



ARTICLE



<https://doi.org/10.1057/s41599-025-05681-3>

OPEN

Understanding consumers' willingness to accept digital exhibitions in the metaverse: evidence from China

Juying Wang¹, Xuelei Lian¹ & Xin Qi¹✉

The metaverse is reshaping the digital commerce landscape, with digital exhibitions emerging as a novel form of marketing engagement. Despite growing academic interest in immersive technologies, existing research has largely focused on general consumer interactions within virtual environments, with limited attention to context-specific applications such as digital exhibitions. This study addresses this gap by examining the key factors influencing consumers' willingness to engage with digital exhibitions in the metaverse. Employing a mixed-methods approach, this research commenced with a qualitative phase, in which 20 in-depth interviews were conducted. Insights from these interviews facilitated the expansion of the unified theory of acceptance and use of technology 2 (UTAUT2) model, which served as the theoretical framework for this investigation. An online survey was subsequently administered to Chinese consumers, from which 283 valid responses were collected. The data analysis utilized partial least squares structural equation modelling (PLS-SEM) and fuzzy-set qualitative comparative analysis (fsQCA), revealing the following findings: 1) effort expectancy and the trust-risk relationship significantly impact consumers' willingness to accept digital exhibitions; 2) electronic word of mouth significantly mediates the relationships among performance expectancy, effort expectancy, social influence, hedonic motivation, and behavioural intention, underscoring its importance; and 3) high performance and social needs orientation as well as trust-related ease of use and hedonic orientation constitute the two principal configurational pathways leading to heightened behavioural intention. This study extends the UTAUT2 model to the emerging context of metaverse-based digital exhibitions, offering a refined framework for understanding consumer acceptance in immersive environments. The findings provide actionable insights for designers and marketers aiming to enhance user engagement, build trust, and strategically leverage social influence within digital exhibition—an area of increasing relevance in the digital economy.

¹Management College, Ocean University of China, Qingdao 266100, China. ✉email: x.qi@ouc.edu.cn

Introduction

Exhibitions serve as a vital platform for enterprises to showcase their brands, products, and services directly to a wide audience (Kim & Roh, 2022). With the ongoing advancement of new technologies, traditional offline exhibitions are gradually shifting towards digitalization. The emergence of the metaverse and the digital transformation of industries are driving businesses to adapt to these evolving trends (Zabel et al., 2023; Jafar et al., 2023; Ghali et al., 2024). The metaverse, envisioned as a future iteration of the internet, integrates immersive, interactive, and continuous virtual and augmented realities, creating a shared space for diverse activities (Cheung et al., 2024). This transformation is underscored by the projected growth of the metaverse market, which is expected to expand from \$38.85 billion in 2021 to \$678.8 billion by 2030 (Grand View Research, 2023), while 66% of industry participants express significant interest in adopting virtual reality technologies for future exhibitions (The Global Association of the Exhibition Industry, 2023). In the context of China, the digital exhibition industry is rapidly evolving, driven by strong government support and widespread consumer adoption of digital technologies. China's metaverse market is projected to grow from approximately \$10.8 billion in 2023 to over \$22.6 billion by 2026 (Zhiyan Consulting, 2024). Tech giants like Tencent and Alibaba have launched virtual exhibition platforms to deliver highly immersive experiences, while the Ministry of Industry and Information Technology has introduced policies to integrate digital technologies with traditional exhibitions, highlighting national commitment to metaverse innovation (ChinaIRN, 2025). Digital exhibitions, which provide unique and captivating experiences by merging real-world elements with digital content, represent a pivotal trend in modern exhibition design, characterized by comprehensive integration, enhanced intelligence, and immersive technologies (Kozinets, 2023; Chen et al., 2023; Cheung et al., 2024). Advancements in metaverse technologies, including augmented reality (AR) and virtual reality (VR), coupled with hardware and software innovations, are enabling the creation of highly realistic and dynamic virtual environments, making digital exhibitions more engaging and accessible than ever before (Chen et al., 2023).

Given the background of the digital era, enterprises have the opportunity to increase their brand attractiveness through the employment of cutting-edge immersive technologies in their marketing initiatives (Park & Yoo, 2020). Although the application of digital exhibitions is in its infancy, many enterprises have already set up digital exhibitions for their own brands. These enterprises recognize the potential and advantages of digital exhibitions using the metaverse, and they are actively investing resources to leverage advanced digital technologies to create highly interactive and immersive exhibition experiences. For example, BYD, a highly renowned Chinese new energy vehicle company celebrated for its significant contributions to the electrification of transportation and groundbreaking advancements in battery technology, has established 'BYD World', an interactive virtual world. This innovative platform is dedicated to offering a forward-thinking, immersive purchase experience, enabling customers across the Americas to engage with the BYD brand and explore its products in a dynamic and interactive environment (BYD, 2023). However, many enterprises focus excessively on employing VR technology and concentrate on devising digital exhibition gimmicks, thus neglecting the critical aspect of visitor acceptance (Song et al., 2023). Although metaverse technology has the capacity to transform the e-commerce industry by introducing innovative and engaging online shopping experiences, its impact will largely depend on the rate of user adoption. Additionally, the implementation of information technology incurs significant costs (Hanelt et al., 2021). Given these

considerations, it is critical to explore whether consumers are willing to embrace digital exhibitions as a new form of metaverse marketing.

The UTAUT2 model extends the original UTAUT framework to better understand consumers' adoption and use of novel technologies (Venkatesh et al., 2012). Specifically, the UTAUT2 model is widely acknowledged for its significant explanatory power in elucidating users' acceptance and utilization of technology, particularly within the consumer technology sector (Gan & Lau, 2024). While existing research on immersive technologies such as AR and VR has employed various theoretical frameworks, such as perceived realism, customer engagement (Cheung et al., 2024), media richness (Cheung et al., 2024), and representation fidelity (Lee et al., 2024), to explore user experiences and technology adoption, the UTAUT2 model offers a more comprehensive and integrated perspective. Despite its broad application, its utilization within the realm of digital exhibitions has yet to be explored. Existing empirical studies have primarily examined the employment of immersive technologies in various contexts. These include digital museums, education, and other scenarios (Kozinets, 2023; Xie et al., 2024; Saneinia et al., 2024). While existing studies have explored consumer engagement motivations in immersive or metaverse environments (Kalender & Guzmán, 2025), research specifically focusing on digital exhibitions as a marketing scenario remains limited. Additionally, research has focused on users' acceptance of AR and VR technologies themselves (Ustun et al., 2023; Lin & Huang, 2024; Schultz & Kumar, 2024). Furthermore, studies have shown that technologies such as AR and VR have a positive effect on consumer purchase decisions (Leveau & Camus, 2023). Considering the similarities between the environments of digital exhibitions and the contexts examined in existing studies (Schuster et al., 2021) and on the basis of the results of semi-structured interviews that explored the key factors influencing consumers' acceptance of digital exhibitions, the UTAUT2 model is effectively suitable for this study.

While the UTAUT2 model offers robust explanatory power in technology acceptance research, particularly in consumer technology contexts, its applicability may vary across different contexts (Trinh et al., 2024). UTAUT is rooted in the specific assumptions of the Theory of Planned Behaviors and related social psychology theories. However, emerging perspectives suggest that technology acceptance is also shaped by deeper cognitive and evolutionary mechanisms given the fast-changing nature of human-technology relationship (Stephanidis et al., 2019; Ho & Vuong, 2025; Moravec et al., 2025). For instance, individuals may subconsciously reject new technologies to reduce informational disorder or cognitive overload. From this view, constructs like effort expectancy may not only represent perceived usability but also reflect a latent cognitive preference for minimizing informational entropy when engaging with unfamiliar digital interfaces (Nesterov, 2022; Vuong & Nguyen, 2024). As human-computer interactions become increasingly frequent, the boundaries between the virtual and physical continue to blur (Shibuya, 2025). Therefore, when applying theoretical models to research contexts, it is important to consider dimensions of user experience and to optimize these models based on the specific characteristics of the context. Building on these considerations, this study conducted semi-structured interviews to refine and adapt the UTAUT2 model, aligning it more closely with the experiential realities of digital exhibitions in the metaverse.

Furthermore, electronic word of mouth (eWOM), also known as online evaluations, suggestions, or reviews, has emerged as a critically influential factor in the digital era, significantly impacting consumer behaviour and decision-making processes (Donthu et al., 2021). Prior studies have emphasized how

important eWOM is in shaping consumers' behavioural intention (Babić Rosario et al., 2016; Wang et al., 2018; Kautish et al., 2023). eWOM has arguably become the predominant medium through which consumers seek and disseminate consumption-related information (Verma et al., 2023). Given the emerging nature of the adoption of brand digital exhibitions, eWOM may significantly affect the intention to accept these innovative marketing methods. In the realm of research employing the UTAUT2 model, the majority of studies have predominantly selected variables such as attitude (Degirmenci & Breitner, 2017), perceived risk (Arfi et al., 2021), and trust (Hooda et al., 2022) as mediators to investigate the impact of external factors on acceptance intention. However, these studies have not considered the mediating role of eWOM. Furthermore, insights derived from semi-structured interviews have highlighted the substantial impact of eWOM on shaping consumer behavioural intention. Accordingly, this paper innovatively inserts eWOM as an intermediary variable within the UTAUT2 framework to more clearly elucidate the complex interactions between external influences and consumers' willingness to accept (Sharma et al., 2021), therefore providing a more thorough understanding of the underlying mechanisms.

To bridge the identified research gaps, we employed a mixed-methods approach to investigate the factors influencing consumers' acceptance of digital exhibitions. This study aims to explore the following research questions:

RQ1: How do performance expectancy, effort expectancy, social influence, facilitating conditions, and hedonic motivation impact consumer behavioural intention?

RQ2: What is the role of the trust–risk relationship in shaping consumers' intention to participate in digital exhibitions?

RQ3: How does electronic word-of-mouth mediate the impact of performance expectancy, effort expectancy, social influence, facilitating conditions, and hedonic motivation on consumer behavioural intention?

RQ4: What are the potential configurational pathways that lead to high behavioural intention towards digital exhibitions?

By addressing these research questions, this study constructs a comprehensive model to delineate the complex interactions between consumer perceptions, technology adoption factors, and behavioural intention, thus providing a more nuanced understanding of the underlying mechanisms.

This study utilizes a mixed-methods approach, combining qualitative and quantitative analyses, to answer the proposed research questions. The findings of this paper offer contributions to both scholarly research and industry practice. First, on the basis of qualitative analysis, this paper extends the application of the UTAUT2 model to the field of digital exhibitions, filling a gap in the literature regarding empirical studies on this subject. Second, by innovatively incorporating eWOM as a mediating variable, this paper not only extends the UTAUT2 model but also investigates the mechanism of the impact of eWOM on the correlation between external influences and consumer acceptance. Third, in light of the scarce literature regarding the acceptance of marketing using the metaverse, this study utilizes qualitative research to explore the factors influencing consumers' willingness to engage with digital exhibitions in the emerging context of the metaverse. Building on insights from the qualitative phase, PLS-SEM is employed for hypothesis testing, and fsQCA is utilized to examine the interrelationships between variables. This mixed-methods approach enhances the reliability and dependability of the research outcomes, providing comprehensive insights that can inform strategic decisions in the digital exhibition sector. Furthermore, this paper contributes to advancing digital exhibition practices within the metaverse, catalysing a paradigm shift towards the digitalization of trade shows and exhibitions. This

contribution not only enriches the theoretical framework for digital event marketing but also critically examines the factors influencing consumers' willingness to engage with marketing initiatives in the metaverse. The insights derived from this study will guide companies in effectively leveraging metaverse technologies, facilitating deeper consumer engagement and the development of innovative marketing strategies that resonate with contemporary digital environments. Moreover, this research will empower enterprises to create more immersive and engaging digital exhibitions while informing the design of promotional campaigns and interactive experiences that meet the evolving expectations of consumers in the metaverse.

Theoretical background

UTAUT2 model. By adding three more constructs to the original UTAUT framework, the UTAUT2 model improves upon it to better understand consumers' behavioural intention to embrace and use technologies. These constructs are hedonic motivation, price value, and habit, which complement the original four variables: performance expectancy, effort expectancy, social influence, and facilitating conditions. Behavioural intention and these seven constructs collectively influence user behaviour, enhancing the model's explanatory power in consumer technology contexts (Venkatesh et al., 2012).

The UTAUT2 model has strong explanatory power for understanding consumers' acceptance of new technologies (Gan & Lau, 2024). Kalinkara and Ozdemir (2023) investigated students embracing and using metaverse technologies for learning anatomy, using the UTAUT2 model as a framework. The components were able to explain 75.30% of the behavioural intention. The UTAUT2 model also has strong explanatory power in terms of the willingness to accept and the acceptance behaviour for technologies such as AR and VR (Ustun et al., 2023; Noble et al., 2022).

