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Stereotypical perceptions in metaverse retail: Exploring warmth, competence, and trust

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Abstract

The present study examines how users form trust in the metaverse-based digital retail platforms by applying the Stereotype Content Model (SCM). It uses the mixed-methodology approach with a qualitative-quantitative sequence. As a result of 11 qualitative interviews, the drivers of perceived competence and perceived warmth were found. Further, the survey data were collected from 317 IT professionals who had prior experience using such platforms. The study found that technical expertise, technical reliability, and service innovativeness significantly influence perceived competence, while service personalization forms perceived warmth. However, perceived security and empathy did not significantly influence competence and warmth, respectively. Furthermore, both competence and warmth positively affect trust. Also, gender moderates the relationship between perceived competence and trust relationship, with a stronger effect for males. Thus, this research contributes by extending the SCM framework in the context of the metaverse-based retail platforms and provides valuable practical implications for building users' trust in these platforms.

Keywords: Metaverse-Based Retail Platforms, Perceived Competence, Perceived Warmth, Stereotype Content Model, Trust

Introduction

The boundary between the physical and digital worlds is getting blurred due to the digital revolution. This change is being propelled by various novel technologies, including the metaverse. The word 'meta' implies transcendence, while 'verse' signifies the extensive digital universe, combining augmented, virtual, and physical realities (Park and Kim, 2022). The overall metaverse market, with more than 400 million monthly active users, was valued at \$61.8 billion in 2022. It is expected to increase to \$426.9 billion by 2027 (Statista, 2024) and \$900 billion by 2030 (Gleim et al., 2025). This development underlines the businesses' growing investment in this novel technology, where they use metaverse-based platforms to provide immersive and interactive service experiences. In the case of metaverse-based retail platforms, users experience a 3-dimensional environment where it is possible for them to interact with virtual stores, avatars, and other users in real time. This is in contrast to the traditional online retail platforms that offer a 2-dimensional interface with no such real-time interaction (Kim and Bae, 2024). Clothing brands such as Nike, Gucci, and Tommy Hilfiger are using metaverse-based retail platforms for enhancing users' brand engagement, where users can explore virtual stores, try on digital clothing, engage with brand events and games, and enjoy more customized experiences. Metaverse-based retail platforms are utilized by the brands

for marketing initiatives, such as establishing virtual fashion shows to engage tech-savvy users. The fantasies and emotional feelings pertaining to the immersive brand experience enhance the happiness of users on the metaverse-based platforms (Jiang et al., 2023). Hence, there is a growing interest among scholars in the metaverse-based platforms and their challenges.

Existing studies on metaverse-based retail platforms have explored various dimensions such as luxury brand attachment and social interactions (Kim and Bae, 2024). However, there is a lack of studies focusing on examining the factors outlining stereotypical judgments of the metaverse-based retail brands that can inculcate trust among users. Stereotypical judgments have a direct impact on human behaviour, and thus, they influence the users' perceptions. Prior research in the marketing domain have focused on stereotypes associated with brands (Aaker et al., 2010) and chatbots (Roy and Naidoo, 2021). However, there is a dearth of studies that have examined the metaverse-based retail platform through the lens of the Stereotype Content Model (SCM). Using SCM, the present study explores the variables that shape the stereotypical perceptions of retail brands using the metaverse. In other words, it examines how perceptions regarding competence and warmth are generated and what their impact is on trust in a metaverse-based retail platform.

Furthermore, existing literature demonstrates that males and females process trust-related cues differently in digital settings, with gender influencing how individuals interpret signals of warmth and competence (Hoffman, 1972; Marini, 2022). The nuanced role of gender as a moderator in trust formation in the metaverse-based retail platform has not received sufficient empirical attention. For instance, while studies have examined gender differences in responses to artificial intelligence-based chatbots, virtual assistants, and online service agents (Roy and Naidoo, 2021), these insights have not been extended to the more immersive, interactive, and socially rich environments offered by the metaverse. Similarly, prior research has shown that virtual influencers' perceived warmth and competence can shape trust and engagement (El Hedhli et al., 2023), yet the interplay between these perceptions and gender differences within a retail-specific metaverse context remains underexplored. Hence, in light of the above discussion, the present study aims to seek answers to the following research questions:

RQ1: Which factors shape the perceptions of competence and warmth in the metaverse-based retail environment?

RQ2: How do the perceptions of competence and warmth impact users' trust in the metaverse-based retail environment?

RQ3: How does gender moderate the effect of perceived competence and perceived warmth on trust in the metaverse-based retail environment?

