.036	Small	Support
H7d	0.080	1.654	0.049	0.003	0.161	0.006	No effect	Support
H7e	0.189	3.409	0.000	0.097	0.278	0.036	Small	Support

Note: We use a 95% confidence interval with a bootstrapping of 10,000.

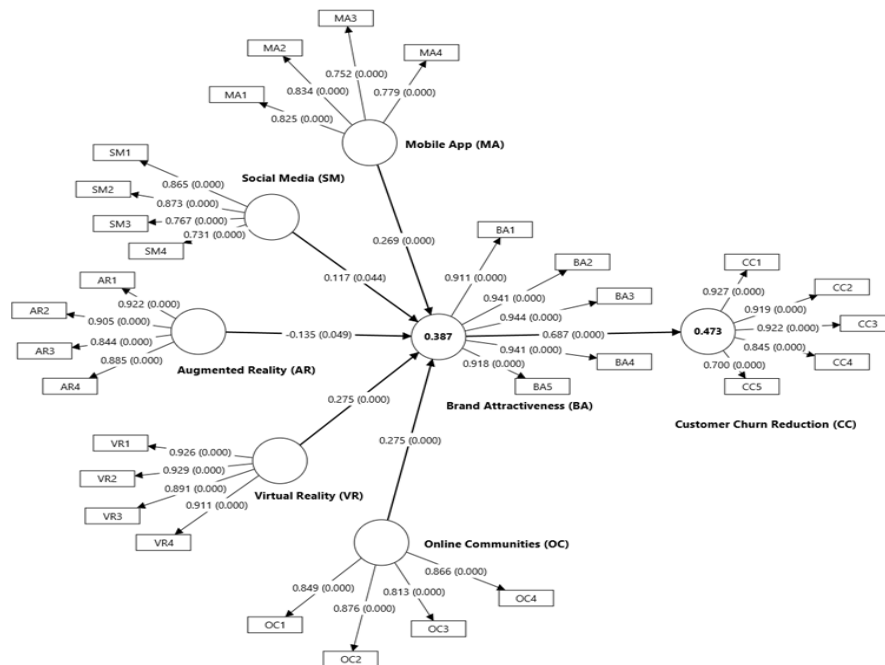


Figure 2. Structural Model Assessment with Path Coefficients and P-value

5. Discussion

The results provide valuable insights into how digitalised content strategies influence brand attractiveness and subsequent customer churn reduction. The significant positive effects of Mobile Apps, Online Communities, Social Media, and Virtual Reality confirm that interactive and engaging digital touchpoints enhance consumer brand perceptions. These findings align with prior research showing that mobile apps support personalised engagement (Ho & Chung, 2020), online communities foster belonging and trust, social media facilitates real-time interaction (Bao & Wang, 2021), and VR delivers immersive experiences (Jin et al., 2021).

However, the significant negative effect of Augmented Reality on brand attractiveness offers a notable contrast. Although AR is widely promoted for its marketing potential, this result suggests that suboptimal implementation due to technological complexity, usability limitations, or insufficient value-added benefits may generate frustration and reduce brand evaluations (Caboni et al., 2024; Yuan et al., 2021; Rhee & Lee, 2021). This underscores the need for user-centric AR design that integrates seamlessly into the consumer journey and meets Millennial expectations (Seyfi et al., 2024).

Further reinforcing the theoretical model, brand attractiveness demonstrated a strong positive effect on customer churn reduction. This supports evidence that emotionally engaging and cognitively appealing brands foster loyalty and mitigate churn (Desveaud et al., 2024; Karami, 2022). Given Millennials' propensity for switching behaviour due to low switching costs and marketplace choice abundance, enhancing brand attractiveness constitutes a critical retention strategy (Johan et al., 2022).

Overall, the findings highlight the strategic value of well-crafted digital content strategies in strengthening brand attractiveness and reducing churn among Millennials in Klang Valley. Brands leveraging mobile apps, online communities, social media, and VR are better positioned to retain consumers, while AR requires careful execution to avoid unintended negative outcomes. These insights guide retailers in aligning digital strategies with Millennial preferences (Department of Statistics Malaysia, 2021).

