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BREAKING THE VIRTUAL WALL: WHY BUSINESSES RESIST METAVERSE IN THE RETAIL INDUSTRY?

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ABSTRACT

While the metaverse is considered the next big thing associated with the information system ecosystem, this disruptive technology has not been widely adopted by many of the enterprises to date. Given its potential to drive the success of businesses as evidence across literature, this study aims to investigate retail enterprises' non-adoption intentions toward the metaverse. The Technology, Organisation, and Environment (TOE) framework is used as an underpinning theory to examine the impact of various barriers on non-adoption intention towards the metaverse. Data were collected from 400 large- and medium-sized retail enterprises in China and analysed using partial least-squares structural equation models (PLS-SEM) to ensure reliability and test hypotheses. The findings indicate that both technological barriers (i.e., perceived complexity and perceived risk), organisational barriers (i.e., a lack of top management support), and environmental barriers (i.e., a lack of governance and standardisation) were found to have a significant effect on resistance to the adoption of the metaverse in retailing, which in turn significantly influenced non-adoption intentions. It is believed that the findings from this study will provide a better understanding of the metaverse's adoption from a business organisation's perspective and its impact on related stakeholders.

Keywords: Metaverse, TOE Framework, Resistance, Retailing, Non-Adoption Intention, Emerging Economies.

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1. INTRODUCTION

The term "Metaverse," which combines the words "meta" and "universe," initially appeared in Neal Stephenson's 1992 science fiction novel "Snow Crash". As the next generation of innovation, the metaverse seeks to create immersive, self-sufficient virtual spaces for play, work, and socialisation that transcend time and space (Wang et al., 2022). It merges physical and virtual environments, powered by technologies like artificial intelligence (AI), blockchain, Web 3.0, and extended reality (XR), which continue to expand its scale and scope (Ball, 2022). The metaverse has attracted significant investment, surpassing $120 billion in the first five months of 2022 and projected to reach a market value of $5 trillion by 2030 (McKinsey & Company, 2022). Its potential to transform the digital economy has made it a critical area for exploration across various industries, with estimates suggesting it could impact 15–33% of the digital economy (Goldman Sachs). The impending wave of disruption from the metaverse necessitates that all industries get ready to face its challenges (Li & Li, 2024).

The metaverse represents a disruptive frontier for enterprises, offering transformative potential in addressing diverse challenges (Kumar et al., 2023). While it promises immersive innovative experiences and revolutionises sectors such as retail, the adoption of such a complex technology requires a nuanced understanding of diverse influencing factors (Abu-Shanab et al., 2024). However, despite its advantages, widespread corporate adoption remains limited due to numerous challenges (Al-Sharafi et al., 2024; Mogaji et al., 2023). There is a growing need to explore factors influencing resistance to the metaverse in organisational contexts, as resistance can hinder its effective adoption (Wu & Yu, 2023).

Although resistance to technology adoption has been widely studied at the individual user level (e.g., Cham et al. (2022a, 2023); Ali et al. (2016), there is limited research on organisational resistance to adopting, particularly in the context of disruptive innovations like the metaverse. Despite the advantages and widespread appeal of the metaverse for businesses, there remains an insufficient level of adoption in the corporate world (Al-Sharafi et al., 2024). Managers' perceptions of employees' resistance play a pivotal role in determining organisational adoption success as they serve as key catalysts for organisational change (Rjab et al., 2023). Despite the potential benefits of metaverse adoption for the retail sector, there has been a dearth of empirical studies examining its barriers, particularly in the Chinese retail industry. This research gap necessitates a deeper investigation of how technological, organisational, and environmental barriers influence non-adoption intentions in retail enterprises.

Given the research deficiency identified across the literature, this study aims to bridge the gaps by providing answers to the following questions: RQ1. Is there any influence of technological barriers (e.g., perceived complexity and perceived risk) on the level of resistance to metaverse adoption? RQ2: Is there any influence of organisational barrier (e.g., a lack of top management support) on the level of resistance to metaverse adoption? RQ3. Is there any influence of environmental barrier (e.g., lack of governance and standardisation) on resistance to metaverse adoption? RQ4. Is there any influence of resistance on companies' non-adoption intention regarding the metaverse?

Using the Technology, Organisation, and Environment (TOE) framework as its foundation, this study develops and validates a research model that contributes to the advancement of information systems research. The study scrutinises the impact of technological, organisational, and

environmental barriers on the retailing industry's non-adoption intentions towards the metaverse. The present study, through a review of the literature and preliminary investigation with experts, has identified and examined key barriers such as perceived complexity (PC), perceived risk (PR), lack of top management support (LTMS), and lack of governance and standardisation (LGS). These findings could enhance our understanding of resistance to adopting disruptive technologies, particularly in emerging contexts like the Metaverse. Additionally, this study validates the importance of technological resistance and their influence on organisational adoption, providing context for inclusive findings at the organisational analysis level. From a practical perspective, the verified research model can assist managers and policymakers in concentrating their efforts on elements that are essential for reducing resistance and encouraging metaverse adoption.

The remainder of the paper is divided into the following sections: Section 2 presents the theoretical background of the metaverse, hypotheses development, and research model formulation. Section 3 describes research design. Section 4 presents an analysis of the data. Section 5 discusses results and presents implications. Finally, in Section 6, we conclude by addressing the limitations of this study and providing suggestions for future research.