The remainder of this paper is organized as follows. Section 2 provides the theoretical background of SCM. Section 3 outlines the research methodology, while Section 4 introduces the conceptual model and proposes a set of hypotheses based on the findings of the qualitative study. Section 5 describes the quantitative study and reports its findings. Section 6 offers a detailed discussion and highlights the study's implications. Section 7 concludes by discussing the study's limitations and suggesting directions for future research.

Theoretical Background: Stereotype Content Model (SCM)

Scholars have discussed the stereotypes in the social psychology domain as a substitute for social judgment (Cuddy et al., 2008). When people interact with a person for the very first time, they evaluate whether that person is supportive and has the capability of acting upon his or her intentions (El Hedhli et al., 2023). Supportive and cooperative nature translates into warmth, while the ability to act upon refers to competence. These cognitive schemas or preconceived notions are known as stereotypes, and they are used to judge a person or brand when there is a shortage of information about that person or brand (Jussim, 2012).

According to SCM, warmth and competence capture entirely how people judge any other person or brand. If a person has the ability to act upon intentions and carry out a particular role, he/she will be considered competent (Fiske, 2012). On the other hand, warmth reflects the emotional aspects of the person, including perceived sociability and friendliness (Kull et al., 2021). For example, if a service provider gives personalized service and empathizes with the issues, it will create the perception of warmth (Rahman et al., 2024). On the other hand, if a service provider is considered reliable and has expertise in his/her task, then the perception of competence is built (Li et al., 2024).

Existing research has discussed the concepts of competence and warmth to study chatbots (Roy and Naidoo, 2021) and human-robot interactions (Yoganathan et al., 2021). We have used these concepts in the context of the use of metaverse-based retail platforms. Existing research has reported that competence and warmth can be conveyed by the human avatar in the digital landscape (Li et al., 2023). Furthermore, psychologists assert that stereotypes affect behaviours and perceptions (El Hedhli et al., 2023). Hence, based on the above discussion, we can argue that the SCM may provide a comprehensive perspective on understanding consumers' responses to the use of metaverse-based retail platforms. It is worth noting that in this study, competence and warmth do not imply that the platform itself has the traits of a human being. Instead, these are the perceptions of users who assess the social and functional cues rooted in these platforms, e.g., virtual assistants, avatars, and personalized services. Hence, perceived competence and perceived warmth are users' perceptions regarding the platform rather than the inherent characteristics of the platform.

Research Methodology

A deeper analysis of a phenomenon can be achieved with the help of triangulation (Tashakkori and Teddlie, 2009). Therefore, we used the mixed-methodology approach with a qualitative and quantitative (QUAL/QUAN) sequence for this research. This approach is valuable for researchers because exploratory and confirmatory research questions can be handled with this approach. Also, it can help in compensating for the weakness of a single methodology. Due to the lack of research on the use of metaverse-based retail platforms, we started with an exploratory qualitative study. We decided to perform the in-depth semi-structured interviews with IT professionals who have experience with the metaverse-based retail platforms. We created an interview protocol on the basis of our research questions and literature review (see Appendix). It enabled us to probe deeper and facilitate the data collection in alignment with the objectives of this research.

We performed the semi-structured interviews with the millennials who are IT professionals. We conducted either face-to-face or telephonic interviews with eleven individuals for about 30 minutes. These interviewees had prior experience with using metaverse-based retail platforms. Thereafter, we conducted the thematic analysis on the transcripts of the interviews by following the steps suggested by Braun and Clarke (2006): a) familiarization with the data, b) generation of initial codes, c) identification of themes, d) review and refinement of themes, e) naming of themes, and f) preparation of the final thematic structure. Thereafter, we linked these themes with the extant literature to discover the antecedents of perceived competence and perceived warmth. Thematic analysis resulted in six themes, out of which four were the antecedents of perceived competence and two were the antecedents of perceived warmth. These themes were found as the facilitators of either perceived competence or perceived warmth among the tech-savvy millennials. Thereafter, we performed the confirmatory quantitative study as discussed in the fifth section of this paper.

Findings of the Qualitative Study and Hypotheses Development

Antecedents of Perceived Competence

Technical Expertise

Technical expertise refers to the specialized skills and knowledge that are used to execute tasks and solve problems (Barnes et al., 2016; Lee and Kim, 2024). In this study, technical expertise is the users' perception regarding the degree to which the metaverse-based retail platforms are professionally designed and technologically advanced. In this way, technical expertise is not an inherent attribute of the platform rather it indicates the effectiveness of the service experience gained by the users of the platform. It involves the capability of a brand to provide a seamless virtual shopping experience, resolve issues, and make use of metaverse capabilities in such a manner that it is perceived to be smart and cutting-edge. One interviewee said, "When I shop on a virtual store, I should find the technical features to be very easy to use. The store should be very well-designed so that I again come here to shop". Thus, strong technical expertise of a brand inculcates the perception among users about its competence. Hence, we hypothesise:

H1: Technical expertise positively impacts the perceived competence of the metaverse-based retail platform.