Regarding mediation, even modest mediating effects are meaningful, as incremental improvements in brand attractiveness can translate into reduced churn over time. This is particularly relevant for Millennials in Klang Valley, who are digitally literate, ethnically diverse, and economically dynamic (Department of Statistics Malaysia, 2021; Johan et al., 2022). Their heightened expectations for digital experiences mean that subtle shifts in perceived brand attractiveness can cumulatively influence loyalty behaviours (Seyfi et al., 2024).

Notably, the mediation effect of Social Media via brand attractiveness (H7d) was statistically significant ($p < .05$) but exhibited a negligible effect size ($v^2 = 0.006$), below recommended practical significance thresholds (Preacher & Kelley, 2011; Kenny, 2025). This indicates that while social media engagement exerts a detectable indirect influence on churn reduction, its magnitude is limited. The distinction between statistical and practical significance is important in larger samples, where small effects may still reach significance. Managerially, this suggests that although social media supports communication and visibility (Bao & Wang, 2021; Khan et al., 2023), it may not serve as a strong lever for reducing churn via brand attractiveness among Millennials in Klang Valley.

The unsupported mediation effect involving AR (H7a) further illustrates the importance of deliberate technology design. Given that Millennials expect intuitive, seamless interactions (Seyfi et al., 2024), poorly executed AR experiences may diminish brand perceptions rather than enhance them (Caboni et al., 2024; Prasad et al., 2022). While technological innovation remains essential (Jung & Shegai, 2023), user-centred design and experiential value must be prioritised for emerging technologies to positively influence brand attractiveness (Rauschnabel et al., 2024).

Overall, the findings validate the strategic role of brand attractiveness in the digital engagement ecosystem, positioning it as a critical mechanism for improving customer retention among Millennials in Klang Valley (Desveaud et al., 2024; Karami, 2022).

6. Conclusion, Implications and Limitations

This study investigated how five digitalised gamified content strategies: Augmented Reality, Mobile Apps, Online Communities, Social Media, and Virtual Reality affect Customer Churn Reduction through Brand Attractiveness among Millennial consumers in Klang Valley. A quantitative cross-sectional survey ($n = 306$) was analysed using PLS-SEM to evaluate the measurement and structural models, assess mediation and predictive relevance, and test the proposed hypotheses. The findings indicate that Mobile Apps, Online Communities, Social Media, and Virtual Reality significantly enhance Brand Attractiveness, while Augmented Reality exerts a negative effect. Brand Attractiveness strongly predicts Customer Churn Reduction and mediates the effects of Mobile Apps, Online Communities, Social Media, and Virtual Reality on churn reduction. Overall, the results conclude that digital content strategies that strengthen Brand Attractiveness contribute to reducing churn among Millennials in the retail context. Based on these findings, the following theoretical and practical implications are offered.

6.1 Theoretical Implications

This study makes an important contribution to the evolving literature on digitalisation-driven gamification and its effect on customer churn reduction, with a focus on the retail market industry. By extending the application of the Stimulus-Organism-Response (S-O-R) framework (Mehrabian & Russell, 1974), it uncovers the indirect mechanisms through which digitalised content strategies such as Augmented Reality, Mobile Apps, Online Communities, Social Media, and Virtual Reality influence customer behavioural outcomes through Brand Attractiveness. While previous studies have explored direct links between gamification features and consumer engagement (Koivisto & Hamari, 2019; Xi & Hamari, 2019), this research advances theoretical discourse by positioning Brand Attractiveness as a central mediating construct, highlighting the emotional and cognitive responses crucial to customer loyalty. Importantly, the study contextualises these findings within the retail sector, providing much-needed empirical evidence from Millennial consumers in Klang Valley, Malaysia which is a market segment known for its high digital savviness and low brand-switching costs (Johan, Syed, & Adnan, 2022). These insights enrich the external validity of gamification research and reinforce the need for sector-specific theoretical models in retail marketing scholarship. Overall, the study demonstrates that the value of the S-O-R framework lies not only in explaining positive consumer responses, but also in identifying when and why certain digital stimuli fail to translate into favourable organismic states and retention outcomes.