2. REVIEW OF LITERATURE AND HYPOTHESIS DEVELOPMENT

2.1 Metaverse

With the continuous development of the digital environment, the metaverse is emerging as a transformative frontier for enterprises on a global scale. Although the metaverse is a relative newcomer to the everyday vocabulary of technology commentators and academics, the concept was first used in Neal Stephenson's 1992 novel Snow Crash (Dwivedi et al., 2022). The novel describes the virtual world as a VR space that utilises the internet and augmented reality (AR) through avatars and software agents (Joshua, 2017). The metaverse is defined as a novel version of the Internet that incorporates VR headsets, blockchain technology, and avatars to seamlessly merge the realms of physical and virtual worlds (Lee et al., 2021).

From the academic point of view, the metaverse has been widely concerned by scholars over the past few years, as demonstrated by the works of Dwivedi et al. (2022) and Hollensen et al. (2022). The metaverse refers to a unified virtual environment that is formed by the merging of physical and virtual realities. It allows individuals to interact and to feel like being present in a shared digital world (Cham et al., 2022c; Lee & Chaney, 2023). More precisely, it can be defined as "a connected and enduring network of virtual environments that are shared, allowing individuals to interact in real-time through their digital representations with other entities and objects" (Kim, 2021, p. 142).

From a sociological standpoint, the metaverse can transcend geographic boundaries and promote more inclusive environments, hence diminishing obstacles to obtaining diverse services like education, health care, as well as jobs (Al-Sharafi et al., 2024). For instance, individuals residing in distant regions can access online classes; patients could engage in virtual appointments with healthcare professionals; and individuals could perform their job duties remotely by utilising the metaverse (Koohang et al., 2023). It has the potential to contribute to economic expansion through the creation of novel industries, employment opportunities, and sources of revenue (Hollensen et al., 2022).

The diminishing appeal of the metaverse has also been highlighted by sources like the Financial Times, which reported on the hesitation of both major technology companies and users in embracing this technology (Kelly, 2023; Waters, 2020). Despite the wide range of attractions and advantages that metaverses offer organisations, the adoption of commercial metaverses remains relatively limited (Kumar et al., 2023). In this context, this study conducts research using the Technological-Organisational-Environment (TOE) framework to better understand the barriers that enterprises face when adopting the metaverse.

2.2 Technology–Organisation–Environment (TOE) Framework

Despite the Metaverse's substantial potential for individuals, organisations, and society at large, offering immersive and innovative experiences, its adoption is marked by complexity and is influenced by a myriad of not yet fully understood factors (Al-Sharafi et al., 2024). To address this scenario, this study employs the technology, organisation, and environment (TOE) framework, as introduced by Tornatzky and Fleischer (1990), which emphasises organisational factors rather than individual ones. The TOE Framework, which provides a comprehensive perspective at the organisational level regarding innovation processes, elucidates how technological, organisational, and environmental factors influence the process of adopting and putting into practice new ideas or technologies (Chatterjee et al., 2021). The TOE framework is grounded in robust theoretical foundations, backed by substantial empirical evidence, and has been extensively employed to examine the adoption of technological innovations (Abed, 2020; Chatterjee et al., 2021; Yin, 2023; Zhong & Moon, 2023).

Reflecting the existing literature, the TOE framework stands out for its ability to provide more precise insights and comprehensive predictions regarding factors impacting technology adoption by comprehending variables related to the environment, technology, and organisation (Chatterjee et al., 2021). It has been instrumental in predicting firms' decisions to adopt new technology based on internal and external factors (Sharma et al., 2022). It offers a suitable and logical framework for understanding the essential factors that companies must consider when introducing and adopting technology (Iranmanesh et al., 2023). The TOE framework has been extensively used in innovations, which include the internet of things (Hsu & Yeh, 2017), cloud computing (CC) (Gangwar et al., 2015), Industry 4.0 (Zhong & Moon, 2023), AI-based technologies (Horani et al., 2023), green innovation (Yin, 2023), and green transformation (Miao & Zhao, 2023).

Given this background, this study adopts the TOE framework to explore the barriers to the non-adoption of the metaverse by Chinese retail enterprises, namely technological barriers (i.e., perceived complexity, perceived risk), organisational barrier (i.e., lack of top management support), and environmental barriers (i.e., lack of governance and standardisation). We strive to comprehend the elements that shape the decision-making processes of Chinese retail companies in this swiftly changing metaverse environment. The specific impact of these three aspects will be described in the following sections.

2.3 Barriers that Cause Enterprises to Show Resistance Towards Metaverse

2.3.1 Technical Barriers: Perceived Complexity (PC) and Perceived Risks (PR)

Technological factors within the TOE framework encompass various aspects associated with the technology to be implemented by the company (Sharma et al., 2022), such as its complexity, infrastructure, compatibility, privacy, security, and cost (Wael AL-khatib, 2023). The potential risks linked to technology usage were also examined (Stjepić et al., 2021). The adoption of innovation and new technology heavily relies on technological factors since they determine the characteristics of the technology itself and its accompanying infrastructure, influencing firms' inclination towards its utilisation (Iranmanesh et al., 2023). Additionally, the existence of intricacy in technological systems may result in an adverse effect on the adoption of technology (Loh et al., 2023; Rjab et al., 2023). Metaverse, as a hyper-connected digital universe, its adoption or not is inseparable from technical factors. As for the present study both PC and PR have been identified as the core elements that drive the resistance of the technological innovation adoption.