Technical Reliability

The dependable performance of a system, such that it delivers interruption-free services in an accurate and timely manner, is known as technical reliability (Ahn et al., 2024). In the present study, technical reliability characterizes the customers' perceptions regarding the degree to which the metaverse-based retail platform works without errors, crashes, and glitches, thus facilitating smooth and instantaneous navigation. For instance, one interviewee said that "the virtual platform should load very fast and should not crash. If it crashes, it will ruin my entire experience and will also look unprofessional". Hence, technical reliability is significantly important in inculcating a perception of competence. Hence, we hypothesise:

H2: Technical reliability positively impacts the perceived competence of the metaverse-based retail platform

Service Innovativeness

Introduction of novel services, ideas, or processes by making use of technologies refers to the service innovativeness (Wu et al., 2019). Thus, it denotes the usage of pioneering technologies such as artificial intelligence, gamification, immersive try-on, and personalized avatars. Service innovativeness thus indicates the platform's capability to stay ahead in the digital era by leading changes and doing experiments. It thus helps the brand to stay competitive. A metaverse-based retail platform has to continuously update its features and use state-of-the-art technology to provide an innovative service. An interviewee stated that if he can walk around the virtual store and interact with other avatars, it will make the brand look more creative. Thus, we propose:

H3: Service innovativeness positively impacts the perceived competence of the metaverse-based retail platform.

Perceived Security

Security ensures that the user feels safe and secure from unauthorized access and cyber threats (Kim and Han, 2020; Yan et al., 2024) while interacting with a metaverse-based retail platform. It is the extent to which users feel that their payment details and identity information are kept secure from fraud and malicious software. Such a perception enables them to believe in the competence of the platform and engage with it without any reluctance. Eight interviewees communicated that the platform should be secure, and their

personal and financial details should not be revealed. If users feel that their personal and financial data are safe, they will be more willing to engage with the brand as they will perceive it to be competent. Hence, we hypothesise:

H4: Perceived security positively impacts the perceived competence of the metaverse-based retail platform.

Antecedents of Perceived Warmth

Service Personalization

In this study, service personalization refers to the platform's ability to accommodate the user's preferences and needs (Rahman et al., 2024). The platform provides personalized offerings based on its understanding of the unique circumstances of a user (Ki et al., 2024). It is the degree to which the metaverse-based retail platform tailors its content and product suggestions on the basis of users' prior navigations. Such ability of the platform enables the users to believe that they have been valued by the brand. Lack of such personalization will make the platform impersonal and cold. Ten interviewees remembered that the platform shows the items that they visited during their last visit. Thus, they feel that the whole store is customised for them and the brand cares for them. Hence, we hypothesise:

H5: Service personalization positively impacts the perceived warmth of the metaverse-based retail platform.

Empathy

Empathy is the ability of the metaverse-based retail platform to understand and respond to the users' emotions and concerns in a supportive way (Mari et al., 2024). It includes the acknowledgement of users' frustrations and reassuring them when they are concerned. Such behavior is important to foster trust and emotional connection while interacting within the metaverse platform. Nine interviewees indicated that the virtual assistant asks follow-up questions and gives recommendations that make them feel that it really wants to help them and cares about them. When users perceive such warmth and customer orientation from a brand, they get more attached to it. Thus, we propose:

H6: Empathy positively impacts the perceived warmth of the metaverse-based retail platform.

Perceived Competence, Perceived Warmth, and Trust

Trust in technology is a precondition to its adoption. Trust exists when one party has confidence in the reliability and integrity of the other party (Morgan and Hunt, 1994). The trusting party believes that the trusted party will not take advantage of the situation (Teo et al. 2008). The metaverse consumers act as the trusting party, while metaverse-based retail platforms represent the trusted party. In the metaverse environment, there is a lack of physical settings, and hence, users have to rely on virtual elements such as avatars, virtual assistants, and various other digital touchpoints. Thus, trust becomes a critical component for users to engage with the metaverse environment (Jeong and Kim, 2023). It is dissimilar to the conventional online environment because the metaverse is a novel technology, and its way of interaction is unfamiliar to many users (Richter and Richter, 2023). Hence, trust can enhance the users' inclination towards the metaverse-based retail platform.