Immersive technologies. Immersive technologies, such as virtual reality (VR), augmented reality (AR), and the metaverse, are transforming how consumers interact with digital environments. These technologies enable highly engaging and interactive experiences by blending the physical and virtual worlds, offering users a sense of presence and immersion (Cheung et al., 2024). In the context of digital exhibitions, immersive technologies have emerged as critical tools for creating captivating and memorable consumer experiences. By leveraging VR and AR, businesses can simulate real-world environments, enhance product visualization, and foster deeper consumer engagement (Leung et al., 2023; Park & Yoo, 2020).

Recent studies have explored the adoption and impact of immersive technologies across various domains, including tourism, education, and e-commerce (Table 1). For example, Cheung et al. (2024) examined how perceived realism in metaverse-mediated tourism environments drives consumer engagement, while Suh (2024) investigated the role of VR in enhancing collaboration performance. The findings of these studies underscore the potential of immersive technologies to reshape consumer behaviour and decision-making processes. However, research on their application in digital exhibitions remains limited, particularly in understanding how these technologies influence consumer acceptance and engagement. This study adopts immersive technologies as its theoretical background, focusing on their role in shaping consumer perceptions and behaviours in digital exhibitions. By integrating insights from the UTAUT2 model, the emerging literature on immersive technologies, and the results of semi-structured interview, this paper aims to bridge this gap and provide a

Table 1 Research on Immersive technologies.		
Study	Focus	Key Findings
Cheung et al. (2024)	Holistic customer engagement in the metaverse	Media richness enhances metaverse realism, boosting engagement, usage intensity, and future visit intention.
Cheung et al. (2024)	Perceived realism in metaverse-mediated tourism	Perceived realism enhances engagement, driving external search behaviour and visit intention.
He & Qin. (2024)	User engagement and offline experience in the Metaverse for Cultural Heritage (MCH)	MCH engagement boosts offline heritage visits, with perceived benefits (e.g., entertainment, narratives) increasing adoption and risks (e.g., privacy concerns) dampening engagement.
Lee et al. (2024) Suh (2024)	Sociability and cyberself engagement in the metaverse Cognitive and emotional appraisals of social VR	Representational fidelity impacts social interaction and self-engagement. VR influences collaboration performance and emotional experiences.
Ghali et al. (2024)	Marketing tourism destinations through the metaverse and its impact on Generation-Z's (re)visit intentions	Metaverse social presence and attachment, driven by time, friends, and virtual places, boost revisit intentions, with engagement amplifying the effect.
Leung et al. (2023)	VR tourism experiences during COVID-19	VR enhances memorable experiences and post-adoption intentions.

comprehensive framework for understanding consumers’ willingness to engage with digital exhibitions in the metaverse.

Trust in the digital era. Trust is conceptualized as the belief in the competence, reliability, integrity, and benevolence of a technology or service provider. In an online shopping context, trust is described as having faith that the supplier is willing to act according to individual expectations and avoid opportunistic behaviour (Wu et al., 2023). This means that consumers expect suppliers to act in a way that is transparent, reliable, and aligned with their stated commitments, reducing concerns about potential fraud or unfair practices. It is a critical factor in the business and marketing domains, underpinning the foundational elements of marketing systems (Wu et al., 2023).

As transformational advancements occur in domains such as the metaverse and the smart virtual world, concerns regarding trust and associated risks are increasingly prevalent among individuals (Habbal et al., 2024). Trust has become an essential determinant of transactional success (Zavolokina et al., 2023; Qi et al., 2025). The widespread adoption of smart devices, alongside the risks associated with technology misuse, underscores the urgent need for robust privacy safeguards (Hooda et al., 2022). In the digital domain, which is devoid of physical interactions or the ability to directly inspect goods and services, trust has become an imperative factor driving consumers’ engagement and acceptance of digital technologies (Hollebeek & Macky, 2019; Mubarak & Petraite, 2020). Users frequently express concerns regarding the loss of data control and potential privacy infringements throughout the processes of data collection, processing, and dissemination (Kozyreva et al., 2020). Given the profound implications of trust in the digital era, especially in the execution of digital marketing initiatives, its role demands significant consideration (Taheri et al., 2024). The development of trust can positively impact consumer behaviours, notably purchase intentions, underlining its importance in fostering successful business strategies and consumer relationships (Van Pinxteren et al., 2019; Irshad et al., 2020).

Electronic word of mouth (eWOM). Within the field of marketing, consumer perception forms the nucleus, with attitudes towards corporations and brands assuming critical significance. The phenomenon of word-of-mouth (WOM) marketing emerges as a pivotal area of focus for marketers (Hu & Kim, 2018; Gregoriades et al., 2021). WOM encapsulates the spontaneous dissemination of information by consumers post-purchase (Gregoriades et al., 2021). eWOM has emerged with the emergence of the digital era. It is defined as the dissemination of

evaluative commentary regarding products, services, or corporations conveyed by prospective, actual, or erstwhile consumers to a broader audience through internet-based platforms (Zhao et al., 2020).

In the digital age, this online discourse—also known as online evaluations, suggestions, or opinions—has grown significantly in importance (Augusto & Torres, 2018). Because online word of mouth offers a wealth of objective information, it has become a key resource for consumers seeking information about products, brands and services (Pai et al., 2013). In recent years, the research community has paid a great deal of attention to eWOM as a research topic (Verma et al., 2023), demonstrating its critical role in influencing consumer intentions and behaviours. eWOM represents a ubiquitous form of communication wherein individuals routinely assess purchased products or services, share their experiences and engage in discussions about enterprises and brands (Verma & Dewani, 2021). Compared with traditional WOM, eWOM has a greater impact because of its swift dissemination, wider audience reach, and removal of direct personal interaction pressures. Moreover, consumers often regard eWOM as more trustworthy than traditional advertising because of the perceived impartiality of fellow consumers (Donthu et al., 2021). eWOM exhibits a definitive persuasive capacity towards consumers, influencing not only their behavioural intention but also their consequent actions on the basis of the received information (Levy & Gvili, 2024).

Research methodology

In this study, a mixed-methods approach was used, and it encompassed two consecutive phases: a preliminary qualitative analysis and a subsequent quantitative investigation. The mixed-methods framework leverages the strengths of both qualitative and quantitative methodologies. This approach produces outcomes that are more comprehensive and reliable. It ensures that the findings are well supported by diverse forms of evidence (Venkatesh et al., 2013). Qualitative research methodologies are employed primarily for exploratory purposes, enabling the generation of novel theoretical insights, fostering a profound understanding of phenomena, and facilitating the formulation of hypotheses (Cheng et al., 2020). Quantitative methodologies are predominantly utilized in confirmatory research, aimed at the empirical testing of theoretical propositions and causal relationships (Venkatesh et al., 2013).

Considering the nascent stage of research on the acceptance of digital exhibitions within the metaverse, mixed methods are particularly appropriate. This approach facilitates a thorough investigation of the variables influencing consumer acceptance,

Table 2 Selected quotes from the interviewees.

Illustrative quotes	Construct	Category
'The digital exhibition provided a wealth of knowledge and interaction that I don't typically find in tradition exhibition. It's like having a personal tour guide.' (Participant 8)	Performance expectancy	UTAUT2 based factors
'Navigating the digital exhibition was straightforward; I could easily find the thing I was interested in without any hassle.' (Participant 5)	Effort expectancy	
'Seeing my friends share their digital exhibition experiences on social media definitely sparked my interest to experience it out myself.' (Participant 13)	Social influence	
'The support available made accessing the digital exhibition simple, even for someone not tech-savvy.' (Participant 2)	Facilitating conditions	
'The interactive elements were delightful!' (Participant 10)	Hedonistic motivation	Extended influencing factors
'I believe that the companies providing digital exhibition will protect my information security.' (Participant 4)	Trust	
'I am a bit concerned about how much personal information is required to participate in these virtual spaces.' (Participant 7)	Privacy risk	
'I decided to experience the digital exhibition after reading some glowing reviews online.' (Participant 16)	eWOM	
'I would like to experience the digital exhibition.' (Participant 20)	Behavioural intention	Consumers' response

which is crucial given the limited literature on this topic. Combining qualitative interviews and quantitative analyses ensures that this study captures the complexity of consumer attitudes while also providing statistically robust conclusions.

Through qualitative enquiry, this study aims to explore the factors shaping consumers' attitudes and behaviours concerning digital exhibitions within the dynamic landscape of the metaverse. Following qualitative research, PLS-SEM and fsQCA were employed to further strengthen the study. The convenience sampling approach to medium sample sizes it is used to evaluate the complex associations among observable and latent variables (Hair et al., 2020). Then, fsQCA is employed to identify patterns and combinations of elements that result in high or low acceptance levels, offering nuanced insights that traditional quantitative methods might overlook (Navarro-García et al., 2024).

Study 1: qualitative study

Data collection. Through semi-structured interviews, we gathered qualitative data to determine the variables that affect consumers' receptivity to digital exhibitions within the metaverse. The design of the interview encompassed four principal components. Initially, the participants were invited to convey their overarching impressions of digital exhibitions. We subsequently delved into specific factors that the participants believed would influence their willingness to accept and engage with digital exhibitions. The participants were then invited to share their preferences for the nature of digital exhibitions and any particular features that they found appealing or off-putting. Finally, open-ended questions were posed to capture a wide range of perspectives on digital exhibitions. To mitigate potential information bias, several precautions were taken. The interview questions were designed to be structured, granting trained interviewers the flexibility to conduct more in-depth probing on the basis of the participants' responses, particularly when unique insights emerged. Furthermore, to guarantee the authenticity of the responses, participant anonymity and confidentiality of the information were assured (Cheng et al., 2022).

The convenience sampling approach was utilized for participant recruitment, which was carried out through social media platforms. Convenience sampling is particularly suitable for exploratory studies where the primary goal is to generate insights and to identify key factors rather than to generalize findings to a larger population. Given the limited literature on this topic, convenience sampling allowed us to efficiently gather preliminary data to inform our theoretical model and hypothesis. We set clear

criteria for potential respondents: 'You have an understanding of digital exhibitions' and 'You are willing to be interviewed for 10–20 min'. A total of 20 participants were interviewed, with each interview lasting an average of 15 min, achieving a 100% effective response rate. During the final interviews, no additional insights were observed, indicating that theoretical saturation had been achieved.

Data analysis. We analysed the data using an inductive methodology (Cheng et al., 2020). The data analysis procedure was structured into three rounds.

Round 1: The initial round of analysis focused on identifying key expressions related to consumers' willingness to accept digital exhibitions. We began by thoroughly reading through the transcribed interviews to pinpoint sentences and phrases that were pertinent to our study question.

Round 2: We systematically categorized the outcomes of coding. This round of analysis allowed us to group similar sentiments and observations, which were then summarized using a set of descriptive keywords.

Round 3: In the final stages of analysis, these keywords from Round 2 were linked to higher-level theoretical frameworks derived from the literature on digital exhibitions and consumer behaviour in virtual environments. This process facilitated the development of a coherent narrative around the identified factors, shedding light on the potential relationships between constructs.

Our analysis was particularly attentive to constructs that were frequently mentioned across interviews, ensuring that the derived themes genuinely reflected the perspectives of our participants. As indicated in Table 2, the qualitative investigation revealed a number of important variables that affect consumers' approval of digital exhibitions, including performance expectancy, trust, privacy risk, eWOM, effort expectancy, social influence, facilitating conditions and hedonistic motivation. The outcomes of the qualitative analysis could offer proof of how concepts were conceptualized and how hypothesis were developed (Cheng et al., 2020). Through a systematic comparison of our results with extant theories, we proposed a number of hypothesized connections.

Hypothesis development

UTAUT2-based relationships. The intention to employ information technology is positively affected by performance expectancy (Venkatesh et al., 2012). In this study, this refers to the perceived degree to which consumers believe that using digital exhibitions

will enhance their effectiveness and facilitate the achievement of relevant tasks or goals. This encompasses their overall assessment of the utility and benefits derived from engaging with digital exhibitions. Previous studies have demonstrated that performance expectancy is a powerful predictor of behavioural intention towards digital technology (Escobar-Rodríguez, 2014; Albanna et al., 2022). The concept of performance expectancy encapsulates consumers' inclination towards prioritizing convenience and time efficiency as significant determinants in their selection process of products or services that integrate new technological advancements. Customers are more inclined to interact with one another when they feel that there is a high level of performance expectancy and exhibit a greater propensity to recommend the service and participate in eWOM activities (Hwang et al., 2019; Loureiro et al., 2018). As one interviewee stated, 'The digital exhibitions greatly facilitated my shopping experience, allowing me to find what I needed more efficiently. Therefore, I am very willing to recommend this service to my friends' (Participant 8). Thus, we propose the following hypothesis:

H1a. Performance expectancy positively influences consumers' willingness to accept digital exhibitions.

H1b. Performance expectancy positively influences electronic word of mouth.

Effort expectancy refers to the perception that using technology-related products requires minimal effort from users (Venkatesh et al., 2012). This concept assesses the complexity and user-friendliness of new technological applications. When a new technology is embraced in its early stages, effort expectancy is crucial (Ooi et al., 2018).