According to Vishwakarma et al. (2020), PC refers to the extent to which the innovation is perceived as challenging in terms of comprehension and adoption. Previous research has suggested that the level of complexity perceived by users plays a crucial role in their acceptance and adoption of an innovation (Cham et al., 2022a, 2023; Heidenreich & Handrich, 2015). For instance, companies often hesitate to adopt a technology if its complexity leads to user confusion (Gangwar et al., 2015). Different research indicates that users are more likely to suspect or resist new services/products due to their perception of the complexity associated with using technological innovations (Cham et al., 2023; Chouk & Mani, 2019; Hajiheydari et al., 2021; Kuisma et al., 2007; Mani & Chouk, 2018). For instance, according to Cham et al. (2023), the PC was found to directly influence resistance to using VR in the tourism industry. Similarly, Cham et al. (2022a) also argued that PC was found to have a positive impact on the elderly's resistance to adopting mobile payment services. This correlation between the complexity of a product and users' resistance to technological advancements is similarly observed in the research conducted by Mani and Chouk (2018).

The complexity of technological innovation in the service sector is perceived as a usage barrier that has a negative influence on adoption (Cham et al., 2022a). For instance, Abumalloh et al. (2023) found that the PC has a detrimental impact on enterprises' attitudes toward the metaverse. Retail firms' adoption and use of the metaverse might be influenced by the PC of technology. If a system or technology is deemed overly intricate or challenging to operate, retail companies may exhibit reluctance toward its implementation and usage. Conversely, if the metaverse is perceived as user-friendly and comprehensible, retail companies are more likely to embrace and use it. According to Hajiheydari et al. (2021), resistance to IoMT can be influenced by perceived complexity. The proposition in the present study is grounded based on the vast literature showing the effect of complexities on consumers' views and intentions in several settings like mobile payment technology (Cham et al., 2022a) and virtual reality in tourism (Vishwakarma et al., 2020).

In addition to the above, it was reported that every innovation would inherently encompass unforeseeable side effects and uncertainties for users (Ram & Sheth, 1989). The PR in this research pertains to the possible negative outcomes and uncertainty linked to the application of the Metaverse. The existing body of literature consistently highlights the importance of the inverse

correlation between perceived risk-induced uncertainty and the acceptance of innovation (Cham et al., 2022a, 2023). For instance, Coldham and Cook (2017) discovered that PR associated with VR engender reservations and disassociation toward its adoption. Cham et al. (2023) investigated the PR linked to older tourists' resistance regarding the adoption of VR in the tourism industry. Users are more inclined to resist utilising a system or technology if they perceive it as insecure or posing potential risks to their privacy and security. Alternatively, they may opt for alternatives that they deem to be safer and more capable of preserving their privacy (Abumalloh et al., 2023). For instance, Kumar et al. (2023) investigated that the non-adoption intention towards the enterprise metaverse is strongly linked to the security risk.

While the metaverse has the potential to facilitate social interaction, entertainment, and commerce, it still poses potential challenges in terms of security and privacy. In the early days of internet retailing, security and privacy concerns were major obstacles to its adoption. Koohang and colleagues' study emphasises that metaverse retailing will face similar challenges, resulting in slow uptake of the innovation adoption (Koohang et al., 2023). Based on a survey conducted by Clement (2022), risks related to the metaverse have been raised by its users in the United States. These concerns include the potential risks of identity theft, unauthorised access to personal data, and hacking devices and networks, as well as the misuse of traditional or cryptocurrency payment methods. The report highlights that 71% of respondents expressed worries about maintaining data privacy and security. The issue of privacy is of utmost importance (Abumalloh et al., 2023; Wang & Zhao, 2022). The metaverse might gather a wide range of individual data, including biographical details, location data, and online behavioural information. This information could potentially be exploited for additional harmful uses, identity theft, or focused advertising. Building on this discussion, the current study is set to examine the association between risks and enterprises' resistance to adopting the metaverse. Based on the above evidence, the following hypotheses were postulated:

H1: The perceived complexity positively influences the enterprises' resistance to use metaverse.
H2: The perceived risks positively influence the enterprises' resistance to use metaverse.

2.3.2 Organisational Barrier: Lack of Top Management Support (LTMS)

Within the TOE framework, organisational factors encompass a range of variables associated with management and the preparedness of firms to embrace and use technology (Iranmanesh et al., 2023). These factors are internal elements that influence how compatible an organisation's structure is with technology adoption and usage (Sharma et al., 2022). They serve as enablers and catalysts for embracing new technology (Tornatzky & Fleischer, 1990), which is vital for successful technology adoption. Moreover, organisational support includes both tangible and intangible support (Iqbal et al., 2023); mobilising necessary resources (Sharma et al., 2022); and implementing required changes to the organisational structure as well as culture in pursuit of organisational success (Rjab et al., 2023). These enablers will help firms to swiftly adapt to an environment that is filled with advance technologies. This agility enhances their ability to adopt new technology while determining their readiness level in accepting and integrating it. However, these factors can sometimes have a detrimental impact when there is insufficient management support, training, or organisational structure (Rjab et al., 2023), which leads to negative consequences for technology adoption. The present study emphasises the importance of top management support as a key enabler of technology adoption. Senior management usually has an

essential role in allocating resources and offering the necessary assistance to make successful implementation happen.