Users who perceive the metaverse-based retail environment to be competent in terms of its functionality, reliability, and service capabilities have a higher tendency to trust it (Christoforakos et al., 2021). In the context of this study, perceived competence indicates the overall assessment of the experience gained by the users while using the platform, rather than it being an inherent human-like attribute of the platform. A technologically efficient platform, which is responsive, provides instinctive navigation and precise information that enables users to be confident that the platform works well in a complex virtual environment. This is evident as an interviewee stated that the platform should not crash and should help in

case of any confusion. This will enable them to build trust in it. Hence, perceived competence enables users to believe that their interaction with the metaverse will be smooth, which is a precondition for trust. Based on the above discussion, we hypothesise:

H7: Perceived competence positively impacts the trust in the metaverse-based retail platform.

Likewise, when users perceive that the metaverse-based retail platform is warm in terms of its empathy-related cues, friendliness, and concerns about them, they have a higher likelihood of trusting it (Christoforakos et al., 2021). As a result, users are more likely to be emotionally connected with the retail platform and perceive it to be customer-oriented and trustworthy. In this study, perceived warmth is echoed through the personalization of services and supportive interactions rather than it being a human-like characteristic. One interviewee said that even in the digital environment, I should get support whenever I need it. Another interviewee communicated that the platform should not push me to buy something but rather suggest options that I can evaluate for purchase. These instances indicated that to build trust, perceived warmth is a prerequisite. Hence, we hypothesise:

H8: Perceived warmth positively impacts the trust in the metaverse-based retail platform.

Gender as a Moderator

Prior research indicates that gender affects how users form trust in a technologically mediated environment. Males and females vary in their evaluation and emotional responsiveness. Males are highly task-oriented and are interested in functional cues and achievement needs (Hoffman, 1972), which is related to perceived competence. On the other hand, females are often more emotionally attuned (Marini, 2022) and hence give more significance to the warmth-related cues. Thus, given that the use of the metaverse in retail provides technical as well as social features, males and females may assess them differently while deciding whether to trust the metaverse-based retail platform. Hence, we hypothesise:

H9a: Gender moderates the relationship between perceived competence and trust such that it is stronger for males than for females.

H9b: Gender moderates the relationship between perceived warmth and trust such that it is stronger for females than for males.

Based on the above hypotheses, Figure 1 presents the research model for the present study.

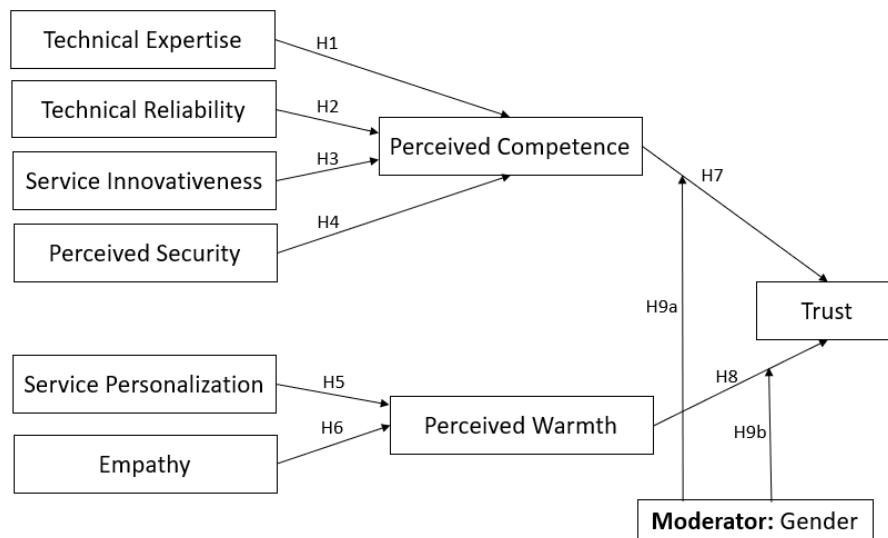


Figure 1: Proposed Research Model

Quantitative Study

Construct Measures and Data Collection

We adopted the questionnaire items from the prior literature for the constructs of the research model of this study (see Table 1). Further, they were tailored to align with the study's context. The content validity of these items was assessed based on the views of four academicians in a business school. These academicians were probed regarding their understanding of the survey questions and were asked to underline any lack of clarity in the questions. The questions were further structured based on their recommendations to make them clearer. We used a 5-point Likert scale (1: strongly disagree to 5: strongly agree) for all the questions. We started by performing a pilot study in which we collected data from 100 IT professionals. We conducted a reliability test and factor analysis on the pilot study data. None of the survey questions was removed because the loading of each question was found to be greater than 0.5 on its respective construct (Hair et al., 2010). Furthermore, the value of Cronbach's alpha was found to be greater than 0.7, which is acceptable (Nunnally, 1978).