Effort expectancy is positively associated with AR technology adoption (Ustun et al., 2023). Customers will enjoy using a new platform when it is simple to use and navigate, which could lead to positive eWOM. An interviewee stated the following: 'Using the digital exhibitions was straightforward and intuitive. I didn't need to spend much time figuring out how to navigate the platform, which made the whole experience more enjoyable. I feel more inclined to use it again' (Participant 14). Additionally, the interviewee stated, 'When I find that the platforms associated with the digital exhibitions are easy to operate, I am willing to recommend the digital exhibitions to others' (Participant 2). Therefore, the following hypothesis are proposed:

H2a. Effort expectancy positively influences consumers' willingness to accept digital exhibitions.

H2b. Effort expectancy positively influences electronic word of mouth.

Social influence demonstrates how significantly an individual feels that important figures in the individual's life deem it essential for him or her to adopt new practices (Venkatesh et al., 2012). Interactions with influential others can significantly mitigate the individual's perceived uncertainties, risks, and anxieties associated with adopting new technologies. This perception markedly influences people's readiness to embrace and adapt to novel platforms (Chopdar et al., 2018).

Quesnel and Riecke (2018) demonstrated that positive emotions associated with commercial products are predominantly elicited by social stimuli. Positive emotions may facilitate the sharing of information among individuals, thus leading to positive eWOM behaviour (Guo et al., 2018; Hameed et al., 2024). An interviewee stated the following: 'Seeing familiar people share information about the digital exhibitions on social media platforms encourages me to want to experience it. If my experience is positive, I am willing to recommend it to people around me' (Participant 7). Therefore, we hypothesize the following:

H3a. Social influence positively influences consumers' willingness to accept digital exhibitions.

H3b. Social influence positively influences electronic word of mouth.

Facilitating conditions relate to how much customers perceive that technological advancements improve their ability to effectively perform a particular activity, thus providing the necessary support and resources to streamline and improve their experience (Venkatesh et al., 2012). Facilitating conditions encompass environments or organizations capable of assisting consumers in overcoming obstacles to adopting new technologies. This paper contends that, within the context of examining consumers' willingness to embrace digital exhibitions, facilitating conditions primarily pertain to the extent to which AR, VR, and other technological infrastructures support consumers' engagement with digital exhibitions.

In digital environments, facilitating conditions, such as ease of access and user support, have been shown to positively affect consumers' willingness to accept and utilize new technologies (Queiroz & Wamba, 2019; Ben Arfi et al., 2021). In turn, this encouragement may result in a more positive outlook on sharing suggestions and good experiences on the internet. For example, some participants said, 'The application of AR technology enhanced my understanding of the information and provided me with a positive experience. This new experience not only increased my satisfaction but also influenced me to write positive reviews online, encouraging others to visit' (Participant 13). Thus, the following hypothesis are proposed:

H4a. Facilitating conditions positively influence consumers' willingness to accept digital exhibitions.

H4b. Facilitating conditions positively influence electronic word of mouth.

Consumer happiness or the pleasure that consumers derive from engaging with technology is known as hedonic motivation, which reflects the degree of perceived fun or pleasure (Venkatesh et al., 2012). Digital exhibitions employing VR, AR and other advanced technologies represent novel experiences for most consumers. The integration of these emerging technologies enhances the interactivity and enjoyment of digital exhibitions. The theory of consumer innovativeness suggests that motivational factors constitute the foundation for consumer innovation. This perspective posits that the impetus for individuals to adopt innovative products or services is propelled by a variety of motivations, including functional, hedonic, social, and cognitive motivations. Among them, hedonic motivation is identified as a significant dimension. Meena and Sarabhai (2023) contends that consumers' engagement with online platforms or applications is predominantly driven by ideals associated with hedonic. Hedonic motivation significantly influences consumers' willingness and behaviour with regard to adopting new technologies and products (Kim & Hall, 2019). This sense of enjoyment and pleasure significantly affects individuals' readiness to engage with and promote novel platforms. A participant in the interview expressed the following: 'Exploring the digital exhibitions was genuinely enjoyable. The advanced technology there, like AR, allowed me to interact with the exhibits in ways I never thought possible' (Participant 6). Additionally, after further questioning, the interviewee expressed a willingness to share the interesting aspects of the digital exhibitions on social media platforms. Thus, we propose the following hypothesis:

H5a. Hedonic motivation positively influences consumers' willingness to accept digital exhibitions.

H5b. Hedonic motivation positively influences electronic word of mouth.

Trust and privacy risk. In the social sciences, trust has been extensively acknowledged as a pivotal element influencing individuals' behaviour and the propensity to take action that can

lower the perceived level of risk (Bansal et al., 2016; Zhani et al., 2022). Bryce and Fraser (2014) emphasize how crucial trust is to communication transactions, a consideration that gains heightened significance when users assess the risks associated with online communication exchanges. The absence of trust coupled with heightened perceived risk among involved parties typically leads to the abandonment of transactions (Hansen et al., 2018). Previous research has revealed that trust can reduce privacy risk (Featherman et al., 2021). As one interviewee stated, 'The more I trust the company that offers a digital exhibition platform, the less concerned I am about my privacy risk. When I believe that the company building the digital exhibitions is reliable, it diminishes my worry about how my personal information is handled' (Participant 17). Hence, we hypothesize the following:

H6. Trust negatively influences consumers' privacy risk.

eWOM and behavioural intention. eWOM is acknowledged as a pivotal element in consumer behaviour, exerting a substantial influence on business performance (Babić Rosario et al., 2020). eWOM transcends the constraints of time and space, amplifying its influence via the extensive reach of the internet. According to social identity theory, consumers are likely to consider the views and experiences of their peers when making decisions. Consumers perceive eWOM communications as more reliable and beneficial than conventional commercial advertising (Filieri et al., 2018). Unlike conventional advertising, which is often seen as driven by the interests of companies, eWOM communications are perceived as genuine experiences and opinions from real users. Consequently, consumers place greater trust in these peer-generated insights, finding them more valuable for making informed purchasing decisions. The observation of positive product or service reviews on social media and other digital platforms can lead consumers to infer superior quality and satisfactory user experiences, thus enhancing their purchase intentions. One of the interviewees stated the following: 'The positive experiences shared by others online really piqued my interest and made me feel more inclined to see what the exhibition was all about. Their endorsements made me confident that it would be worth my time' (Participant 9). Therefore, we propose the following:

H7. Electronic word of mouth positively influences consumers' willingness to accept digital exhibitions.

Privacy risk and behavioural intention. Within the e-commerce domain, perceived risk is the subjective anticipation of potential losses that users might encounter in their quest to achieve desired outcomes. Chopdar et al. (2018) highlighted that perceived risk is a multifaceted concept that includes informational, financial, and product risks. Information risk refers to consumers' concerns about security and privacy. Among the various perceived risks, this study's main focus is on privacy risk. When customers believe that there is a significant privacy risk, their willingness to adopt new technological products is likely to be diminished (Merhi et al., 2019; Ben Arfi et al., 2021). As one interviewee stated, 'I was interested in visiting the digital exhibitions, but I hesitated because I was worried about how my personal information would be used' (Participant 11). Therefore, this paper proposes the following hypothesis:

H8. Privacy risk negatively influences consumers' willingness to accept digital exhibitions.

Meditating influence of perceived risk. The perception of privacy risk, which is characterized as a detrimental factor, may attenuate consumers' acceptance and diminish their subsequent purchase intentions. If trust exists among the parties involved in

establishing connections, it can mitigate the cognitive subject's anxiety regarding perceived risks and enhance the subject's willingness to adopt new technologies (Zahid & Haji, 2019). Trust acts as a crucial buffer against the negative impact of privacy risk, providing reassurance to consumers that their data will be handled securely and responsibly. When trust is established, consumers feel more confident and less apprehensive about engaging with digital platforms, which can lead to increased acceptance and usage (Zahid & Haji, 2019). When consumers discern risk in specific behaviours or decisions, they are inclined to adopt a conservative stance to avert potential dangers. This conservative stance is a natural defensive mechanism aimed at protecting oneself from possible negative outcomes. Therefore, we hypothesize the following:

H9. Privacy risk significantly mediates the impact of trust on consumers' willingness to accept digital exhibitions.

Meditating influence of eWOM. Earlier research has shown that the social value of interaction, hedonic motivation, and the fulfilment of personal interests within the community can facilitate the generation of eWOM (Motyka et al., 2018). It allows consumers to reduce uncertainty and effort by relying on peer experiences and reviews (Verma et al., 2023). Performance expectancy reflects consumers' beliefs that digital exhibitions are useful and enhance their experience. When users perceive high utility, they are more likely to share positive feedback online, reinforcing collective perceptions of value. This may indirectly shape the behavioural intentions of others. Therefore, we propose:

H10a. Electronic word of mouth significantly mediates the effect of performance expectancy on behavioural intention.

Effort expectancy is linked to ease of use, which influences user satisfaction and their willingness to communicate that experience to others. Consumers engage with eWOM information with the anticipation of minimizing the time and effort associated with decision-making processes, thus increasing the likelihood of reaching more satisfactory outcomes (Babić Rosario et al., 2020). When digital exhibitions are easy to navigate, users are more likely to engage in eWOM, encouraging others to try the platform. Therefore, we propose:

H10b. Electronic word of mouth significantly mediates the effect of effort expectancy on behavioural intention.

The advancement of social technologies has reintroduced social interaction into the online purchasing process, transforming it into a more socially driven experience (Lho et al., 2022). Social influence can encourage users to participate in digital exhibitions, but the translation of this pressure into action is often reinforced through shared user experiences. eWOM acts as a channel where social cues become validated and amplified. Therefore, we propose:

H10c. Electronic word of mouth significantly mediates the effect of social influence on behavioural intention.

Enjoyable and emotionally engaging experiences often trigger users to share their satisfaction online (Liu et al., 2021). These hedonic experiences, when communicated through eWOM, can persuade others to participate. Accordingly, we propose:

H10d. Electronic word of mouth significantly mediates the effect of hedonic motivation on behavioural intention.

Supportive technical infrastructure may not directly affect behavioural intention but may encourage users to share their seamless experiences with others. These shared experiences, in turn, build confidence among potential users (Yadav et al., 2024). Thus, we propose:

H10e. Electronic word of mouth significantly mediates the effect of facilitating conditions on behavioural intention.

Our research model is shown in Fig. 1.

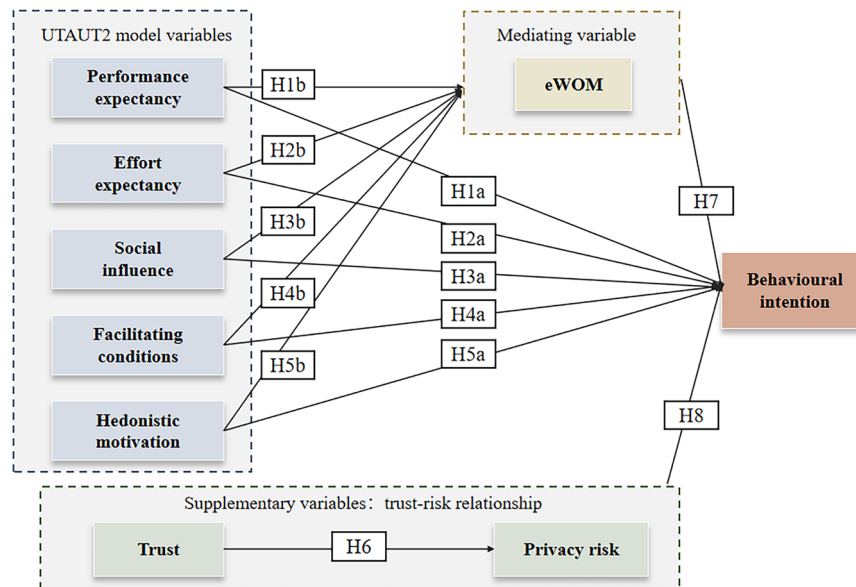


Fig. 1 Research model.

Study 2: PLS-SEM analysis

Sample and data collection. To evaluate the hypothesis, we modified the measurement instruments for the constructs (Table 3) from the literature. These instruments have been previously validated, and their reliability has been demonstrated. We disseminated an online questionnaire after a pre-test. Between April and May 2023, we garnered 367 responses. Following the exclusion of invalid responses characterized by exceptionally brief completion times, insufficient information, or overly consistent selections, 283 valid responses were retained for analysis.

Among the recovered questionnaires, the relatively balanced male-female ratio helps ensure the validity and reasonableness of the collected questionnaires. The majority of participants fell within the 18-40 age group, representing the demographic with the highest internet usage. The study was conducted in compliance with the principles of the Declaration of Helsinki. For participants under the age of 18, ethical measures were rigorously applied, including obtaining informed consent from parents or legal guardians and ensuring the anonymity and confidentiality of responses. The majority of the respondents had received a college education, which likely contributed to their greater ability to understand the questionnaire items and greater receptiveness to new things (Table 4).