In addition, top management support refers to the extent to which senior management of a company provides backing for the adoption of a technological innovation, such as the Metaverse in this case. Chatterjee et al. (2020) proposed that top management plays a crucial role as potential decision-makers within an organisation. Top management possesses the ability to foster the adoption of new technologies by crafting a compelling vision of how such adoption can benefit the firm, securing adequate resources, and effectively addressing any resistance from members (Iqbal et al., 2023; Lacap et al., 2021; Tan et al., 2019). The support of top management indicates their willingness to allocate resources and encourage the adoption of change. The literature indicates that top management support plays a vital role in adopting different technologies and systems in organisations, including BDA (Maroufkhani et al., 2020), B2B mobile apps (Swani, 2021), AI-integrated CRM systems (Chatterjee et al., 2020), green manufacturing (Singh et al., 2020), and energy-efficient supply chains (Iqbal et al., 2023).

Based on the TOE framework, top management plays a crucial role in determining outcomes (Wael AL-khatib, 2023). The adoption of new technology in firms is contingent upon the involvement of top management, as they hold decision-making power. It is upper management that effectively utilises resources and offers financial and organisational backing (Rjab et al., 2023). Furthermore, it is the duty of top management to promote the adoption of technology by consistently providing training opportunities for staff members and offering assistance for research and development endeavours (Iranmanesh et al., 2023). The importance and necessity of management support, as well as its crucial role in facilitating the adoption of new technology, have been confirmed by numerous studies (Iranmanesh et al., 2023). This highlights the pivotal role of leadership in driving organisational change and technological integration. The absence of top management support may result in unsuccessful endeavours to adopt technology (Rjab et al., 2023), amplifying the adverse consequences of competitive and technological pressures (Iranmanesh et al., 2023). Thus, the following hypothesis was proposed:

H3: The lack of top management support positively influences the enterprises' resistance to use metaverse.

2.3.3 Environmental Barrier: Lack of Governance and Standardisation (LGS)

While the TOE framework considers environmental factors as the last aspect, it encompasses all industry-related pressures and changes that firms encounter (Bag et al., 2023a). These include stakeholder expectations, legislation, laws, competition, and customer demands that influence a firm's strategic approach to adopting new technology (Merhi & Harfouche, 2023). Prior to technology adoption, understanding these environmental factors is crucial as they can either create new opportunities or present challenges for decision-makers in the adoption process (Rjab et al., 2023). At an industry level, environmental factors have a significant impact on firms by shaping the business landscape through the emergence of fresh opportunities or unprecedented challenges (Merhi & Harfouche, 2023). In terms of technological innovation adoption, a preliminary examination with industry players by the researchers found that a lack of standardisation across technologies is a key factor slowing down adoption due to the uncertainties associated with them.

Standardisation pertains to the presence and extent of uniformity in technology standards implemented within various industries, both individually and collectively (Dehghani et al., 2022). The metaverse refers to a digital realm where people can engage in communication using various digital tools and necessitates a significant level of standardisation to ensure smooth connection as well as compatibility among virtual platforms and applications (Dwivedi et al., 2022). Without the presence of these systems, it would be challenging for users to seamlessly exchange information across various metaverse platforms. The absence of standardisation further complicates the development and implementation of metaverse technologies (Dwivedi et al., 2022). In this study, standardisation involves creating protocols, interfaces, and formats that are similar to facilitate easy connectivity and communication among various virtual systems (Bag et al., 2023b).

Without established standards, various commercial enterprises may create proprietary solutions that lack compatibility (Bhattacharya & Chatterjee, 2022). This lack of standardisation restricts the potential advantages of metaverse technology. Efficient governance can help foster standardised practices by addressing issues related to ownership, distribution, and the use of digital devices and intellectual property. Without clear governance, businesses often face uncertainty, which discourages substantial investment, particularly when the control and ownership of virtual platforms are ambiguous. Such ambiguity can act as a barrier to adopting metaverse technology (Bhattacharya & Chatterjee, 2022). As highlighted by Bag et al. (2023b), a lack of well-defined governance structures and standardised frameworks presents challenges for implementing metaverse technology across industries. Governance and standardisation play a critical role in ensuring the effective adoption of this technology by addressing concerns like security, interoperability, and legal compliance for organisations (Bag et al., 2023b). Therefore, the following hypothesis is proposed:

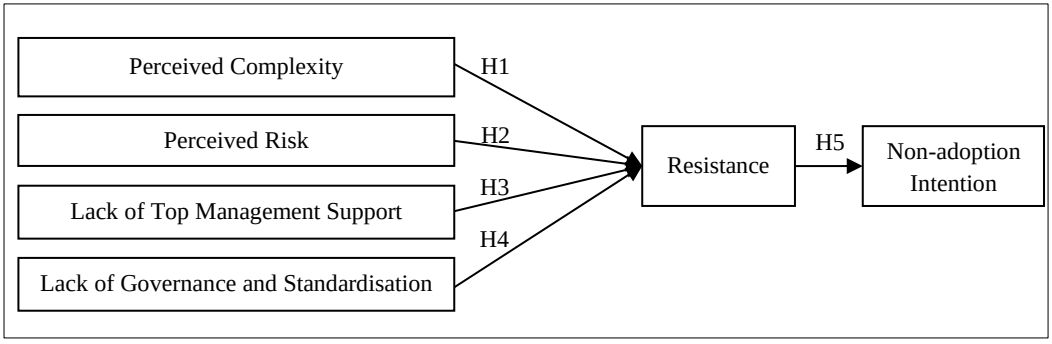
H4: The lack of governance and standardisation positively influences the enterprises' resistance to use metaverse.