6.2 Practical Implications

From a managerial standpoint, the findings offer critical insights for retail businesses aiming to minimise customer churn and maximise brand loyalty in a highly competitive digital landscape. The significant positive effects of gamification using Mobile Apps, Online Communities, Social Media, and Virtual Reality on Brand Attractiveness suggest that retail firms must strategically invest in interactive, immersive, and community-driven digital initiatives. Given the retail industry's increasing reliance on digital engagement to build long-term customer relationships, these tools are no longer optional but essential for brand competitiveness. Retailers targeting Millennials, who demonstrate elevated expectations for digital

experiences (Department of Statistics Malaysia, 2021; Seyfi, Vo-Thanh, & Zaman, 2024) must focus on delivering personalised, seamless, and enriching touchpoints. However, the negative influence of Augmented Reality on Brand Attractiveness serves as a cautionary note. Poorly designed AR experiences may alienate rather than engage, underlining the necessity for user-centric, intuitive design in retail marketing applications (Caboni et al., 2024). The study offers a strategic framework for retail managers, indicating that a balanced and well-executed digitalisation strategy can elevate Brand Attractiveness and foster customer loyalty, ultimately reducing churn rates in a highly volatile retail market.

6.3 Limitations and Future Research

Despite its contributions, several limitations should be noted. First, the use of non-probability convenience sampling, although suitable for theory testing (Calder, Phillips, & Tybout, 1981), restricts the generalisability of the findings beyond Millennials in Klang Valley. Future studies could adopt stratified or probability sampling methods to extend insights across diverse demographic groups and retail contexts. Second, the cross-sectional research design limits the ability to establish causality. Longitudinal research could further elucidate how digital engagement strategies and Brand Attractiveness evolve over time to influence customer churn in the retail sector. Third, this study focused on five digitalised content strategies. Future research should expand this scope to include emerging retail technologies such as Artificial Intelligence-driven personalisation engines, blockchain loyalty programmes, and gamified e-commerce interfaces. Additionally, qualitative methods such as interviews or focus groups could deepen understanding of consumer experiences and refine the theoretical model. Finally, comparative studies across different retail sectors (e.g., fashion, grocery, electronics) would provide richer insights into sector-specific digital engagement dynamics and churn mitigation strategies.

Acknowledgments

The authors would like to thank Multimedia University for providing financial support to publish this article.

Author contributions

CES - Conceptualization, Methodology, Project Administration, Writing Original Draft, Data Curation, Formal Analysis, Writing - Review & Editing. YHO - Supervision, Resources, Writing - Review & Editing. NABMN - Validation, Visualization, Writing - Review & Editing. All authors read and approved of the final manuscript.

Funding

Not applicable.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Redfame Publishing.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