Data analysis. The measurement and structural model were evaluated using PLS-SEM (Hair et al., 2019). To determine the configurations of the antecedent conditions influencing the results, fsQCA was subsequently used (Ragin, 2008).

In studies with small sample sizes and data that are not regularly distributed, PLS-SEM is more suitable. Furthermore, PLS-SEM enhances modelling flexibility by accommodating complex models and formative constructs (Hair et al., 2019). Given the intricate nature of our research model, we have opted for the PLS-SEM approach. This method allows us to effectively handle the complexity and specific requirements of our study, ensuring robust and reliable results.

In daily life, results typically emerge from various antecedent condition combinations, not just a single factor, especially in situations of substantial causal complexity. The fsQCA method is uniquely well suited for dissecting these causal mechanisms,

offering a configurational perspective on the interplay of causes leading to outcomes and addressing considerable causal complexity (Romero-Castro et al., 2022; Chen et al., 2023). Therefore, we applied fsQCA to supplement the findings of the qualitative method, allowing for a more in-depth analysis in this study and a more comprehensive understanding of business behaviour complexity (Navarro-García et al., 2024).

Measurement model: By employing PLS-SEM within SmartPLS 4.0, the analysis shows that the measurement model satisfies all accepted general requirements. Table 5 shows that since the standardized loading of every single item was greater than 0.7, every single item met the requirements for reliability. In addition, convergent validity was analysed on the basis of factor loadings and AVEs; each item within the variable dimensions exhibited standardized factor loadings greater than 0.6, and the AVE values exceeded 0.5, indicating strong convergent validity (Hair et al., 2019). Furthermore, as shown in Tables 6 and 7, the square root of the AVE for every variable is greater than the correlation coefficients of that variable with the other variables, and the HTMT ratios between all the variables are significantly less than 0.9. These results indicate that the variables possess strong discriminant validity (Fornell & Larcker, 1981).

Common method bias: Common method bias (CMB) arises when variance in observed data is due to the use of a common measurement instrument rather than the actual constructs being measured. It can occur when both independent and dependent variables are collected using the same method, such as a self-report questionnaire, leading to spurious correlations and misleading conclusions. To assess CMB, we used Kock's (2015) full collinearity test. According to Kock (2015), if the variance inflation factors (VIFs) in the inner model are ≤ 3.3 , the model is free of CMB. Our results revealed that all VIFs ranged from 1.000 to 1.678, well below the threshold, indicating that CMB is not an issue in this study and that the observed relationships are free from methodological artefacts.

Structural model and hypothesis testing: The variance inflation factor (VIF) is used to examine multicollinearity. Table 7 shows

Table 3 Measurement instruments.

Variables	Corresponding item and its description	Source
Performance expectancy (PE)	PE1: Digital exhibition can provide me with a better pre-purchase experience. PE2: Digital exhibition can help me better obtain useful information about the product. PE3: Digital exhibition can help me better perceive the image of the brand and the enterprise.	Venkatesh et al.
Effort expectancy (EE)	EE1: I believe it is easy to access the digital exhibition through platforms such as web pages or apps. EE2: I think learning how to navigate the digital exhibition is straightforward. EE3: I think the platform for experiencing the digital exhibition is understandable.	Venkatesh et al.
Social influence (SI)	SI1: Those who are significant to me believe that I should engage with the digital exhibition. SI2: Those who are familiar with me believe that I should experience the digital exhibition. SI3: Those who impact my behaviour believe that I should experience the digital exhibition.	Arfi et al.
Facilitating conditions (FC)	FC1: I have the necessary resources to experience digital exhibition. FC2: I possess the required knowledge to navigate and utilize the digital exhibition. FC3: Assistance is accessible if I encounter issues while engaging with the digital exhibition.	Venkatesh et al.
Hedonistic motivation (HM)	HM1: Digital exhibition is interesting to me. HM2: Digital exhibition is novel. HM3: Digital exhibition will make me feel relaxed and happy.	Venkatesh et al.
Trust (TR)	TR1: I believe that the service providers of digital exhibition are trustworthy. TR2: I believe that when I experience digital exhibition the personal information, I provide will be kept confidential. TR3: I believe that the service providers of digital exhibition are reliable.	Al-Saedi et al.
Privacy risk (PR)	PR1: I will be concerned about privacy issues. PR2: I think the digital exhibition service providers might share my personal information with third parties without my consent. PR3: I think service providers of digital exhibition may use my personal information without my permission.	Chopdar et al.
Electronic word of mouth (eWOM)	eWOM1: I will discuss the positive aspects of digital exhibition. eWOM2: I will talk about the positive reviews with digital exhibition. eWOM3: I will spread the positive reviews about digital exhibition.	Kautish et al.
Behavioural intention (BI)	BI1: I will be willing to adopt digital exhibition. BI2: I intend to experience digital exhibition. BI3: I plan to experience digital exhibition.	Venkatesh et al.

Table 4 Demographics of the respondents (n = 283).

Category	Item	Frequency	Percentage (%)
Gender	Male	148	52.3
	Female	135	47.7
Age	<18	11	3.89
	18-25	71	25.09
	26-30	86	30.39
	31-40	73	25.8
	41-50	35	12.37
	>50	7	2.47
Education	High school or below	19	6.71
	Bachelor	246	86.93
	Master or above	18	6.36

that the VIF values are notably well below the critical threshold of 3, ranging from 1.000 to 1.678 (Hair et al., 2019). This observation suggests that multicollinearity is not a concern in this analysis.

We used 5000 resamples of bootstrapping for hypothesis testing. As displayed in Table 8, effort expectancy ($\beta = 0.130$, $p < 0.05$), eWOM ($\beta = 0.182$, $p < 0.01$) and privacy risk ($\beta = -0.278$, $p < 0.001$) significantly influence behavioural intention, supporting H2a, H7 and H8. Performance expectancy ($\beta = 0.049$, $p > 0.05$), social influence ($\beta = 0.054$, $p > 0.05$), facilitating conditions ($\beta = 0.034$, $p > 0.05$), and hedonistic motivation

($\beta = 0.089$, $p > 0.05$) have no significant effect on behavioural intention. Thus, H1a, H3a, H4a and H5a are not supported.

To examine the mediating roles, we adopted the bootstrapping method (Roldán et al., 2017). As shown in Table 9, the indirect effects indicate that eWOM acts as a major mediator in the relationship between performance expectancy ($t = 2.057$, $p < 0.05$), social influence ($t = 2.060$, $p < 0.05$), effort expectancy ($t = 2.187$, $p < 0.05$), and BIs. However, the mediating effects on the relationship between hedonistic motivation ($t = 1.662$, $p > 0.05$) and FCs ($t = 0.785$, $p > 0.05$) with behavioural intention are not significant. The significant mediating role of privacy risk in the relationship between trust ($t = 3.732$, $p < 0.001$) and behavioural intention is also confirmed in this study.

Study 3: fsQCA analysis. The initial phase in the fsQCA process is data calibration. This process entails converting variables into fuzzy sets by assigning them set membership scores that range from 0 to 1. Here, a score of 1 represents full membership in the set, whereas a score of 0 denotes full non-membership (Pappas & Woodside, 2021). For this study, the thresholds for full membership, the crossover point, and full non-membership were set at the 95th, 50th, and 5th percentiles of the original data, respectively. The data calibration results are shown in Table 10.

Before carrying out a sufficiency analysis, it is essential to perform a necessity analysis to explain that a single independent variable alone cannot constitute a necessary condition for

explaining the dependent variable. Doing so involves determining whether there are necessary antecedent conditions that produce the outcome variable. According to Fiss (2011), when a condition has a consistency score greater than 0.9, it is considered required (Wang et al., 2021). As shown in Table 11, the consistency of each antecedent condition is less than 0.9, indicating that an output behavioural intention cannot be produced by a single condition.

By constructing a truth table, this paper further explored the sufficiency of different configurations of multiple antecedent condition variables in shaping consumer behavioural intention. To prevent distractions from less significant configurations, this study used a frequency cut-off of 3 (Pappas & Woodside, 2021) and a consistency cut-off of 0.8 (Ragin, 2008).

The findings derived from the fsQCA, as presented in Table 12, reveal two configurations for behavioural intention. The overall solution consistency and solution coverage exceeded the thresholds recommended by Ragin (2008), specifically 0.75 and 0.25, respectively. Furthermore, the consistency of each solution

exceeded 0.8, affirming the sufficiency of all identified solutions. Additionally, the coverage of every solution was greater than zero, demonstrating its empirical relevance (Ragin, 2008).

For behavioural intention, effort expectancy (EE), social influence (SI), hedonistic motivation (HM) and eWOM are present in both configurations, and privacy risk (PR) is absent in both configurations, indicating their importance in the analysis. In configuration 1, high behavioural intention are associated with the presence of EE, SI, and HM, alongside eWOM. The absence of PR also characterizes this configuration. Configuration 2 for high behavioural intention also includes EE, SI, and eWOM, similar to configuration 1. However, facilitating conditions (FCs) and trust (TR) are also present, indicating additional pathways that contribute to behavioural intention.

Discussion and implications

Discussion. Using both PLS-SEM and fsQCA, this paper explored the factors influencing consumers' acceptance of digital exhibitions. Drawing upon the findings from semi-structured interviews, the paper proposed an augmented model grounded in UTAUT2, which integrated the trust–privacy risk relationship and innovatively included eWOM as a mediating variable. The PLS-SEM results indicated that, except for effort expectancy (EE), the other independent variables have no significant influence on behavioural intention. However, eWOM was identified as an important mediator. Additionally, the findings from fsQCA also underscored the critical role of eWOM, confirming its significant mediating influence within the UTAUT2 model. Furthermore, the significant role of the trust–privacy risk relationship in behavioural intention was validated in this study. The results derived from fsQCA elucidated a more detailed and multifaceted perspective on the interrelations among the constructs under investigation. The detailed analyses are as follows:

The PLS-SEM results confirmed that EE positively influences consumers' behavioural intention, which has been confirmed by many scholars (Hooda et al., 2022; Ben Arfi et al., 2021). This study has once again proven this point. Consumers' willingness to accept digital exhibitions is influenced by EE, reflecting the importance of the ease of use of digital exhibitions for consumers. Within this context, eWOM serves as a partial mediator. This result suggests that while EE directly impacts consumer intentions, eWOM also contributes to this process by influencing how EE affects consumer attitudes and behaviours towards digital exhibitions.

With respect to performance expectancy (PE), it is evident that in certain scenarios, users might not regard it as their primary consideration; instead, other factors could emerge as more pivotal (Venkatesh et al., 2003). The study's empirical evidence supports this viewpoint. Moreover, the empirical results indicate that PE significantly influences eWOM, with eWOM acting as a crucial

Table 5 Measurement model.

Construct	Item	Factor loading	Cronbach's alpha	AVE	Composite reliability
Performance expectancy	PE1	0.877	0.832	0.748	0.899
	PE2	0.881			
	PE3	0.836			
Effort expectancy	EE1	0.868	0.830	0.746	0.898
	EE2	0.866			
	EE3	0.857			
Social influence	SI1	0.864	0.840	0.758	0.904
	SI2	0.874			
	SI3	0.874			
Facilitating conditions	FC1	0.860	0.859	0.778	0.913
	FC2	0.876			
	FC3	0.908			
Hedonistic motivation	HM1	0.863	0.828	0.742	0.896
	HM2	0.836			
	HM3	0.884			
Trust	TR1	0.876	0.853	0.768	0.908
	TR2	0.909			
	TR3	0.843			
Privacy risk	PR1	0.871	0.849	0.768	0.909
	PR2	0.890			
	PR3	0.868			
Electronic word of mouth	eWOM1	0.869	0.828	0.744	0.897
	eWOM2	0.866			
	eWOM3	0.853			
Behavioural intention	BI1	0.879	0.832	0.748	0.899
	BI2	0.855			
	BI3	0.861			

Table 6 Fornell-Larcker criterion.

	EE	FC	HM	PE	PR	SI	TR	BI	eWOM
EE	0.864								
FC	0.296	0.882							
HM	0.455	0.321	0.861						
PE	0.413	0.256	0.446	0.865					
PR	−0.365	−0.288	−0.36	−0.302	0.876				
SI	0.441	0.237	0.505	0.343	−0.350	0.871			
TR	0.349	0.336	0.335	0.326	−0.327	0.294	0.876		
BI	0.409	0.251	0.388	0.328	−0.469	0.358	0.177	0.865	
eWOM	0.457	0.248	0.442	0.412	−0.377	0.435	0.258	0.437	0.862

EE effort expectancy, FC facilitating conditions, HM hedonistic motivation, PE performance expectancy, PR privacy risk, SI social influence, TR trust, BI behavioural intention, eWOM electronic word of mouth. The bold values on the diagonal represent the square roots of the Average Variance Extracted (AVE) for each construct.

Table 7 Heterotrait-Monotrait Ratio (HTMT).