2.4 The Interrelationship Between Resistance and Non-Adoption Intention

Resistance has been widely acknowledged as a crucial factor in the existing body of literature on technology adoption. For instance, according to a study conducted by Cham and colleagues in 2022, the resistance affects their attitude and intention not to adopt mobile payment. In addition, a study conducted by Cham et al. (2023) revealed that senior visitors' resistance significantly hinders their adoption of VR for tourism purposes. According to a study conducted by Kwon and Ahn (2021), expressing resistance to CSR has a negative impact on behavioural intentions. Previous research has consistently shown that scepticism has a positive effect on resistance in the context of innovative technology adoption and that scepticism and resistance have a direct effect on non-adoption (Cham et al., 2022). The adoption of the Metaverse, as a disruptive technology, is marked by complexity (Al-Sharafi et al., 2023). Given the aforementioned considerations, it is likely that individuals and organisations may express scepticism or concern about the metaverse's implications due to its sophisticated nature and its relatively recent inception (Lee & Chaney, 2023). This study posits that organisations may become resistant to the metaverse due to scepticism about its uncertainties. and resistance will further influence organisations not to adopt the metaverse.

H5: Resistance positively influences the enterprises' non-adoption Intention of metaverse.
Based on the literature review, Figure 1 depicts the research model proposed in this study.

Figure 1: Research Model



3. RESEARCH METHODOLOGY

3.1 Measurement Items

The measurement items for the constructs in this study were adapted from the existing literature to fit the study's context. The constructs' measurement items were derived from the existing literature, through minor adjustments made to ensure a more accurate reflection of the study's specific context. As shown in the Appendix 1, measurement of variables was conducted using previously validated scales: perceived complexity (Cham et al., 2022a), perceived risks (Phonthanukitithaworn et al., 2016), lack of top management support (Maduku et al., 2016), lack of governance and standardisation (Bag et al., 2023b), resistance (Cham et al., 2023), and non-adoption intention (Jalo & Pirkkalainen, 2024). The responses were collected using a 7-point Likert scale, with 1 indicating "strongly disagree" and 7 representing "strongly agree".

Two academics and practitioners of operations management participated in a pre-test before the pilot and full-scale testing, assessing the content's validity and suggesting changes to better suit the needs of Chinese businesses. Based on their feedback, the inconsistencies were resolved, and specific terminology was revised to enhance clarity. This input was instrumental in mitigating potential biases within the questionnaire. Subsequently, a pilot test involving 30 respondents was conducted to refine the scale items as well as optimise the survey design. Furthermore, given that the study was conducted in China, the research adhered to the forward- and backward-translation procedures suggested by Koller et al. (2012) to ensure linguistic and conceptual equivalence between the English and Chinese versions.

3.2 Sampling and Data Collection

Large and medium-sized retail enterprises in China were chosen as the study's sample since they play an extremely vital role in the economic landscape. This study targets managers in large and medium-sized retail enterprises in China, as they can offer valuable insights into the non-adoption

of the metaverse. Due to the impracticality of reaching all managers, non-probability sampling was employed, with purposive sampling used to ensure respondent suitability.

To obtain justifiable responses, four screening questions were included to ensure that the respondents were suitable and qualified for the purpose of this study. The filtering questions are: (1) Has your organisation adopted the metaverse? (2) Does your organisation belong to the retail industry? (3) Are you a mid-level or senior manager in your organisation? (4) Are you familiar with the metaverse? Moreover, the purpose of the survey will be explained to the respondents through the cover page. Prior to responding, they will be given an overview of the terms and instructions. As part of ethical observation, respondents participated voluntarily for the survey, and "informed consent" was obtained.

Data were gathered by a self-administered questionnaire, resulting in the collection of 400 valid replies as outlined in Tables 1 and 2. This surpasses the minimum criterion of 98 valid data sets established by the G Power initiative. Additionally, this sample size conforms to the established "10 times rule," hence enhancing the PLS-SEM analysis and essential condition analysis (Hair et al., 2019).

Table 1: Demographic Profile

Variables	Descriptions	Frequency	Percentage
Gender	Female	113	28.2
	Male	287	71.8
Age (years)	Equal or under 30	3	0.8
	31-35	16	4.0
	36-40	106	26.5
	41-45	172	43.0
	46-50	86	21.5
	Above 50	17	4.3
Education Level	High school or below	6	1.5
	College degree	69	17.3
	Bachelor Degree	227	56.8
	Master degree	87	21.8
	Doctoral Degree	11	2.8
Experience (years)	Equal or less than 5	2	0.5
	6-10	39	9.8
	10-15	155	38.8
	16-20	150	37.5
	More than 20	54	13.5

Sources: Authors' own work

Table 2: Organisational Profile

Variables	Descriptions	Frequency	Percentage
Age of the Organisation (Years)	Less than 5	0	0
	6-10	101	25.3
	More than 10	299	74.8
Number of Employees	Equal or more than 50- Less than 300	207	51.7
	Equal or more than 300	193	48.3
Operation Revenue (millions CNY)	Equal or more than 5- Less than 200	207	51.7
	Equal or more than 200	193	48.3

Sources: Authors' own work

3.3. Analysis Methods

This research employed multivariate methodologies to examine the data. Specifically, SPSS was utilised for assessing data quality and conducting descriptive statistics. The model fit was assessed through confirmatory factor analysis (CFA), and the hypotheses were tested using partial least squares structural equation modelling (PLS-SEM). PLS-SEM was employed for three main reasons. Firstly, PLS-SEM demonstrates superior statistical power compared to other analysis methods, suggesting its ability to effectively capture all significant correlations present in the data (Hair et al., 2019). Secondly, Hair et al. (2022) emphasised that a small sample size is sufficient for precise parameter estimation when employing PLS-SEM, rendering a large sample size unnecessary. Thirdly, PLS-SEM demonstrates its superiority in conducting exploratory research that expands upon existing theories (Hair et al., 2022), similar to the approach adopted in this study.