For the main study, we distributed 1172 survey questionnaires to IT professionals globally. These IT professionals were asked to fill out the survey only if they had prior experience with the use of the metaverse-based retail platforms and were born between 1981 and 1996. IT professionals were chosen as the target population because of their higher familiarity with the evolving technologies, such as the metaverse. Hence, we considered them to be in a better position to assess the experiential characteristics of the metaverse-based platform. As IT professionals are technologically-oriented, they would be able to provide valuable insights regarding competence, warmth, and trust related to such platforms. Though the sample comprising IT professionals would limit the generalizability of the outcomes of this study for the overall population, the study would contribute to the extant literature by providing an initial understanding of trust formation among the tech-savvy users who may be the early adopters of the metaverse-based platform. These respondents were informed about the purpose of this research, and their responses were ensured to remain anonymous. At the end, we received 317 complete responses, out of which 171 and 146 responses were received from males and females, respectively. Thus, a response rate of 27% was achieved.

Data Analysis and Results

The research model consists of multiple constructs with complex relationships. Hence, we chose to apply the Structural Equation Modeling (SEM) to achieve the results. We made use of the SmartPLS 4 software to assess the measurement and path models.

Measurement Model

We tested the reliability, convergent validity, and discriminant validity to ensure the adequacy of the measurement model and robustness of the constructs. The reliability of all the constructs was confirmed through composite reliability and Cronbach's alpha values, which were greater than 0.7 (Fornell and Larcker, 1981). Additionally, convergent validity was ascertained as the average variance extracted (AVE) values were greater than 0.5 (see Table 1) (Hair et al., 2010). Discriminant validity was established as the square root of the AVE for each construct exceeded its correlations with all other constructs (Fornell and Larcker, 1981) (see Table 2).

Afterward, we examined the presence of multicollinearity issues through the Variance Inflation Factor (VIF) values. Every VIF value was found to be below the recommended threshold of 10. It indicated that multicollinearity is not a concern (O'Brien, 2007). Subsequently, we assessed the Common Method Bias (CMB) with the help of Harman's single-factor test (Podsakoff et al., 2003). The analysis revealed that a

single factor accounted for only 13.86% of the total variance, which is below the threshold of 50%. Thus, CMB is not a significant issue in this study.

Table 1: Measurement Items, Reliability, and Convergent Validity of Constructs

Construct (Source)	Measurement Items	Cronbach's α and AVE
Technical Expertise (Barnes et al., 2016)	I can rely on the metaverse-based retail service to accurately perform its functions.	$\alpha = 0.81$; AVE = 0.72
	The metaverse-based retail platform is capable of providing quick and relevant responses to my queries.	
	The metaverse-based retail platform demonstrates a strong understanding of my needs based on my interactions.	
Technical Reliability (Barua et al., 2018)	The metaverse-based retail platform delivers timely responses.	$\alpha = 0.86$; AVE = 0.70
	The metaverse-based retail platform provides accurate and reliable services as promised.	
	The metaverse-based retail platform consistently delivers the expected service whenever needed.	
	The metaverse-based retail platform maintains error-free interactions and transaction records.	
Service Innovativeness (Wu et al., 2019)	The metaverse-based retail platform offers highly innovative service solutions.	$\alpha = 0.86$; AVE = 0.64
	The metaverse-based retail platform is continuously updated with new service features.	
	The metaverse-based retail platform utilizes state-of-the-art technology to enhance the user experience.	
	The metaverse-based retail platform is regularly supplemented with advanced functionalities.	
	The metaverse-based retail platform undergoes continuous innovations to improve service efficiency.	
Perceived Security (Wei et al., 2024)	I am confident that the private information I provide while interacting with the metaverse-based retail platform will only be accessed by the retailer.	$\alpha = 0.95$; AVE = 0.57
	I believe that the information I share with the metaverse-based retail platform is protected from unauthorised access.	
	I trust that the information I provide while using the metaverse-based retail platform will not be manipulated by unauthorized entities.	
	I have confidence in the security of my transactions conducted through the metaverse-based retail platform.	
Service Personalization (Wang et al., 2017)	The metaverse-based retail platform provides shopping services that I frequently use.	$\alpha = 0.93$; AVE = 0.82
	The metaverse-based retail platform meets my specific shopping needs.	
	The metaverse-based retail platform offers personalized product recommendations.	
	The metaverse-based retail platform delivers customized assistance based on my shopping preferences.	