	EE	FC	HM	PE	PR	SI	TR	BI	eWOM
EE									
FC	0.352								
HM	0.538	0.375							
PE	0.499	0.294	0.540						
PR	0.436	0.336	0.418	0.357					
SI	0.527	0.275	0.599	0.410	0.413				
TR	0.416	0.394	0.396	0.392	0.368	0.343			
BI	0.491	0.288	0.456	0.393	0.561	0.428	0.208		
eWOM	0.549	0.289	0.523	0.494	0.450	0.519	0.306	0.525	

EE effort expectancy, FC facilitating conditions, HM hedonistic motivation, PE performance expectancy, PR privacy risk, SI social influence, TR trust, BI behavioural intention, eWOM electronic word of mouth.

Table 8 Direct effects.

Path	β	t-value	p-value	Confidence Intervals		VIF	supported
				2.5%	97.5%		
PE \rightarrow BI	0.049	0.815	0.415	-0.064	0.165	1.414	no
EE \rightarrow BI	0.130	2.19	0.029*	0.016	0.249	1.561	Yes
FC \rightarrow BI	0.034	0.623	0.533	-0.069	0.139	1.189	no
HM \rightarrow BI	0.089	1.517	0.129	-0.025	0.207	1.678	no
SI \rightarrow BI	0.054	0.854	0.393	-0.07	0.176	1.539	no
eWOM \rightarrow BI	0.182	2.866	0.004**	0.052	0.304	1.536	Yes
PR \rightarrow BI	-0.278	4.397	0.000***	-0.399	-0.155	1.321	Yes
BI $R^2 = 0.342$							
EE \rightarrow eWOM	0.217	3.649	0.000***	0.098	0.334	1.469	Yes
FC \rightarrow eWOM	0.045	0.872	0.383	-0.058	0.146	1.163	no
HM \rightarrow eWOM	0.154	2.218	0.027*	0.023	0.294	1.630	Yes
PE \rightarrow eWOM	0.177	2.883	0.004**	0.054	0.298	1.362	Yes
SI \rightarrow eWOM	0.190	3.208	0.001***	0.073	0.306	1.466	Yes
eWOM $R^2 = 0.334$							
TR \rightarrow PR	-0.327	6.246	0.000***	-0.432	-0.227	1.000	Yes
PR $R^2 = 0.107$							

PE performance expectancy, EE effort expectancy, SI social influence, FC facilitating conditions, HM hedonistic motivation, TR trust, PR privacy risk, eWOM electronic word of mouth, BI behavioural intention.
***p < 0.001, **p < 0.01, *p < 0.05.

mediator in the relationship between PE and behavioural intention. This finding suggests that although PE is important, consumers may seek to validate their expectations through the experiences of others, thus converting these expectations into behavioural intention under the influence of eWOM (Babić Rosario et al., 2020). In the context of Chinese culture, this indirect path may be better understood through the lens of collectivist values, which emphasize social harmony, group consensus, and interpersonal influence (Qi & Ploeger, 2021). Therefore, the mediating role of eWOM in the relationship between performance expectancy and behavioural intention may reflect a culturally rooted preference for socially validated action over purely individualistic evaluation.

Social influence (SI) has no appreciable effect on customers' intention to experience digital exhibitions. One possible explanation posits that, in instances where the adoption of technology is perceived as discretionary, the influence of social factors on behavioural intention may be less pronounced or diminished (Venkatesh & Morris, 2000). Considering the significant mediating role of eWOM, this paper posits that within the realm of digital exhibitions, consumers may be influenced not only by their immediate social circle but also by the wider network of opinions and recommendations available online (Wang et al., 2022). In the context of Chinese culture, this may reflect a shift in

how social influence operates under collectivist values, with decision-making increasingly hinging on distributed digital consensus rather than traditional authority figures or close personal ties (You & Hon, 2019). This point reaffirms that eWOM serves as a vital conduit to access a wider spectrum of social opinions and feedback, thus influencing consumers' decisions. This underscores the importance of focusing on and optimizing eWOM strategies in managing digital exhibitions, such as pushing satisfied customers to spread the word about their positive experiences, thus fostering broader social acceptance and participation (Yeo et al., 2022).

In this study, it was discovered that consumers' intentions to embrace digital exhibitions were not significantly impacted by facilitating conditions (FCs). This finding conflicts with several previous studies (Albanna et al., 2022; Escobar-Rodríguez & Carvajal-Trujillo, 2014). Previous studies have also demonstrated that FCs and behavioural intention do not significantly correlate (Wang et al., 2020; Ben Arfi et al., 2021). UTAUT theory focuses primarily on users' subjective perceptions and evaluations of technology use, which includes three core dimensions: PE, EE, and SI. The final FCs may be encompassed by these three core dimensions, so when their impact on acceptance intention is verified, significant results may not be obtained (Venkatesh et al., 2003). In a study on the acceptance of the Internet of Things by

consumers, relevant scholars have noted that, as a disruptive technology that most people are not familiar with, the behavioural intention towards using this technology may depend on specific devices (Ben Arfi et al. 2021). The same is true in digital exhibitions, where some devices may require more technical support while others require less support. However, this also depends on the specific research context and subjects, as factors affecting acceptance may differ across different scenarios and backgrounds (Tamilmani et al., 2021).

The empirical results showed that while hedonic motivation (HM) has no discernible influence on behavioural intention, it significantly improves eWOM. Integrating the results from fsQCA, it is evident that HM, as a solitary factor, has little impact on consumers' acceptance intentions towards digital exhibitions. However, when combined with other conditions (such as effort expectancy), it influences behavioural intention. As noted by Tamilmani et al. (2021), while consumers exhibiting lower levels of PE and EE demonstrate a reduced willingness to utilize mobile internet, the actual usage rates may remain relatively high, influenced by hedonic motivation and additional factors.

In this study, we extended the original UTAUT2 model dimensions by including trust as an independent variable. In recent years, trust has been proven by many scholars to be an extended variable that is related to consumer behavioural intention (Hooda et al., 2022; Al-Saedi et al. 2020). This study validated the mediating role of privacy risk in the relationship between trust and behavioural intention, as previously indicated by scholars (Arfi et al., 2021; Bugshan & Attar, 2020). This means that privacy risk serves as a bridge between trust and acceptance intentions towards digital exhibitions.

The fsQCA yielded a complex constellation of conditions associated with consumers' willingness to accept digital exhibitions. The findings confirm that rather than isolated, individual effects, specific configurations of factors contribute collectively to the outcome. In the first configuration, the presence of PE, EE, SI,

HM, and eWOM emerged as core conditions positively contributing to behavioural intention. This finding suggests a significant route where consumers' expectation of performance, the ease with which digital exhibitions can be navigated, the social endorsement they receive, the enjoyment they provide, and the positive discourse surrounding them collectively drive the acceptance of digital exhibitions. Notably, in this configuration, facilitating conditions and privacy risk are absent, indicating that even without optimal support or infrastructural conditions, the combination of the other factors is sufficient to lead to positive behavioural intention (Venkatesh et al., 2003).

Moreover, the second configuration excludes PE but includes EE, SI, hedonic HM, trust, and eWOM as core conditions that are present, along with facilitating conditions that, in this case, positively contribute to behavioural intention. Here, the presence of trust contrasts with its peripheral role in the first pathway, underscoring its significance in the absence of PE. The inclusion of FCs suggests that when consumers perceive the necessary support to experience digital exhibitions, in the presence of trust, combined with other conditions, facilitating conditions can positively drive their intentions to engage, even in the absence of PE.

Theoretical implications. This study makes several significant theoretical contributions to the literature on immersive technology adoption and consumer behaviour in the context of digital exhibitions. First, this study contributes to the literature in the area of immersive technology adoption by exploring the factors influencing consumers' willingness to engage with digital exhibitions in the metaverse. While previous studies have explored the antecedents of immersive technology adoption from theoretical perspectives such as perceived realism (Cheung et al., 2024), media richness (Cheung et al., 2024), and the experience economy framework (Leung et al., 2022), few have delved into consumers' psychological responses in the specific emerging context of digital exhibitions. This study extends the unified theory of acceptance and use of technology 2 (UTAUT2) model to the digital exhibition context. This adaptation not only validates the applicability of the model in a novel technological setting but also enriches the understanding of how consumers interact with immersive technologies in marketing-oriented environments.

Second, this study innovatively incorporates electronic word-of-mouth (eWOM) into the UTAUT2 model, confirming its critical mediating role in the digital exhibition acceptance process. While prior research has focused primarily on variables such as attitudes, perceived risk, and trust as mediators in technology acceptance models (Degirmenci & Breitner, 2017; Arfi et al., 2021; Hooda et al., 2022), this study emphasizes the importance of eWOM in shaping consumer behavioural intention. This result aligns with the findings of Babić Rosario et al. (2020), who highlighted the role of eWOM in consumer decision-making processes, but it extends their work by demonstrating how

Table 9 Indirect effects.			
Path	t-value	p-values	supported
HM -> e -> BI	1.662	0.097	no
PE -> e -> BI	2.057	0.040*	Yes
SI -> e -> BI	2.060	0.039*	Yes
TR -> PR -> BI	3.732	0.000***	Yes
EE -> e -> BI	2.187	0.029*	Yes
FC -> e -> BI	0.785	0.433	no
HM Hedonistic motivation, PE Performance expectancy, SI Social influence, TR Trust, EE Effort expectancy, FC Facilitating conditions, BI Behavioural intention, eWOM Electronic word of mouth. ***p < 0.001, *p < 0.05.			

Table 10 Data calibration.			
	Full membership	Crossover point	Full nonmembership
Performance expectancy	5.00	3.33	1.67
Effort expectancy	5.00	3.33	1.67
Social influence	5.00	3.33	2.00
Facilitating conditions	5.00	3.33	1.67
Hedonistic motivation	5.00	3.33	1.67
Privacy risk	4.33	2.67	1.00
Trust	5.00	3.00	1.67
eWOM	5.00	3.33	1.67
Behavioural intention	5.00	3.33	1.67

Table 11 Necessary conditions.		
Conditions tested	Outcome variable: BI	
	Consistency	Coverage
PE	0.725880	0.708450
-PE	0.568067	0.571777
EE	0.721316	0.723534
-EE	0.558012	0.546439
SI	0.718320	0.692732
-SI	0.541040	0.551421
FC	0.684590	0.686549
-FC	0.596521	0.584271
HM	0.732084	0.707610
-HM	0.529131	0.537993
PR	0.504386	0.519882
-PR	0.760894	0.726098
TR	0.677530	0.646987
-TR	0.583400	0.600882
eWOM	0.746489	0.749428
-eWOM1	0.542538	0.530840

PE performance expectancy, EE effort expectancy, SI social influence, FC facilitating conditions, HM hedonistic motivation, TR trust, PR privacy risk, eWOM electronic word of mouth, BI behavioural intention.

Table 12 Truth table.		
	Behavioural intention	
	1	2
Performance expectancy	•	
Effort expectancy	●	●
Social influence	●	●
Facilitating conditions	⊕	•
Hedonistic motivation	•	•
Trust		•
eWOM	●	●
Privacy risk	⊕	⊕
Consistency	0.937275	0.939175
Raw coverage	0.241888	0.35235
Unique coverage	0.0613279	0.17179
Solution coverage	0.413678	
Solution consistency	0.93099	

The black circle represents the presence of core or peripheral conditions. The crossed-out circle represent the absence of core or peripheral conditions; Blank cells show a 'do not care' situation.

eWOM mediates the relationships between key UTAUT2 constructs and behavioural intention in the context of digital exhibitions. This contribution not only extends the applicability of the UTAUT2 model but also offers a fresh perspective for future studies to explore how enhancing eWOM can improve consumers' psychological readiness and acceptance of digital exhibitions, guiding enterprises in building better digital experiences.

Third, by integrating the concepts of trust and privacy risk within the UTAUT2 framework, this study confirms the significant role that these factors play in technology acceptance. In doing so, this study builds on and extends the work of Arfi et al. (2021) and Bugshan and Attar (2020), who examined trust and privacy risk separately in the context of the IoT and social commerce. However, this research uniquely demonstrates how trust mitigates privacy risk, thus enhancing consumers' willingness to engage with digital exhibitions. In the Chinese context, national policy documents tend to convey a predominantly positive and development-oriented tone (Hine & Floridi, 2024),

which may help reduce consumers' perceived risk and increase their willingness to engage with emerging technological innovations. This model extension highlights the psychological necessity of building trust and managing privacy risk when creating and promoting digital exhibition services, as these factors are increasingly decisive in user technology acceptance in the digital age.