Open access

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

References

- Ahmed, S., Islam, T., & Ghaffar, A. (2024). Shaping brand loyalty through social media influencers: The mediating role of follower engagement and social attractiveness. *SAGE Open*, 14(2). <https://doi.org/10.1177/21582440241242928>
- Ahn, J. (2021). Impact of cognitive aspects of food mobile application on customers' behaviour. *Current Issues in Tourism*, 25(4), 516–523. <https://doi.org/10.1080/13683500.2021.1890700>
- Ahn, J., & Kwon, J. (2021). Examining the relative influence of multidimensional customer service relationships in the food delivery application context. *International Journal of Contemporary Hospitality Management*, 33(3), 912–928. <https://doi.org/10.1108/IJCHM-09-2020-0973>
- Ahn, J., & Mirzaei, A. (2021). Consumer engagement within retail communication channels: An examination of online brand communities and digital content marketing initiatives. *European Journal of Marketing*, 55(5), 1411–1439. <https://doi.org/10.1108/EJM-01-2018-0007>
- Ahn, J., & Visitacion, J. K. (2022). Influencer marketing factors affecting brand awareness and brand image of start-up businesses. *Journal of Business and Management Studies*, 4(1), 189–202. <https://doi.org/10.32996/jbms.2022.4.1.22>
- Bao, Z., & Wang, D. (2021). Examining consumer participation on brand microblogs in China: Perspectives from elaboration likelihood model, commitment–trust theory and social presence. *Journal of Research in Interactive Marketing*, 15(1), 10–29. <https://doi.org/10.1108/JRIM-02-2019-0027>
- Becker, J. M., Cheah, J. H., Gholamzade, R., Ringle, C. M., & Sarstedt, M. (2023). PLS-SEM's most wanted guidance. *International Journal of Contemporary Hospitality Management*, 35(1), 321–346. <https://doi.org/10.1108/IJCHM-04-2022-0474>
- Boateng, H., Kosiba, J. P., Adam, D. R., Ofori, K. S., & Okoe, A. F. (2020). Examining brand loyalty from an attachment theory perspective. *Marketing Intelligence & Planning*, 38(4), 479–494. <https://doi.org/10.1108/MIP-03-2019-0161>
- Bonus, A. K., Raghani, J., Visitacion, J. K., & Castaño, M. C. (2022). Influencer marketing factors affecting brand awareness and brand image of start-up businesses. *Journal of Business and Management Studies*, 4(1), 189–202. <https://doi.org/10.32996/jbms.2022.4.1.22>
- Boonsiritomachai, W., & Sud-On, P. (2020). Increasing purchase intention and word-of-mouth through hotel brand awareness. *Tourism and Hospitality Management*, 26(2), 265–289. <https://doi.org/10.20867/thm.26.2.1>
- Bruhn, M., Schoenmueller, V., & Schäfer, D. B. (2012). Are social media replacing traditional media in terms of brand equity creation? *Management Research Review*, 35(9), 770–790. <https://doi.org/10.1108/01409171211255948>
- Caboni, F., Basile, V., Kumar, H., & Agarwal, D. (2024). A holistic framework for consumer usage modes of augmented reality marketing in retailing. *Journal of Retailing and Consumer Services*, 80, 103924. <https://doi.org/10.1016/j.jretconser.2024.103924>
- Cain, S., Zhang, Z., & Yuan, K. (2017). Univariate and multivariate skewness and kurtosis for measuring nonnormality. *Behavior Research Methods*, 49(5), 1716–1735. <https://doi.org/10.3758/s13428-016-0814-1>
- Calder, B. J., Phillips, L. W., & Tybout, A. M. (1981). Designing research for application. *Journal of Consumer Research*, 8(2), 197–207. <https://doi.org/10.1086/208856>
- Chavadi, C. A., Sirothiya, M., Menon, S. R., & M. R., V. (2023). Modelling the effects of social media-based brand communities on brand trust, brand equity and consumer response. *Vikalpa*, 48(2), 114–141. <https://doi.org/10.1177/02560909231172010>
- Chin, W. W. (2010). How to write up and report PLS analyses. In *Handbook of Partial Least Squares* (pp. 655–690). Springer. https://doi.org/10.1007/978-3-540-32827-8_29
- Chuah, S. H. W., Aw, E. C. X., & Tseng, M. L. (2021). The missing link in the promotion of customer engagement: The roles of brand fan page attractiveness and agility. *Internet Research*, 31(2), 587–612. <https://doi.org/10.1108/INTR-01-2020-0025>
- Creswell, J. W., & Creswell, J. D. (2022). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). Sage.
- Department of Statistics Malaysia. (2021). *Current Population Estimates, Malaysia, 2021*. <https://www.dosm.gov.my/>
- Desveaud, K., Mandler, T., & Eisend, M. (2024). A meta-model of customer brand loyalty and its antecedents. *Journal of Business Research*, 176, 114589. <https://doi.org/10.1016/j.jbusres.2024.114589>