To mitigate concerns related to common method bias, both procedural and statistical remedies were employed. Procedurally, the clarity of survey items was enhanced through a pre-test conducted with leading scholars in the discipline (Cham et al., 2022b; Memon et al., 2023). Additionally, assurances of anonymity and confidentiality were provided to respondents. The statistical method first adheres to Harman's one-factor test (Podsakoff et al., 2003), revealing no predominant factor over 50% variance. Furthermore, the correlation matrix procedure was applied, showing a highest inter-construct correlation of 0.60, well under the threshold of 0.90. Collectively, these results indicate that common method bias is unlikely to pose a significant issue in this study.

4. DATA ANALYSIS

4.1 Measurement Model Assessment

The assessment of the measurement model involved evaluating the whole constructs' reliability and validity. Primarily, as shown in Table 3, all measurement items achieved Cronbach's alpha values above 0.7, indicating acceptable internal consistency. The standardised factor loadings and composite reliability values—both exceeding 0.7—align with the thresholds proposed by Hair et al. (2014). Additionally, the average variance extracted (AVE) values surpass the 0.5 benchmark, confirming the convergent validity of all constructs.

In addition, the heterotrait-monotrait ratio (HTMT), as presented in Table 4, was used to evaluate discriminant validity. HTMT reflects the mean correlation among items that belong to the same construct. HTMT values obtained in our study indicate favourable discriminant validity. All

HTMT values fall below the 0.85 threshold suggested by Hair et al. (2019), confirming the establishment of discriminant validity for all variables in our study.

Table 3: Result of Validity and Reliability Test

Constructs/Items	Loadings	Cronbach's α	Rho_A	CR	AVE
Perceived complexity		0.757	0.760	0.860	0.673
PC1	0.796				
PC2	0.837				
PC3	0.826				
Perceived risk		0.781	0.783	0.858	0.602
PR1	0.774				
PR2	0.784				
PR3	0.775				
PR4	0.771				
Lack of top management support		0.714	0.715	0.840	0.636
LTMS1	0.772				
LTMS2	0.815				
LTMS3	0.805				
Lack of governance and standardisation		0.757	0.763	0.846	0.579
LGS1	0.790				
LGS2	0.728				
LGS3	0.739				
LGS4	0.784				
Resistance		0.782	0.782	0.851	0.534
RE1	0.740				
RE2	0.706				
RE3	0.744				
RE4	0.736				
RE5	0.726				
Non-adoption intention		0.740	0.744	0.852	0.657
NAI1	0.782				
NAI2	0.813				
NAI3	0.837				

Table 4: Heterotrait-Monotrait Ratio (HTMT)

	PC	PR	LTMS	LGS	RE	NAI
PC						
PR	0.702					
LTMS	0.612	0.698				
LGS	0.727	0.751	0.656			
RE	0.677	0.741	0.673	0.741		
NAI	0.739	0.722	0.684	0.804	0.723	

Notes: Perceived complexity (PC), Perceived risk (PR), Lack of top management support (LTMS), Lack of governance and standardisation (LGS), Resistance (RE), Non-Adoption Intention (NAI)

4.2 Structural Model-Hypothesis Testing

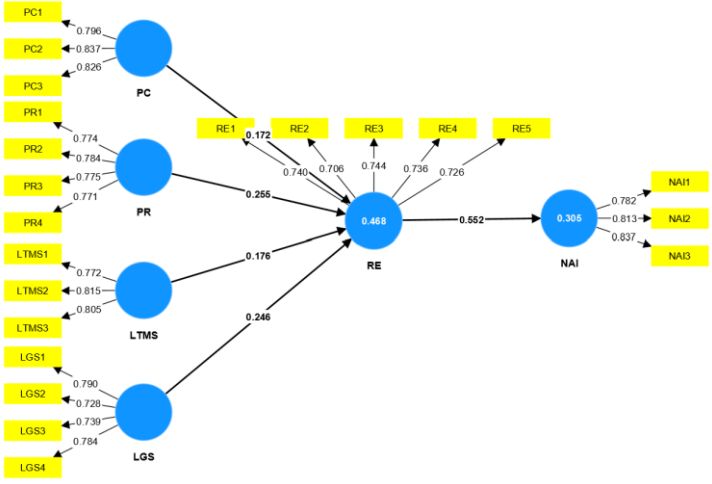
Prior to evaluating the path coefficients for all the hypotheses, we followed the recommendation by Hair et al. (2019) by assessing the multicollinearity of the data. All constructs had variance inflation factor (VIF) values below the essential threshold of 3.3, according to the results (Hair et al., 2017). We next used the bootstrapping approach with 5,000 subsamples to evaluate the path coefficients' significance. The findings are presented in Table 5 and Fig. 2. PC, PR, LTMS, and LGS show significant positive relationships with RE, which in turn has a substantial positive effect on NAI. As a result, all hypotheses (H1, H2, H3, H4, and H5) are supported. To evaluate the predictive relevance of the research hypotheses, effect sizes (f^2) were utilised. The f^2 values, as shown in Table 5, varied from 0.034 to 0.438. These results suggest that the hypotheses of the research model H1, H2, H3, and H4 have small effect sizes, while H5 has a large effect size.