Fourth, the integration of fuzzy-set qualitative comparative analysis (fsQCA) into this study provides a nuanced and configurational understanding of consumers' willingness to engage with digital exhibitions. By identifying two distinct pathways—Configuration 1 (performance expectancy, effort expectancy, social influence, hedonic motivation, and eWOM) and Configuration 2 (effort expectancy, social influence, facilitating conditions, trust, and eWOM)—the fsQCA results highlight the complex interplay of factors driving consumer behavioural intention. These configurations align with Pappas and Woodside's (2021) emphasis on the importance of examining causal complexity and the combined effects of multiple conditions rather than isolated variables. The findings underscore that consumer acceptance is determined not by a single factor but by specific combinations of conditions, which can vary depending on contextual factors such as the presence of trust or the emphasis on ease of use. This configurational perspective extends the theoretical understanding of the UTAUT2 model by demonstrating how different pathways can lead to the same outcome, offering a more holistic view of consumer behaviour in the context of digital exhibitions.

Finally, from a methodological perspective, the use of semi-structured interviews combined with the PLS-SEM and fsQCA methods offers a composite methodological example that captures and interprets complex relationships within the data more comprehensively. The interview phase played a foundational role in adapting the UTAUT2 framework to the context of digital exhibitions, which were later confirmed and theorized in the quantitative stages. Specifically, the PLS-SEM results reveal the linear relationships among key variables, while the fsQCA results uncover multiple equifinal paths toward acceptance. The integration of fuzzy-set qualitative comparative analysis (fsQCA) into this study provides a nuanced and configurational understanding of consumers' willingness to engage with digital exhibitions. By identifying two distinct pathways—Configuration 1 (performance expectancy, effort expectancy, social influence, hedonic motivation, and eWOM) and Configuration 2 (effort expectancy, social influence, facilitating conditions, trust, and eWOM)—the fsQCA results highlight the complex interplay of factors driving consumer behavioural intention. These configurations align with Pappas and Woodside's (2021) emphasis on the importance of examining causal complexity and the combined effects of multiple conditions rather than isolated variables. The findings underscore that consumer acceptance is determined not by a single factor but by specific combinations of conditions, which can vary depending on contextual factors such as the presence of trust or the emphasis on ease of use. This extends the theoretical understanding of the UTAUT2 model by demonstrating how different pathways can lead to the same outcome, offering a more holistic view of consumer behaviour in the context of digital exhibitions. Moreover, the fsQCA results complement the PLS-SEM findings, providing deeper insights into the mechanisms through which trust, eWOM, and other factors influence consumer decisions. By adopting this dual-method approach, this study not only validates the robustness of the findings but also offers a methodological example for future research exploring complex consumer behaviour in emerging technological contexts.

Practical implications. This study not only addresses the pressing needs of organizations in the digital exhibition space but also contributes to the broader discourse on digital marketing strategies and consumer behaviour in the evolving landscape of the metaverse.

First, the significant effect of effort expectancy is shown by our findings. To enhance this aspect, organizations should prioritize creating intuitive and user-friendly interfaces that minimize cognitive and physical effort. This can be achieved by designing seamless navigation and interaction frameworks to reduce user friction, leveraging augmented reality (AR) and virtual reality (VR) technologies to simplify the exploration of digital exhibitions, and conducting usability testing to identify and address pain points in user journeys. For example, the Louvre Museum's virtual tour platform uses simple click-and-drag navigation and clear directional cues, making it easy for users to explore exhibitions without frustration. Similarly, BYD's 'BYD World' metaverse platform demonstrates this principle through its interactive showrooms, where users can effortlessly explore vehicles with intuitive controls that replicate real-world dealership experiences.

Second, the study confirms the significant mediating role of eWOM in shaping behavioural intention, demonstrating that positive eWOM can amplify consumers' interest and trust in digital exhibitions. To capitalize on this finding, organizations should encourage users to share their experiences by incentivizing reviews, testimonials, and social media posts; create shareable and engaging content that highlights the unique features and benefits of digital exhibitions; and actively monitor and respond to eWOM on platforms such as social media and review sites to address concerns and amplify positive feedback (Kautish et al., 2023). By fostering a robust eWOM ecosystem, organizations can enhance the visibility and credibility of their digital exhibitions, increasing adoption rates. For instance, Nike's 'Nikeland' on Roblox effectively leverages eWOM by encouraging users to share their virtual experiences via social media, thereby amplifying engagement.

Third, the incorporation of trust and privacy risk into the consumer acceptance model highlights the need for stringent security measures and transparent privacy policies. By emphasizing the importance of robust data security measures, transparent data handling practices, and clear communication of privacy policies, organizations can address consumer concerns and foster a sense of reliability. Additionally, leveraging secure authentication and encryption technologies further reinforces the safeguarding of user interactions, which is critical in mitigating perceived risks. Creating a trustworthy environment not only builds consumer confidence but also encourages sustained participation in digital exhibitions, as demonstrated by one participant's statement: 'I believe that the company providing the digital exhibition will protect my information security' (Participant 4). This research underscores the need for organizations to prioritize trust-building as a strategic imperative, ultimately driving higher adoption rates and long-term success in the digital exhibition space. By integrating these insights, organizations can position themselves as secure and user-centric, thus enhancing their competitive edge in an increasingly privacy-conscious market.

Finally, while factors beyond effort expectancy do not directly influence behavioural intention, they may affect them either through the mediating role of eWOM or in conjunction with other elements. From the fsQCA, we identified two configurations associated with behavioural intention. The first configuration shows that PE, EE, SI, HM, and eWOM constitute core conditions. This finding indicates that consumers have a greater tendency to form positive behavioural intention when they expect high performance (e.g., informative and entertaining content) and social interaction from digital exhibitions. To capitalize on this finding, organizations should design exhibitions that are

immersive, interactive, and entertaining; incorporate social features such as live chats, forums, and collaborative spaces to foster community engagement; and integrate gamification elements to increase users' enjoyment and hedonic motivation. For example, BMW's Joytopia metaverse event successfully merged high-performance visuals, such as realistic virtual test drives with interactive social features like live chats with engineers, creating a multifaceted experience that attracted significant consumer engagement. The second configuration identifies EE, SI, FCs, HM, trust, and eWOM as core conditions. This configuration emphasizes that in addition to the simplicity of the user experience and fun, the establishment and maintenance of trust and positive social influences significantly impact behavioural intention. Organizations should provide technical support, tutorials, and resources to ease user navigation, foster trust through consistent, reliable service and transparent communication, and leverage eWOM to reinforce trust and social validation. Together, these pathways offer actionable strategies for organizations to create engaging, trustworthy, and socially enriched digital exhibition experiences that drive consumer participation and long-term success.

Conclusions and future work

Conclusions. This research seeks to identify the factors influencing consumers' willingness to accept digital exhibitions. To that end, we used semi-structured interviews to identify important variables. On the basis of the semi-structured interview findings, we identified the significant role of eWOM and incorporated the trust-privacy risk relationship into the UTAUT2 model to construct the research model for this paper. We subsequently analysed 283 questionnaire responses using the PLS-SEM and fsQCA methods, revealing the mediating role of eWOM in the UTAUT2 model, as well as the impact of effort expectancy and the trust-privacy relationship on behavioural intention. Simultaneously, we identified two configurational paths that lead to high behavioural intention, contributing to both theoretical research and management practice.

Limitations and future directions. This study has some limitations that also offer avenues for future research. First, the cross-sectional design of the study restricts the ability to observe changes and trends over time. Conducting a longitudinal study would be beneficial for determine whether the interrelationships among the variables considered persist over time and for capturing the dynamic nature of consumer behaviour in the evolving metaverse landscape. These future directions will help build on the current findings and provide deeper insights into the factors influencing consumers' engagement with digital exhibitions. Second, the study was conducted within a single national context China, which means that it does not account for cross-cultural differences in how consumers perceive and accept digital exhibitions in the metaverse. Future studies can explore not only the comparative applicability of models like UTAUT2 across countries, but also how localized understandings of key constructs. This has important implications for digital governance, especially as global platforms must navigate diverse ethical, legal, and cultural expectations in designing user-centred technologies (Ho et al., 2023).

Data availability

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Received: 6 November 2024; Accepted: 30 July 2025;