- Dunn, T. J., Baguley, T., & Brunsden, V. (2014). From alpha to omega: A practical solution to the pervasive problem of internal consistency estimation. *British Journal of Psychology*, 105(3), 399–412. <https://doi.org/10.1111/bjop.12046>
- Escobar, F. B., Petit, O., & Velasco, C. (2021). Virtual terroir and the premium coffee experience. *Frontiers in Psychology*, 12, 586983. <https://doi.org/10.3389/fpsyg.2021.586983>
- 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>
- Grădinaru, C., Obadă, D. R., Grădinaru, I. A., & Dabija, D. C. (2022). Enhancing sustainable cosmetics brand purchase: A comprehensive approach based on the SOR model and the triple bottom line. *Sustainability*, 14(21), 14118. <https://doi.org/10.3390/su142114118>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., & Danks, N. P. (2022). *Partial least squares structural equation modeling (PLS-SEM) using R: A workbook* (1st ed.). Springer Nature. https://doi.org/10.1007/978-3-030-80519-7_1
- Hamari, J., & Koivisto, J. (2015). Why do people use gamification services? *International Journal of Information Management*, 35(4), 419–431. <https://doi.org/10.1016/j.ijinfomgt.2015.04.006>
- Hayes, A. F., & Coutts, J. J. (2020). Use omega rather than Cronbach's alpha for estimating reliability. But.... *Communication Methods and Measures*, 14(1), 1–24. <https://doi.org/10.1080/19312458.2020.1718629>
- Ho, M. H. W., & Chung, H. F. L. (2020). Customer engagement, customer equity and repurchase intention in mobile apps. *Journal of Business Research*, 121, 13–21. <https://doi.org/10.1016/j.jbusres.2020.07.046>
- Huaman-Ramirez, R., & Merunka, D. (2021). Celebrity CEOs' credibility, image of their brands and consumer materialism. *Journal of Consumer Marketing*, 38(6), 638–651. <https://doi.org/10.1108/JCM-08-2020-4026>
- Idris Sazali, K. H., Abu, N. Z., Harith, A., Azmi, A. Z., Ishak, M. H., Anuar, F., & Nik Azuar, N. N. S. (2023). The influence of green marketing on consumer purchasing behaviour among Millennials group in Klang Valley, Malaysia. *International Journal of Academic Research in Economics and Management Sciences*, 12(3), 120–132. <https://doi.org/10.6007/IJAREMS/v12-i3/18586>
- Jahan, M. R. M., Syed, M. A. M., & Adnan, H. M. (2022). Digital media and online buying considerations among Generation Z in Malaysia. *Jurnal Intelek*, 17(1), 164–180. <https://doi.org/10.24191/ji.v17i1.15920>
- Jiang, Z., & Lyu, J. (2024). The role of augmented reality app attributes and customer-based brand equity on consumer behavioural responses: An S–O–R framework perspective. *Journal of Product & Brand Management*, 33(6), 702–716. <https://doi.org/10.1108/JPBM-09-2023-4706>
- Jin, B., Kim, G., & Moore, M. (2021). Consumer store experience through virtual reality: Its effect on emotional states and perceived store attractiveness. *Fashion and Textiles*, 8, 19. <https://doi.org/10.1186/s40691-021-00256-7>
- Johan, M. R. M., Syed, M. A. M., & Adnan, H. M. (2022). Digital media and online buying considerations among Generation Z in Malaysia. *Jurnal Intelek*, 17(1), 164–180. <https://doi.org/10.24191/ji.v17i1.15920>
- Jung, S. U., & Shegai, V. (2023). The impact of digital marketing innovation on firm performance: Mediation by marketing capability and moderation by firm size. *Sustainability*, 15(7), 5711. <https://doi.org/10.3390/su15075711>
- Kamalasena, B. D. T. M., & Sirisena, A. B. (2021). The impact of online communities and e-word of mouth on purchase intention of Generation Y: The mediating role of brand trust. *Sri Lanka Journal of Marketing*, 7(1), 92–116. <https://doi.org/10.4038/sljmuok.v7i1.58>
- Kapuscinski, G., Zhang, N., Zeng, L., & Cao, A. (2021). Effects of crisis response tone and spokesperson's gender on employer attractiveness. *International Journal of Hospitality Management*, 94, 102884. <https://doi.org/10.1016/j.ijhm.2021.102884>
- Karami, M. (2022). Brand equity, brand loyalty and the mediating role of customer satisfaction: Evidence from medical cosmetics brands. *Research Journal of Business Management*, 9(3), 156–171. <https://doi.org/10.17261/Pressacademia.2022.1627>
- Ke, D., Zhang, H., Yu, N., & others. (2021). Who will stay with the brand after posting non-5/5 rating of purchase? *Information Systems and e-Business Management*, 19, 405–437. <https://doi.org/10.1007/s10257-019-00416-9>
- Kenny, D. A. (2025). *Mediation*. <https://davidakenny.net/cm/mediate.htm>
- Kim, T. H., & Im, H. (2024). Can augmented reality impact your self-perceptions? The malleability of the self and brand relationships in AR try-on services. *Journal of Consumer Behaviour*, 23(4), 1623–1637.