Construct (Source)	Measurement Items	Cronbach's α and AVE
	The metaverse-based retail platform provides individualized notifications about relevant products or offers.	
Empathy (Ahn et al., 2024)	I believe the metaverse-based retail platform recognizes and responds to my emotions in a supportive manner.	$\alpha = 0.94$; AVE = 0.81
	I feel that the metaverse-based retail platform prioritizes my interests and concerns by responding appropriately.	
	I believe the metaverse-based retail platform makes me feel understood and valued.	
	I think the metaverse-based retail platform provides a warm and supportive service experience.	
Perceived Competence (Fiske et al., 2002; Gao et al., 2024)	I think the metaverse-based retail platform is competent.	$\alpha = 0.79$; AVE = 0.55
	I think the metaverse-based retail platform is capable.	
	I think the metaverse-based retail platform is efficient.	
	I think the metaverse-based retail platform is intelligent.	
	I think the metaverse-based retail platform is adaptable.	
Perceived Warmth (Fiske et al., 2002; Gao et al., 2024)	I think the metaverse-based retail platform is friendly.	$\alpha = 0.85$; AVE = 0.62
	I think the metaverse-based retail platform is warm.	
	I think the metaverse-based retail platform is good-natured.	
	I think the metaverse-based retail platform is sincere.	
	I think the metaverse-based retail platform is helpful.	
Trust (Goyal et al., 2023)	The metaverse-based retail platform that I use is trustworthy.	$\alpha = 0.86$; AVE = 0.71
	I believe that the metaverse-based retail platform that I use is in my best interest.	
	The metaverse-based retail platform that I use is competent and effective in providing advice on services.	
	The metaverse-based retail platform that I use is truthful in its dealings with me.	

Table 2: Discriminant Validity of Constructs

	EMP	PC	PS	PW	SI	SP	TE	TR	TRel
EMP	0.90								
PC	0.07	0.74							
PS	-0.01	0.13	0.76						
PW	0.04	-0.06	0.04	0.79					
SI	0.00	0.38	0.01	0.14	0.80				
SP	0.02	-0.07	0.03	0.48	0.03	0.91			
TE	0.24	0.39	-0.20	-0.02	0.14	-0.01	0.85		
TR	0.05	0.47	0.06	0.33	0.31	0.16	0.18	0.84	
TRel	-0.07	0.24	0.11	-0.10	-0.10	0.03	-0.16	0.10	0.84

Notes- 1. Empathy (EMP); Perceived Competence (PC); Perceived Security (PS); Perceived Warmth (PW); Service Innovativeness (SI); Service Personalization (SP); Technical Expertise (TE); Technical Reliability (TRel); Trust (TR)
2. Square roots of the AVE are represented by values in diagonal positions. Inter-construct correlation values are present below the diagonal values.

Path Model

Model fit was assessed using the data collected for this study. The PLS path model fit is validated via the Standardized Root Mean Square Residual (SRMR) value, which should lie between 0 and 0.08 (Henseler et al., 2016). In this study, the SRMR value was found to be 0.065. Subsequently, we assessed the path model for testing the hypothesized relationships. The path model was evaluated using the coefficients of determination (R^2) and path coefficients (Chin and Newsted, 1999). The significant levels of the path coefficients governed whether the hypotheses were supported. Furthermore, the R^2 value reflected the explanatory power of the research model in accounting for the variance in the criterion variable. The outcomes of the path model evaluation are shown in Table 3 as well as Figure 2.

Table 3: Outcome of the Path Model Evaluation

Relationship (Hypothesis)	β	P value	Result
TE $\rightarrow$ PC (H1)	0.430*	0.000	Supported
TRel $\rightarrow$ PC (H2)	0.329*	0.000	Supported
SI $\rightarrow$ PC (H3)	0.356*	0.000	Supported
PS $\rightarrow$ PC (H4)	0.176 ^{ns}	0.189	Not Supported
SP $\rightarrow$ PW (H5)	0.478*	0.000	Supported
EMP $\rightarrow$ PW (H6)	0.028 ^{ns}	0.693	Not Supported
PC $\rightarrow$ TR (H7)	0.488*	0.000	Supported
PW $\rightarrow$ TR (H8)	0.363*	0.000	Supported

Note- ns: non-significant; *: $p < 0.05$.