Published online: 29 August 2025

References

- Albanna H, Alalwan AA, Al-Emran M (2022) An integrated model for using social media applications in non-profit organizations. *Int J Inf Manag* 63:102452. <https://doi.org/10.1016/j.jinfomgt.2021.102452>
- Al-Saedi K, Al-Emran M, Ramayah T, Abusham E (2020) Developing a general extended UTAUT model for M-payment adoption. *Technol Soc* 62:101293. <https://doi.org/10.1016/j.techsoc.2020.101293>
- Arfi WB, Nasr IB, Kondrateva G, Hikkerova L (2021) The role of trust in intention to use the IoT in eHealth: application of the modified UTAUT in a consumer context. *Technol Forecast Soc Change* 167:120688. <https://doi.org/10.1016/j.techfore.2021.120688>
- Augusto M, Torres P (2018) Effects of brand attitude and eWOM on consumers' willingness to pay in the banking industry: Mediating role of consumer-brand identification and brand equity. *J Retail Consum Serv* 42:1–10. <https://doi.org/10.1016/j.jretconser.2018.01.005>
- Babić Rosario A, De Valck K, Sotgiu F (2020) Conceptualizing the electronic word-of-mouth process: What we know and need to know about eWOM creation, exposure, and evaluation. *J Acad Mark Sci* 48(3):422–448. <https://doi.org/10.1007/s11747-019-00706-1>
- Babić Rosario A, Sotgiu F, De Valck K, Bijmolt THA (2016) The effect of electronic word of mouth on sales: a meta-analytic review of platform, product, and metric factors. *J Mark Res* 53(3):297–318. <https://doi.org/10.1509/jmr.14.0380>
- Bansal G, Zahedi FM, Gefen D (2016) Do context and personality matter? Trust and privacy concerns in disclosing private information online. *Inform Manag Amster* 53(1):1–21. <https://doi.org/10.1016/j.im.2015.08.001>
- Ben Arfi W, Ben Nasr I, Khvatova T, Ben Zaied Y (2021) Understanding acceptance of eHealthcare by IoT natives and IoT immigrants: an integrated model of UTAUT, perceived risk, and financial cost. *Technol Forecast Soc Change* 163:120437. <https://doi.org/10.1016/j.techfore.2020.120437>
- Bryce J, Fraser J (2014) The role of disclosure of personal information in the evaluation of risk and trust in young peoples' online interactions. *Comput Human Behav* 30:299–306. <https://doi.org/10.1016/j.chb.2013.09.012>
- Bugshan H, Attar RW (2020) Social commerce information sharing and their impact on consumers. *Technol Forecast Soc Change* 153:119875. <https://doi.org/10.1016/j.techfore.2019.119875>
- BYD (2023) BYD Launches 'BYD World', in Partnership with AI and Metaverse Company, MeetKai, expanding the reach and connection to our customers beyond the physical world and into the Metaverse. <https://www.byd.com/us/news-list/BYD-Launches-BYD-World-in-Partnership-with-AI-and-Metaverse-Company-MeetKai.html>. Accessed 13 Dec 2024
- Chen M, Wang H, Liang Y, Zhang G (2023) Net and configurational effects of determinants on cloud computing adoption by SMEs under cloud promotion policy using PLS-SEM and fsQCA. *J Innov Knowl* 8(3):100388. <https://doi.org/10.1016/j.jik.2023.100388>
- Chen SX, Wu H-C, Huang X (2023) Immersive experiences in digital exhibitions: the application and extension of the service theater model. *J Hosp Tour Manag* 54:128–138. <https://doi.org/10.1016/j.jhtm.2022.12.008>
- Cheng X, Bao Y, Zarifis A (2020) Investigating the impact of IT-mediated information interruption on emotional exhaustion in the workplace. *Inform Process Manag* 57(6):102281. <https://doi.org/10.1016/j.ipm.2020.102281>
- Cheng X, Zhang X, Cohen J, Mou J (2022) Human vs. AI: Understanding the impact of anthropomorphism on consumer response to chatbots from the perspective of trust and relationship norms. *Inform Process Manag* 59(3):102940. <https://doi.org/10.1016/j.ipm.2022.102940>
- Cheung ML, Leung WKS, Chang LMK, Aw EC-X, Wong RYM (2024) Immersive time in the metaverse and visits to the physical world: Why not both? A holistic customer engagement framework. *Int J Contemp Hosp Manag* 36(11):3674–3703
- Cheung ML, Leung WKS, Chang MK, Wong RYM, Tse SY (2024) Driving engagement in metaverse-mediated tourism environments: Exploring the role of perceived realism. *Internet Res*. <https://doi.org/10.1108/INTR-06-2023-0496>
- ChinaIRN (2025) Analysis of the current situation and market size, competitive landscape and future development trend of the metaverse industry in 2025. <https://www.chinairn.com/news/20250113/093242757.shtml>. Accessed 15 March 2025
- Chopdar PKR, Korfiatis N, Sivakumar VJ, Lytras MD (2018) Mobile shopping apps adoption and perceived risks: a cross-country perspective utilizing the unified theory of acceptance and use of technology. *Comput Human Behav* 86:109–128. <https://doi.org/10.1016/j.chb.2018.04.017>
- Degirmenci K, Breitner MH (2017) Consumer purchase intention for electric vehicles: Is green more important than price and range? *Transp Res D-Tr E* 51:250–260. <https://doi.org/10.1016/j.trd.2017.01.001>
- Donthu N, Kumar S, Pandey N, Mishra A (2021) Mapping the electronic word-of-mouth (eWOM) research: a systematic review and bibliometric analysis. *J Bus Res* 135:758–773. <https://doi.org/10.1016/j.jbusres.2021.07.015>
- Escobar-Rodríguez T, Carvajal-Trujillo E (2014) Online purchasing tickets for low cost carriers: an application of the unified theory of acceptance and use of technology (UTAUT) model. *Tour Manag* 43:70–88. <https://doi.org/10.1016/j.tourman.2014.01.017>
- Featherman M, Jia S, Califf CB, Hajli N (2021) The impact of new technologies on consumers beliefs: reducing the perceived risks of electric vehicle adoption. *Technol Forecast Soc Change* 169:120847. <https://doi.org/10.1016/j.techfore.2021.120847>
- Filieri R, McLeay F, Tsui B, Lin Z (2018) Consumer perceptions of information helpfulness and determinants of purchase intention in online user reviews. *Inform Manag Amster* 55(8):956–970. <https://doi.org/10.1016/j.im.2018.04.010>
- Fiss PC (2011) Building better causal theories: a fuzzy set approach to typologies in organization research. *Acad Manag J* 54(2):393–420. <https://doi.org/10.5465/amj.2011.60263120>
- Fornell C, Larcker DF (1981) Evaluating structural equation models with unobservable variables and measurement error. *J Mark Res* 18(1):39–50. <https://doi.org/10.1177/002224378101800104>
- Gan Q, Lau RYK (2024) Trust in a 'trust-free' system: blockchain acceptance in the banking and finance sector. *Technol Forecast Soc Change* 199:123050. <https://doi.org/10.1016/j.techfore.2023.123050>
- Ghali Z, Rather RA, Khan I (2024) Investigating metaverse marketing-enabled consumers' social presence, attachment, engagement and (re)visit intentions. *J Retail Consum Serv* 77:103671. <https://doi.org/10.1016/j.jretconser.2023.103671>
- Grand View Research (2023) Immersive media industry data book-augmented reality, metaverse and virtual reality market size, share, trends analysis, and segment forecasts, 2022–2030. <https://www.grandviewresearch.com/sector-report/immersive-media-industry-data-book>. Accessed 10 Apr 2023
- Gregoriades A, Pampaka M, Herodotou H, Christodoulou E (2021) Supporting digital content marketing and messaging through topic modelling and decision trees. *Expert Syst Appl* 184:115546. <https://doi.org/10.1016/j.eswa.2021.115546>
- Guo S, Jiang L, Huang R, Ye W, Zhou X (2018) Inspiring awe in consumers: relevance, triggers, and consequences. *Asian J Soc Psychol* 21(3):129–142. <https://doi.org/10.1111/ajsp.12215>
- Habbal A, Ali MK, Abuzaraida MA (2024) Artificial intelligence trust, risk and security management (AI TRISM): frameworks, applications, challenges and future research directions. *Expert Syst Appl* 240:122442. <https://doi.org/10.1016/j.eswa.2023.122442>
- Hair JF, Howard MC, Nitzl C (2020) Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *J Bus Res* 109:101–110. <https://doi.org/10.1016/j.jbusres.2019.11.069>
- Hair JF, Risher JJ, Sarstedt M, Ringle CM (2019) When to use and how to report the results of PLS-SEM. *Eur Bus Rev* 31(1):2–24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Hameed I, Akram U, Khan Y, Khan NR, Hameed I (2024) Exploring consumer mobile payment innovations: an investigation into the relationship between coping theory factors, individual motivations, social influence and word of mouth. *J Retail Consum Serv* 77:103687. <https://doi.org/10.1016/j.jretconser.2023.103687>
- Hanelt A, Bohnsack R, Marz D, Antunes Marante C (2021) A systematic review of the literature on digital transformation: insights and implications for strategy and organizational change. *J Manag Stud* 58(5):1159–1197. <https://doi.org/10.1111/joms.12639>
- Hansen JM, Saridakis G, Benson V (2018) Risk, trust, and the interaction of perceived ease of use and behavioral control in predicting consumers' use of social media for transactions. *Comput Hum Behav* 80:197–206. <https://doi.org/10.1016/j.chb.2017.11.010>
- He TL, Qin F (2024) Exploring how the metaverse of cultural heritage (MCH) influences users' intentions to experience offline: a two-stage SEM-ANN analysis. *Herit Sci* 12:193. <https://doi.org/10.1186/s40494-024-01315-0>
- Hine E, Floridi L (2024) Artificial intelligence with American values and Chinese characteristics: a comparative analysis of American and Chinese governmental AI policies. *AI Soc* 39:257–278. <https://doi.org/10.1007/s00146-022-01499-8>
- Ho MT, Mantello P, Ho MT (2023) An analytical framework for studying attitude towards emotional AI: the three-pronged approach. *MethodsX* 10:102149. <https://doi.org/10.1016/j.mex.2023.102149>
- Ho MT, Vuong QH (2025) Five premises to understand human-computer interactions as AI is changing the world. *AI Soc* 40:1161–1162. <https://doi.org/10.1007/s00146-024-01913-3>
- Hollebeek LD, Macky K (2019) Digital content marketing's role in fostering consumer engagement, trust, and value: framework, fundamental propositions, and implications. *J Interact Mark* 45:27–41. <https://doi.org/10.1016/j.intmar.2018.07.003>
- Hooda A, Gupta P, Jeyaraj A, Giannakis M, Dwivedi YK (2022) The effects of trust on behavioral intention and use behavior within e-government contexts. *Int J Inform Manag* 67:102553. <https://doi.org/10.1016/j.jinfomgt.2022.102553>
- Hu Y, Kim HJ (2018) Positive and negative eWOM motivations and hotel customers' eWOM behavior: Does personality matter? *Int J Hosp Manag* 75:27–37. <https://doi.org/10.1016/j.ijhm.2018.03.004>

- Hwang J, Kim H, Kim W (2019) Investigating motivated consumer innovativeness in the context of drone food delivery services. *J Hosp Tour Manag* 38:102–110. <https://doi.org/10.1016/j.jhtm.2019.01.004>
- Irshad M, Ahmad MS, Malik OF (2020) Understanding consumers' trust in social media marketing environment. *Int J Retail Distrib* 48(11):1195–1212. <https://doi.org/10.1108/IJRDM-07-2019-0225>
- Jafar RMS, Ahmad W, Sun Y (2023) Unfolding the impacts of metaverse aspects on telepresence, product knowledge, and purchase intentions in the metaverse stores. *Technol Soc* 74:102265. <https://doi.org/10.1016/j.techsoc.2023.102265>
- Kalender Y, Guzmán F (2025) What drives consumers to engage in immersive technologies? A consumer metaverse engagement motivation model. *Psychol Mark* 42(3):921–950. <https://doi.org/10.1002/mar.22158>
- Kalinkara Y, Özdemir O (2023) Anatomy in the metaverse: exploring student technology acceptance through the UTAUT2 model. *Anat Sci Educ* 17(2):319–336. <https://doi.org/10.1002/ase.2353>
- Kautish P, Purohit S, Filiari R, Dwivedi YK (2023) Examining the role of consumer motivations to use voice assistants for fashion shopping: The mediating role of awe experience and eWOM. *Technol Forecast Soc Change* 190:122407. <https://doi.org/10.1016/j.techfore.2023.122407>
- Kim MJ, Hall CM (2019) A hedonic motivation model in virtual reality tourism: comparing visitors and non-visitors. *Int J Inform Manag* 46:236–249. <https://doi.org/10.1016/j.jinfomgt.2018.11.016>
- Kim Y, Roh T (2022) Preparing an exhibition in the post-pandemic era: evidence from an O2O-based exhibition of B2B firms. *Technol Forecast Soc Change* 185:122041. <https://doi.org/10.1016/j.techfore.2022.122041>
- Kock N (2015) Common method bias in PLS-SEM: A full collinearity assessment approach. *Int J e-Collab* 11(4):1–10. <https://doi.org/10.4018/ijec.2015100101>
- Kozinets RV (2023) Immersive netnography: a novel method for service experience research in virtual reality, augmented reality and metaverse contexts. *J Serv Manag* 34(1):100–125. <https://doi.org/10.1108/JOSM-12-2021-0481>
- Kozyreva A, Lewandowsky S, Hertwig R (2020) Citizens versus the internet: confronting digital challenges with cognitive tools. *Psychol Sci Public Interest* 21(3):103–156. <https://doi.org/10.1177/1529100620946707>
- Lee S, Chang Y, Park J, Chong AY, Yin Q (2024) How representational fidelity affects sociability and cyberself engagement in the Metaverse. *Internet. Res.* <https://doi.org/10.1108/INTR-12-2022-0937>
- Leung WK, Chang MK, Cheung ML, Shi S (2023) VR tourism experiences and tourist behavior intention in COVID-19: an experience economy and mood management perspective. *Inform Technol Peopl* 36(3):1095–1125. <https://doi.org/10.1108/ITP-06-2021-0423>
- Leung WK, Cheung ML, Chang MK, Shi S, Tse SY, Yusrini L (2022) The role of virtual reality interactivity in building tourists' memorable experiences and post-adoption intentions in the COVID-19 era. *J Hosp Tour Technol* 13(3):481–499. <https://doi.org/10.1108/JHTT-03-2021-0088>
- Leveau P, Camus ES (2023) Embodiment, immersion, and enjoyment in virtual reality marketing experiences. *Psychol Mark* 40(7):1329–1343. <https://doi.org/10.1002/mar.21822>
- Levy S, Gvili Y (2024) Self as source: The interplay of sharing eWOM with consumer engagement and incentive acceptance. *J Retail Consum Serv* 80:103926. <https://doi.org/10.1016/j.jretconser.2024.103926>
- Lho LH, Quan W, Yu J et al. (2022) The sharing economy in the hospitality sector: the role of social interaction, social presence, and reciprocity in eliciting satisfaction and continuance behavior. *Humanit Soc Sci Commun* 9:362. <https://doi.org/10.1057/s41599-022-01379-y>
- Lin K-Y, Huang TK (2024) Shopping in the digital world: How augmented reality mobile applications trigger customer engagement. *Technol Soc* 77:102540. <https://doi.org/10.1016/j.techsoc.2024.102540>
- Liu Y, Jayawardhena C, Osburg VS, Babu MM (2021) Social sharing of consumption emotion in electronic word of mouth (eWOM): A cross-media perspective. *J Bus Res* 132:208–220. <https://doi.org/10.1016/j.jbusres.2021.04.030>
- Loureiro SMC, Cavallero L, Miranda FJ (2018) Fashion brands on retail websites: customer performance expectancy and e-word-of-mouth. *J Retail Consum Serv* 41:131–141. <https://doi.org/10.1016/j.jretconser.2017.12.005>
- Meena R, Sarabhai S (2023) Extrinsic and intrinsic motivators for usage continuance of hedonic mobile apps. *J Retail Consum Serv* 71:103228. <https://doi.org/10.1016/j.jretconser.2022.103228>
- Merhi M, Hone K, Tarhini A (2019) A cross-cultural study of the intention to use mobile banking between Lebanese and British consumers: Extending UTAUT2 with security, privacy and trust. *Technol Soc* 59:101151. <https://doi.org/10.1016/j.techsoc.2019.101151>
- Moravec V, Gavurova B, Hynek N et al. (2025) Human-machine in the vortex of digital synergy. *Humanit Soc Sci Commun* 12:691. <https://doi.org/10.1057/s41599-025-05014-4>
- Motyka S, Grewal D, Aguirre E, Mahr D, De Ruyter K, Wetzels M (2018) The emotional review-reward effect: How do reviews increase impulsivity? *J Acad Mark Sci* 46(6):1032–1051. <https://doi.org/10.1007/s11747-018-0585-6>
- Mubarak MF, Petraite M (2020) Industry 4.0 technologies, digital trust and technological orientation: What matters in open innovation? *Technol Forecast Soc Change* 161:120332. <https://doi.org/10.1016/j.techfore.2020.120332>
- Navarro-García A, Ledesma-Chaves P, Gil-Cordero E, De-Juan-Vigaray MD (2024) Intangible resources, static and dynamic capabilities and perceived competitive advantage in exporting firms. A PLS-SEM/fsQCA approach. *Technol Forecast Soc Change* 198:123001. <https://doi.org/10.1016/j.techfore.2023.123001>
- Nesterov AV (2022) Information workers' workplaces in the conditions of digitalization: about inforgs by L. Floridi and Self-Communication by M. Castells. *Sci Tech Inf Proc* 49:30–34. <https://doi.org/10.3103/S0147688222010087>
- Noble SM, Saville JD, Foster LL (2022) VR as a choice: What drives learners' technology acceptance? *Int J Educ Technol H* 19(1):6. <https://doi.org/10.1186/s41239-021-00310-w>
- Ooi K-B, Lee V-H, Tan GW-H, Hew T-S, Hew J-J (2018) Cloud computing in manufacturing: the next industrial revolution in Malaysia? *Expert Syst Appl* 93:376–394. <https://doi.org/10.1016/j.eswa.2017.10.009>
- Pai M-Y, Chu H-C, Wang S-C, Chen Y-M (2013) Electronic word of mouth analysis for service experience. *Expert Syst Appl* 40(6):1993–2006. <https://doi.org/10.1016/j.eswa.2012.10.024>
- Pappas IO, Woodside AG (2021) Fuzzy-set qualitative comparative analysis (fsQCA): guidelines for research practice in Information Systems and marketing. *Int J Inform Manag* 58:102310. <https://doi.org/10.1016/j.jinfomgt.2021.102310>
- Park M, Yoo J (2020) Effects of perceived interactivity of augmented reality on consumer responses: a mental imagery perspective. *J Retail Consum Serv* 52:101912. <https://doi.org/10.1016/j.jretconser.2019.101912>
- Qi X, Liu X, Zhang X, Xia Y, Liu S, Lin H, Wang Z (2025) One requirement, multiple insights: the impact of innovation job requirement on employee radical and incremental creativity. *J Bus Res* 195(5):115395. <https://doi.org/10.1016/j.jbusres.2025.115395>
- Qi X, Ploeger A (2021) Explaining Chinese consumers' green food purchase intentions during the COVID-19 pandemic: an extended theory of planned behaviour. *Foods* 10(6):1200. <https://doi.org/10.3390/foods10061200>
- Queiroz MM, Fosso Wamba S (2019) Blockchain adoption challenges in supply chain: an empirical investigation of the main drivers in India and the USA. *Int J Inform Manag* 46:70–82. <https://doi.org/10.1016/j.jinfomgt.2018.11.021>
- Quesnel D, Riecke BE (2018) Are you awed yet? How virtual reality gives us awe and goose bumps. *Front Psychol* 9:2158. <https://doi.org/10.3389/fpsyg.2018.02158>
- Ragin CC (2008) Redesigning Social Inquiry: Fuzzy Sets and Beyond. University of Chicago Press. <https://doi.org/10.7208/chicago/9780226702797.001.0001>
- Roldán JL, Sánchez-Franco MJ, Real JC (2017) From frequency of use to social integration: the mediation of routinization and infusion in Tuenti community. *Eur Res Manag Bus Ec* 23(2):63–69. <https://doi.org/10.1016/j.jedeen.2016.07.002>
- Romero-Castro N, López-Cabarcos MÁ, Piñeiro-Chousa J (2022) Uncovering complexity in the economic assessment of derogations from the European industrial emissions directive. *J Innov Knowl* 7(1):100159. <https://doi.org/10.1016/j.jik.2021.11.001>
- Saneinia S, Zhai X, Zhou R, Gholizadeh A, Wu R, Zhu S (2024) Beyond virtual boundaries: the intersection of the metaverse technologies, tourism, and lifelong learning in China's digital discourse. *Humanit Soc Sci Commun* 11:1287. <https://doi.org/10.1057/s41599-024-03624-y>
- Schultz CD, Kumar H (2024) ARvolution: Decoding consumer motivation and value dimensions in augmented reality. *J Retail Consum Serv* 78:103701. <https://doi.org/10.1016/j.jretconser.2023.103701>
- Schuster F, Engelmann B, Sponholz U, Schmitt J (2021) Human acceptance evaluation of AR-assisted assembly scenarios. *J Manuf Syst* 61:660–672. <https://doi.org/10.1016/j.jmsy.2020.12.012>
- Sharma A, Dwivedi YK, Arya V, Siddiqui MQ (2021) Does SMS advertising still have relevance to increase consumer purchase intention? A hybrid PLS-SEM-neural network modelling approach. *Comput Hum Behav* 124:106919. <https://doi.org/10.1016/j.chb.2021.106919>
- Shibuya K (2025) Transforming phenomenological sociology for virtual personalities and virtual worlds. *AI & Soc.* <https://doi.org/10.1007/s00146-025-02189-x>
- Song H, Zeng W, Wu M (2023) Understanding exhibition image in digital exhibitions: an application of cognitive appraisal theory. *Asia Pac J Tour Res* 28(7):667–681. <https://doi.org/10.1080/10941665.2023.2264988>
- Stephanidis C, Salvendy G, Antona M et al. (2019) Seven HCI grand challenges. *Int J Hum-Comput Int* 35(14):1229–1269. <https://doi.org/10.1080/10447318.2019.1619259>
- Suh A (2024) How users cognitively appraise and emotionally experience the metaverse: focusing on social virtual reality. *Inform Technol Peopl* 37(4):1613–1641. <https://doi.org/10.1108/ITP-06-2022-0461>
- Taheri B, Yousaf A, Gannon M, Mishra A (2024) e-commerce website customer engagement: delineating the role of UTAUT, vividness, and compulsion. *J*