<https://doi.org/10.1002/cb.2296>

- Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-Collaboration*, 11(4), 1–10. <https://doi.org/10.4018/ijec.2015100101>
- Kock, N., & Lynn, G. S. (2012). Lateral collinearity and misleading results in variance-based SEM. *Journal of the Association for Information Systems*, 13(7), 546–580. <https://doi.org/10.17705/1jais.00302>
- Koivisto, J., & Hamari, J. (2019). The rise of motivational information systems: A review of gamification research. *International Journal of Information Management*, 45, 191–210. <https://doi.org/10.1016/j.ijinfomgt.2018.10.013>
- Lin, H. F. (2022). Influence of virtual experience immersion, product control, and stimulation on advertising effects. *Journal of Global Information Management*, 30(9), 1–19. <https://doi.org/10.4018/JGIM.292066>
- Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. MIT Press.
- Memon, M. A., Cheah, J. H., Ramayah, T., Ting, H., & Chuah, F. (2018). Mediation analysis: Issues and recommendations. *Journal of Applied Structural Equation Modeling*, 2(1), i–ix. [https://doi.org/10.47263/JASEM.2\(1\)01](https://doi.org/10.47263/JASEM.2(1)01)
- Memon, M. A., Salleh, R., Mirza, M. Z., Cheah, J. H., Ting, H., Ahmad, M. S., & Tariq, A. (2021). Satisfaction matters: The relationships between HRM practices, work engagement and turnover intention. *International Journal of Manpower*, 42(1), 21–50. <https://doi.org/10.1108/IJM-04-2018-0127>
- Memon, M. A., Ting, H., Cheah, J. H., Thurasamy, R., Chuah, F., & Cham, T. H. (2020). Sample size for survey research: Review and recommendations. *Journal of Applied Structural Equation Modeling*, 4(2), i–xx. [https://doi.org/10.47263/JASEM.4\(2\)01](https://doi.org/10.47263/JASEM.4(2)01)
- Nugroho, S. D. P., Rahayu, M., & Hapsari, R. D. V. (2022). The impacts of social media influencer's credibility attributes on Gen Z purchase intention with brand image as mediation. *International Journal of Research in Business and Social Science*, 11(5), 18–32. <https://doi.org/10.20525/ijrbs.v11i5.1893>
- Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). McGraw-Hill.
- Pahlevi, A. S., Sayono, J., & Hermanto, Y. A. L. (2021). Design of a virtual tour as a solution for promoting the tourism sector in the pandemic period. *KnE Social Sciences*, 5(6), 368–374. <https://doi.org/10.18502/kss.v5i6.9226>
- Pardede, B., & Aprianingsih, A. (2023). The influence of K-pop artist as brand ambassador on brand loyalty. *International Journal of Management Research and Economics*, 1(2), 1–15. <https://doi.org/10.54066/ijmre-itb.v1i2.455>
- Prasad, K., Tomar, A. S., De, T., & Soni, H. (2022). A conceptual model for building the relationship between augmented reality, experiential marketing and brand equity. *International Journal of Professional Business Review*, 7(6), e01030. <https://doi.org/10.26668/businessreview/2022.v7i6.1030>
- Preacher, K. J., & Kelley, K. (2011). Effect size measures for mediation models. *Psychological Methods*, 16(2), 93–115. <https://doi.org/10.1037/a0022658>
- Punwatar, S., & Verghese, M. (2025). Investigating the impact of gamification on customer engagement, brand loyalty and purchase intent. *Journal of Applied Research and Technology*, 23(1), 94–102. <https://doi.org/10.22201/icat.24486736e.2025.23.1.2592>
- Rachmadanty, A. D., Muhtar, A. A., & Agustina, A. (2025). Examining the impact of gamification and customer experience on customer loyalty in e-commerce. *Journal of Enterprise Development*, 7(1), 180–191. <https://doi.org/10.20414/jed.v7i1.12995>
- Rauschnabel, P. A., Hüttl-Maack, V., Ahuvia, A. C., & Schein, K. E. (2024). Augmented reality marketing and consumer-brand relationships. *Psychology & Marketing*, 41(4), 819–837. <https://doi.org/10.1002/mar.21953>
- Rhee, H. L., & Lee, K. H. (2021). Enhancing the sneakers shopping experience through virtual fitting using augmented reality. *Sustainability*, 13(11), 6336. <https://doi.org/10.3390/su13116336>
- Ringle, C. M., Wende, S., & Becker, J.-M. (2022). *SmartPLS 4* [Computer software]. <https://www.smartpls.com/>
- Rizma, F. A., & Marsasi, E. G. (2024). The effect of trustworthiness to increase brand trust and purchase intention on social media. *Jurnal Manajemen*, 15(1), 61–81. <https://doi.org/10.32832/jm-uika.v15i1.15766>
- Russell, J. A., & Mehrabian, A. (1974). *An approach to environmental psychology*. MIT Press.
- Sang, V. M., & Cuong, M. C. (2024). The influence of brand experience on brand loyalty in e-commerce. *Cogent Business & Management*, 12(1), 2440629. <https://doi.org/10.1080/23311975.2024.2440629>