Table 5: Assessment of the Structural Model

Hypothesis	Path	β	SE	p-values	Effect size (f^2)	Supported
H1	PC -> RE	0.172	0.046	0.000	0.034	YES
H2	PR -> RE	0.255	0.049	0.000	0.067	YES
H3	LTMS -> RE	0.176	0.041	0.000	0.038	YES
H4	LGS -> RE	0.246	0.049	0.000	0.064	YES
H5	RE -> NAI	0.552	0.045	0.000	0.438	YES

Notes: Perceived complexity (PC), Perceived risk (PR), Lack of top management support (LTMS), Lack of governance and standardisation (LGS), Resistance (RE), Non-Adoption Intention (NAI)

Figure 2: Structural Model Test Results



4.3 Predictive Relevance and PLS Predict.

As shown in Table 6, the R^2 values indicate that, on average, 46.8% of the variance in NAI and 30.5% of the variance in RE are accounted for by the independent variables included in the model. Regarding Q^2, the values for RE and NAI are clearly above zero, confirming the model's predictive relevance (Hair et al., 2017). Following the guidelines of Hair et al. (2019), the PLS Predict procedure with 10-fold cross-validation was performed. The Q^2 prediction values for NAI and RE exceed zero, confirming the model's robust predictive capability.

Table 6: Results of R^2 and Q^2

Endogenous construct	R^2	Q^2
RE	0.303	0.241
NAI	0.463	0.192

Notes: Resistance (RE), Non-Adoption Intention (NAI)

5. DISCUSSION AND IMPLICATIONS OF THE FINDINGS

5.1 Discussion and Implications

Despite extensive research on adoption intentions regarding the metaverse, only a limited number of studies have specifically examined the intention of large and medium-sized enterprises in China's retail sector to refrain from adopting the metaverse. Based on the aforementioned circumstances, this study utilises the TOE framework, which integrates PC, PR, LTMS, and LGS, to forecast retail enterprises' non-adoption intentions toward the metaverse. The study uses the PLS-SEM method to analyse the collected data. The results of the analysis reveal several significant insights. It was revealed that both technological barriers (i.e., PC and PR), organisational barriers (i.e., LTMS), and environmental barriers (i.e., LGS) significantly influence resistance to adopting the metaverse in retailing, which in turn significantly influences non-adoption intentions.

Primarily, technological barriers like perceived complexity and perceived risk positively influence the resistance of large and medium-sized enterprises towards adopting the metaverse in retail. Our findings offer strong evidence in support of H1, showing that PC significantly impacts retail enterprises' RE toward the metaverse. This finding aligns with the conclusions of Cham et al. (2022a, 2023), Choi et al. (2020), and Hajiheydari et al. (2021), who found that the resistance can be influenced by the perceived complexity. According to Abumalloh et al. (2023), the perception of complexity has a detrimental impact on enterprises' attitudes toward the metaverse. In addition, resistance is influenced by perceived risk; users are more likely to avoid a system or technology if they perceive it as insecure or risky to their privacy and security (Abumalloh et al., 2023). This elucidates the significant impact of PR on RE, thereby validating H2. Our findings are in accord with recent studies indicating that the intention to not adopt the enterprise metaverse is closely tied to perceived risks (Kumar et al., 2023).

Secondly, this research revealed the significant impact of organisational barriers on the resistance of large and medium-sized enterprises towards adopting the metaverse in retail. Specifically, the

findings revealed the significant impact of the lack of top management support on enterprises' resistance to adopting the metaverse in retail, thereby confirming H3. This result is consistent with the prior studies conducted by Rjab et al. (2023) and Iranmanesh et al. (2023). Thirdly, it was discovered that environmental barriers, including lack of governance and standardisation, significantly affect the resistance of large and medium-sized enterprises to adopt the metaverse in the retail sector, thereby supporting H4. There are similarities between the current study and previous studies. The absence of clear governance and standardised frameworks in the metaverse creates uncertainty about ownership, control, and utilisation, preventing commercial organisations from adopting or investing in the technology (Bhattacharya & Chatterjee, 2022). Furthermore, as noted by Bag et al. (2023b), the absence of governance, as well as standardisation, is among the significant barriers to implementing the metaverse. This research additionally revealed that RE significantly influences enterprises' non-adoption intentions toward the metaverse, thus confirming H5. This finding aligns with the conclusions drawn by Cham et al. (2022a, 2023), who reported that non-adoption intention is affected by resistance.