- Retail Consum Serv 79:103835. <https://doi.org/10.1016/j.jretconser.2024.103835>
- Tamilmani K, Rana NP, Wamba SF, Dwivedi R (2021) The extended unified theory of acceptance and use of technology (UTAUT2): a systematic literature review and theory evaluation. *Int J Inform Manag* 57:102269. <https://doi.org/10.1016/j.ijinfomgt.2020.102269>
- The Global Association of the Exhibition Industry (2023) The Global Exhibition Barometer (July 2023). <https://www.ufi.org/archive-research/the-global-exhibition-barometer-july-2023/>. Accessed 12 Apr 2023
- Trinh LTT, Hang NTT, Cuong LM, Dinh NV, Linh HK, Trinh DT, Tram NTP, Nguyen H, Ho MT (2024) State-of-the-arts methods for studying factors driving the utilization of open science resources. *MethodsX* 14:103125. <https://doi.org/10.1016/j.mex.2024.103125>
- Ustun AB, Karaoglan-Yilmaz FG, Yilmaz R, Ceylan M, Uzun O (2023) Development of UTAUT-based augmented reality acceptance scale: a validity and reliability study. *Educ Inf Technol* 29(9):11533–11554. <https://doi.org/10.1007/s10639-023-12321-3>
- Van Pinxteren MME, Wetzels RWH, R  ger J, Pluymaekers M, Wetzels M (2019) Trust in humanoid robots: implications for services marketing. *J Serv Mark* 33(4):507–518. <https://doi.org/10.1108/JSM-01-2018-0045>
- Venkatesh V, Morris GM, Davis BG, Davis DF (2003) User acceptance of information technology: toward a unified view. *Mis Quart* 27(3):425. <https://doi.org/10.2307/30036540>
- Venkatesh V, Thong James YL, Xu X (2012) Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *Mis Quart* 36(1):157. <https://doi.org/10.2307/41410412>
- Venkatesh V, Brown SA, Bala H (2013) Bridging the qualitative-quantitative divide: guidelines for conducting mixed methods research in information systems. *Mis Quart* 37(1):21–54. <https://doi.org/10.25300/MISQ/2013/37.1.02>
- Venkatesh V, Morris MG (2000) Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *Mis Quart* 24(1):115. <https://doi.org/10.2307/3250981>
- Verma D, Dewani PP (2021) eWOM credibility: a comprehensive framework and literature review. *Online Inform Rev* 45(3):481–500. <https://doi.org/10.1108/OIR-06-2020-0263>
- Verma D, Dewani PP, Behl A, Dwivedi YK (2023) Understanding the impact of eWOM communication through the lens of information adoption model: A meta-analytic structural equation modeling perspective. *Comput Hum Behav* 143:107710. <https://doi.org/10.1016/j.chb.2023.107710>
- Vuong QH, Nguyen MH (2024) Exploring the role of rejection in scholarly knowledge production: insights from granular interaction thinking and information theory. *Learned Publ* 37(4):e1636. <https://doi.org/10.1002/leap.1636>
- Wang H, Du R, Shen W, Qiu L, Fan W (2022) Product reviews: a benefit, a burden, or a trifle? How seller reputation affects the role of product reviews. *Mis Quart* 46(2):1243–1272. <https://doi.org/10.25300/MISQ/2022/15660>
- Wang J-J, Wang L-Y, Wang M-M (2018) Understanding the effects of eWOM social ties on purchase intentions: a moderated mediation investigation. *Electron Commer R A* 28:54–62. <https://doi.org/10.1016/j.elerap.2018.01.011>
- Wang L, Wang Z, Wang X, Zhao Y (2021) Explaining consumer implementation intention in mobile shopping with SEM and fsQCA: Roles of visual and technical perceptions. *Electron Commer R A* 49:101080. <https://doi.org/10.1016/j.elerap.2021.101080>
- Wu W, Wang S, Ding G, Mo J (2023) Elucidating trust-building sources in social shopping: a consumer cognitive and emotional trust perspective. *J Retail Consum Serv* 71:103217. <https://doi.org/10.1016/j.jretconser.2022.103217>
- Yadav N, Verma S, Chikhalkar R (2024) Online reviews towards reducing risk. *J Tour Futures* 10(2):299–316. <https://doi.org/10.1108/JTF-01-2022-0016>
- Yeo SF, Tan CL, Kumar A, Tan KH, Wong JK (2022) Investigating the impact of AI-powered technologies on Instagrammers' purchase decisions in digitalization era—A study of the fashion and apparel industry. *Technol Forecast Soc Change* 177:121551. <https://doi.org/10.1016/j.techfore.2022.121551>
- You L, Hon L (2019) How social ties contribute to collective actions on social media: a social capital approach. *Public Relat Rev* 45(4):101771. <https://doi.org/10.1016/j.pubrev.2019.04.005>
- Xie Y, Wan C, Kong K (2024) Factors influencing Chinese pre-service teachers' behavioral intention and use behavior to adopt VR training system: based on the UTAUT2 model. *Humanit Soc Sci Commun* 11:1300. <https://doi.org/10.1057/s41599-024-03832-6>
- Zabel C, O'Brien D, Natzel J (2023) Sensing the metaverse: the microfoundations of complementor firms' dynamic sensing capabilities in emerging-technology ecosystems. *Technol Forecast Soc Change* 192:122562. <https://doi.org/10.1016/j.techfore.2023.122562>
- Zahid H, Haji Din B (2019) Determinants of intention to adopt E-government services in Pakistan: an imperative for sustainable development. *Resources* 8(3):128. <https://doi.org/10.3390/resources8030128>
- Zavolokina L, Zani N, Schwabe G (2023) Designing for trust in blockchain platforms. *IEEE T Eng Manag* 70(3):849–863. <https://doi.org/10.1109/TEM.2020.3015359>
- Zhani N, Mouri N, Ahmed T (2022) The role of mobile value and trust as drivers of purchase intentions in m-servicescape. *J Retail Consum Serv* 68:103060. <https://doi.org/10.1016/j.jretconser.2022.103060>
- Zhao Y, Wang L, Tang H, Zhang Y (2020) Electronic word-of-mouth and consumer purchase intentions in social e-commerce. *Electron Commer R A* 41:100980. <https://doi.org/10.1016/j.elerap.2020.100980>
- Zhiyan Consulting (2024) Analysis of the current situation and future trends of China's metaverse industry in 2024. <https://www.chyxx.com/industry/1188820.html>. Accessed 8 March 2025

Acknowledgements

This work was supported by the National Social Science Fund of China (23BJY260).

Author contributions

WJY contributed to the conceptualization, methodology, data curation, visualization, validation, investigation, writing review and editing. LXL contributed to conceptualization, methodology, data curation, visualization, formal analysis, investigation, and writing—original draft. QX contributed to conceptualization, methodology, resources, visualization, validation, investigation, writing review and editing.

Competing interests

The authors declare no competing interests.

Ethical approval

The study received ethics approval from the Research Review Committee of the School of Management, Ocean University of China (Approval No. 20230311EA) on March 11 2023. The research was conducted in strict accordance with the ethical principles outlined in the Declaration of Helsinki (1964) and its subsequent amendments or similar ethical standards. All procedures involving human participants adhered to the institutional and national ethical standards for research.

Informed consent

All participants received comprehensive information prior to participating in the study to ensure they could make an informed decision. Participants were informed about the purpose of the study, procedures, potential risks and benefits, confidentiality measures, and their right to withdraw at any time without consequences. Participation was entirely voluntary, and no personally identifiable information was collected. All data were anonymized and analysed in aggregate form to ensure participant privacy. Informed consent was obtained from each participant prior to the commencement of the interviews and questionnaire surveys, which were conducted from March to May 2023. Additionally, the authors have obtained informed consent from the guardians of the minor respondents to safeguard their rights and ensure their appropriate and responsible contribution to the study. Similar information regarding keeping respondents' identities anonymous and confidential was provided to the guardians of the minor respondents.

Additional information

Correspondence and requests for materials should be addressed to Xin Qi.

Reprints and permission information is available at <http://www.nature.com/reprints>

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Open Access This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

  The Author(s) 2025