- Santiago, J. K., & Serralha, T. (2022). What more influences followers? *Issues in Information Systems*, 23(1), 86–101. https://doi.org/10.48009/1_iis_2022_107
- Sarkis, N., Jabbour Al Maalouf, N., Saliba, E., & Azizi, J. (2025). The impact of augmented reality within the fashion industry on purchase decisions, customer engagement, and brand loyalty. *International Journal of Fashion Design, Technology and Education*, 1–10. <https://doi.org/10.1080/17543266.2025.2470187>
- Saunders, M., Lewis, P., & Thornhill, A. (2023). *Research methods for business students* (9th ed.). Pearson.
- Seyfi, S., Vo-Thanh, T., & Zaman, M. (2024). Hospitality in the age of Gen Z. *International Journal of Contemporary Hospitality Management*, 36(13), 118–134. <https://doi.org/10.1108/IJCHM-01-2024-0035>
- Shahid, S., Nauman, Z., & Ayyaz, I. (2023). The impact of parasocial interaction on brand relationship quality. *International Journal of Management Research and Emerging Sciences*, 13(1), 51–82. <https://doi.org/10.56536/ijmres.v13i1.349>
- Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J. H., Ting, H., Vaithilingam, S., & Ringle, C. M. (2019). Predictive model assessment in PLS-SEM: Guidelines for using PLSpredict. *European Journal of Marketing*, 53(11), 2322–2347. <https://doi.org/10.1108/EJM-02-2019-0189>
- Siu, N. Y. M., Zhang, T. J., & Yeung, R. S.-P. (2023). The bright and dark sides of online customer engagement on brand love. *Journal of Consumer Marketing*, 40(7), 957–970. <https://doi.org/10.1108/JCM-01-2022-5118>
- Tran, T. P., Zemanek, J. E., & Sakib, M. N. (2024). Improving brand love through branded apps: Is that possible? *Journal of Marketing Analytics*, 1–21. <https://doi.org/10.1057/s41270-024-00356-5>
- Uysal, A., & Okumuş, A. (2022). The effect of consumer-based brand authenticity on customer satisfaction and brand loyalty. *Asia Pacific Journal of Marketing and Logistics*, 34(8), 1740–1760. <https://doi.org/10.1108/APJML-05-2021-0358>
- Xi, N., & Hamari, J. (2019). Does gamification satisfy needs? *International Journal of Information Management*, 46, 210–221. <https://doi.org/10.1016/j.ijinfomgt.2018.12.002>
- Yuan, C., Wang, S., Liu, Y., & Ma, J. W. (2023). Factors influencing parasocial relationship in the virtual reality shopping environment. *Asia Pacific Journal of Marketing and Logistics*, 35(2), 398–413. <https://doi.org/10.1108/APJML-06-2021-0402>
- Yuan, C., Wang, S., Yu, X., Kim, K. H., & Moon, H. (2021). The influence of flow experience in the AR context on psychological ownership. *International Journal of Advertising*, 40(6), 922–944. <https://doi.org/10.1080/02650487.2020.1869387>
- Zeng, J. Y., Xing, Y., & Jin, C. H. (2023). The impact of VR/AR-based consumers' brand experience on consumer–brand relationships. *Sustainability*, 15(9), 7278. <https://doi.org/10.3390/su15097278>