5.2 Theoretical Implications

This study makes multiple contributions to the theory and literature on the metaverse and retailing. Firstly, it is one of the few studies focusing on the factors influencing retail enterprises' resistance to adopting the metaverse, particularly by examining technological, organisational, and environmental barriers. Beyond the TOE framework, this study enhances its theoretical realm by highlighting the role of resistance to adoption as a mediator, thus providing deeper insights into the barriers influencing non-adoption intentions. Secondly, this study validates the critical role of technological (e.g., perceived complexity and perceived risk), organisational (e.g., lack of top management support), and environmental (e.g., lack of governance and standardisation) barriers in shaping resistance, which, in turn, impacts non-adoption intentions. As of now, research has been scarce in the retail sector to explore how resistance influences non-adoption decisions. The study establishes foundational insights into the interplay between resistance and non-adoption within the metaverse context in retailing. Thirdly, the study approaches metaverse non-adoption from the perspective of retail enterprises, particularly focusing on large and medium-sized companies in China. The study contributes to understanding non-adoption from the perspective of large and medium-sized retail enterprises, providing a unique lens through which the adoption of emerging technologies is viewed.

5.3 Managerial Implications

From a practical perspective, the findings of this study reveal how technological barriers (e.g., perceived complexity and perceived risk), organisational barriers (e.g., lack of top management support), and environmental barriers (e.g., lack of governance and standardisation) influence retail enterprises' non-adoption intentions toward the metaverse. The findings emphasise the need for actionable strategies from technology developers, policymakers, and retail managers to address these barriers and foster the adoption of metaverse technologies in retail settings. Firstly, regarding technological barriers, metaverse solution providers should prioritise user-friendly system designs to reduce perceived complexity and enhance usability. For example, adopting intuitive interfaces, offering clear guidance for implementation, and ensuring compatibility with existing retail infrastructure can significantly lower technological barriers. To address perceived risks,

technology providers should emphasise robust security measures and data privacy protocols while transparently communicating these features to retail enterprises.

Secondly, organisational resistance, such as a lack of top management support, underscores the need for targeted initiatives to educate and engage leadership teams in retail enterprises. This can be achieved through workshops, industry-specific demonstrations, and pilot programs that showcase the tangible business value of metaverse adoption, such as enhancing customer experience, streamlining operations, and driving revenue growth. Thirdly, the lack of governance and standardisation highlights the critical role of policymakers and industry associations in establishing regulatory frameworks for the metaverse. Clear governance structures, standardised protocols, and guidelines are essential to reducing uncertainty and building confidence among retail enterprises. Collaborative efforts between government agencies and metaverse developers can also include subsidies, grants, or tax incentives to encourage early adoption. By addressing these barriers and capitalising on the potential of the metaverse, retail enterprises, technology developers, and policymakers can collectively foster an ecosystem conducive to innovation in the retail sector.

6. CONCLUSION, LIMITATIONS AND FUTURE STUDY

To conclude, this study introduces a research framework for PC, PR, LTMS, LGS, RE, and NAI in Chinese large and medium-sized enterprises. The results showed that resistance towards adopting the metaverse in retailing is significantly influenced by technological barriers such as PC and PR, organisational barriers like LMS, and environmental barriers like LGS, all of which significantly impact non-adoption intentions. As like any research endeavour, this study has several limitations that warrant attention in future studies. First, the findings are based on data from large and medium-sized retail enterprises in China; the results may vary in other organisational or geographical contexts. Expanding the scope to global regions and diverse enterprise categories and sizes would enhance generalisability. Second, the study's cross-sectional design captures variable relationships at a single time point, limiting insights into temporal dynamics. Longitudinal research is recommended to explore the evolving nature of non-adoption intentions and related barriers. Third, this study employed a quantitative approach using self-administered surveys and PLS-SEM analysis. Future research should consider mixed methods or qualitative approaches, such as interviews or case studies, to gain deeper insights into the complexities of non-adoption intentions.

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Appendix 1

Constructs	Items	Source
Perceived Complexity (PC)	1. I think learning to use metaverse will be difficult for our employees. 2. I think metaverse will be difficult to use for organisation's operation. 3. I think it is not easy to get results that our organisation desire from metaverse.	Cham et al. (2022)
Perceived Risks (PR)	1. In general, I think using metaverse in our organisation's operation will be risky. 2. I think there will be potential for loss associated with using metaverse. 3. I think there will be too much uncertainty associated with using metaverse. 4. I think using metaverse will involve many unexpected problems.	Phonthanukitithawn et al. (2016)
Lack of Top Management Support (LTMS)	1. The top management of our organisation would not provide necessary support for the adoption of metaverse 2. The top management of our organisation would not support the use of metaverse 3. The top management of our organisation would not be enthusiastic about adopting metaverse	Maduku et al. (2016)
Lack of Governance and Standardization (LGS)	1. There is no agreed-upon standard for metaverse implementation 2. There is no agreed-upon standard for established rules for metaverse platform governance 3. Different metaverse platforms and systems (protocols, interfaces and data formats, making) challenging to share information between them 4. Different platforms create silos of information that can hinder collaboration and coordination across the whole	Bag et al. (2023)
Resistance (RE)	1. In sum, the use of metaverse in our organisation's operation would cause problems that we do not need 2. We are likely to make a mistake by using metaverse in our organisation's operation. 3. There are too many uncertainties associated with metaverse in our organisation's operation. 4. The use of metaverse is not suitable for our organisations. 5. Given the limitations of metaverse, we opposed the use of metaverse in our organisation's operation.	Cham et al. (2023)
Non-Adoption Intention (NAI)	1. Predict that our organisation will not use metaverse in the future. 2. Our organisation has no plan to use metaverse in the future. 3. Our organisation does not intend to use metaverse in the future.	Jalo and Pirkkalainen (2024)