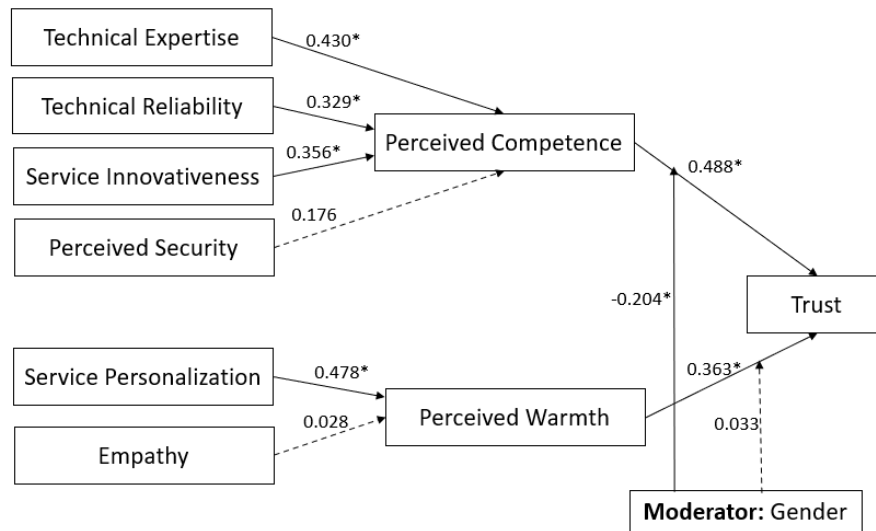


Figure 2: Results of Path Analysis and Multigroup Analysis

Note: Solid arrows indicate significant relationships ($p < 0.05$), while dashed arrows indicate non-significant relationships. The moderation paths indicate the subtraction of the path coefficient of male from the path coefficient of female (Female β – Male β) obtained through the multigroup analysis.

Technical expertise ($\beta = 0.430$, $p < 0.001$), technical reliability ($\beta = 0.329$, $p < 0.001$), and service innovation ($\beta = 0.356$, $p < 0.001$) were found to have a significant influence on perceived competence. However, perceived security ($\beta = 0.176$, $p = 0.189$) had an insignificant relationship with perceived competence. Service personalization ($\beta = 0.478$, $p < 0.001$) was found to have a significant influence on perceived warmth. However, empathy ($\beta = 0.028$, $p = 0.693$) had an insignificant relationship with perceived warmth.

Furthermore, perceived competence ($\beta = 0.488$, $p < 0.001$) and perceived warmth ($\beta = 0.363$, $p < 0.001$) had a significant impact on trust. Thus, hypotheses H1, H2, H3, H5, H7, and H8 were supported, while H4 and H6 were not. Moreover, the model explained 40%, 22.5%, and 34.4% variations in perceived competence, perceived warmth, and trust, respectively.

Multigroup Analysis based on Gender

To determine if gender moderates the trust relationships in the proposed research model, we performed multigroup analysis. The multigroup analysis results are provided in Table 4 as well as Figure 2. We found support for both the relationships for males and females. The relationship between perceived competence and trust was found to be stronger for males. However, we did not find any significant difference between males and females for the relationship between perceived warmth and trust. Thus, we found partial support for H9a, but no support was found for H9b.

Table 4: Multigroup analysis

Relationship (Hypothesis)	Females β	Males β	$\Delta\beta$
PC $\rightarrow$ TR (H9a)	0.376	0.58	-0.204*
PW $\rightarrow$ TR (H9b)	0.383	0.35	0.033 ^{ns}

Note- ns: non-significant; *: $p < 0.05$.

Discussion and Implications

This study provides useful insights regarding how users assess metaverse-based retail platforms in terms of their perceptions related to warmth, competence, and trust. The outcomes of the study signify that technical expertise, technical reliability, and service innovativeness significantly augment the perception regarding competence of the metaverse-based retail platform (H1, H2, and H3 supported). These results recommend that the users evaluate technical robustness and innovative capabilities as the crucial indicators for perceived competence of the metaverse-based retail platforms. Unexpectedly, we did not find the significant impact of perceived security on perceived competence (H4 not supported). This is in contrast with the prior literature that suggests that users expect the security to be an inherent feature of the platform equipped with novel technologies (Kim and Han, 2020; Yan et al., 2024) rather than a differentiating feature of the metaverse-based retail platform. In other words, people expect security to be a basic requirement by default and thus may not interpret it as an indicator of competence. Instead, competence is found to be derived from other factors which are more visible and experiential, i.e., technical expertise, technical reliability, and service innovativeness.

Furthermore, service personalization significantly influences the perceived warmth (H5 supported), while empathy does not influence it significantly (H6 not supported). This indicates that users value customized experiences in the digital environment. However, they do not expect emotional support from virtual platforms in the same manner that they expect from humans. It appears that warmth is derived from personalization of services that make the users feel valued and understood rather than from empathy-related cues. This result suggests that perceived warmth in metaverse-based retail platforms is mainly interpreted through service personalization, not through empathy. Moreover, we found that SCM holds relevance in the context of an immersive retail environment, as perceived competence as well as perceived warmth significantly enhance trust in a metaverse-based retail platform (H7 and H8 supported). It indicates that users trust those metaverse-based retail platforms that are not only capable in terms of expertise, reliability, and innovativeness, but also warm in terms of providing services in a friendly and human-centric manner. Thus, such platforms should balance performance-based excellence along with emotional tone.

Lastly, gender partially moderates the trust relationships in the model. Trust among males is more influenced by the perceived competence of the platform than that of their female counterparts (H9a supported). This finding is in alignment with the prior research that suggests that males give priority to the performance-related traits (Hoffman, 1972). On the other hand, though prior research suggests that females are more emotionally attuned (Marini, 2022), gender does not moderate the relationship between perceived warmth and trust (H9b not supported). That means perceived warmth is interpreted similarly by both genders in a metaverse-based retail environment.

Theoretical Implications

The present study provides the following theoretical implications. First, it extends the applicability of SCM in the context of the metaverse-based retail environment. It further empirically validates how perceived competence and perceived warmth impact trust in this environment. This study not only validates SCM in the context of metaverse, but it also identifies the antecedents of stereotypical perceptions. The study found that technical expertise, technical reliability, and service innovativeness are the major antecedents of perceived competence. On the other hand, service personalization drives perceived warmth. Furthermore, the non-significant relationships of perceived security and empathy indicate that users interpret competence and warmth differently in metaverse retail environments than in other retail environments. Thus, this study provides insights into how functional and social cues build trust in the metaverse-based retail platforms. Second, it contributes to the literature by discovering that in an immersive retail environment, competence of the platform can be built through its technical expertise, technical reliability, and service innovativeness. Third, in a non-human service setting, users can interpret warmth through service personalization. Lastly, the theoretical understanding of the demographic influence is enriched through the partial support for gender as a moderator. Males and females differ in how they give weight to the technical abilities of the platform to trust it. However, they do not differ in terms of warmth provided by the platform when it comes to trusting the platform.

Practical Implications

For practitioners operating in or shifting to a metaverse-based retail environment, the present study provides the following actionable insights. First, while developing the metaverse-based retail platform, the focus should not only be on the technical robustness (e.g., faster loading and innovativeness) but also on providing a personalized experience to the users. This dual focus enhances trust among the users. Therefore, retailers operating in metaverse environments should not merely replicate conventional online retail strategies but should focus on creating immersive, personalized, and socially interactive experiences that enhance both functional performance and emotional engagement. Second, retailers should invest more in gaining technical expertise and technical reliability. They should also make sure that the platform provides innovative services. These capabilities of the platform enhance the perception of its competence among users and further translate into higher trust. Third, retailers should provide personalized services to the users. Tailored experiences based on the needs of the users are perceived as warm and friendly, which results in emotional attachment with the brand. The personalization can be enhanced with the help of tools such as avatars and recommendation engines.

Conclusion, Limitations, and Future Research Directions

This study focuses on how users inculcate trust in metaverse-based retail platforms by applying the SCM. It examines the antecedents of perceived competence and perceived warmth. The findings highlight the significance of technical capability, service personalization, and service innovativeness in shaping user perceptions, which ultimately translates into trust. The study also shows that gender differences persist in competence-based evaluations but may be less relevant for warmth-related perceptions in an immersive retail environment. The study has several limitations and provides avenues for future research. First, this

study is focused on IT professionals who are more familiar and comfortable with the use of the metaverse than the general population. Therefore, the outcomes of this study should be interpreted as the reflection of the perceptions of technologically sophisticated users rather than the general consumer population. Hence, future researchers should use this model for different demographic groups that include users who are not tech-savvy. Second, this study has collected data from users in different countries. However, future researchers can explore how perceived competence and perceived warmth are shaped by users in different cultures. Third, future researchers can explore the further outcomes of this model, e.g., brand engagement, usage intention, and brand loyalty. Lastly, as the metaverse is an evolving concept, the users' perceptions may change over time as the technology matures. Hence, future researchers should perform longitudinal studies to understand the change in the perception of competence, warmth, and trust.

References

- Aaker, J., Vohs, K. D., & Mogilner, C. (2010). Non-profits are seen as warm and for-profits as competent: Firm stereotypes matter. *Journal of Consumer Research*, 37(2), 224–237.
- Ahn, S., Park, J., & Ye, S. (2024). How AI enhances employee service innovation in retail: Social exchange theory perspectives and the impact of AI adaptability. *Journal of Retailing and Consumer Services*, 84, 104207.
- Barnes, D. C., Collier, J. E., Howe, V., & Hoffman, K. D. (2016). Multiple paths to customer delight: The impact of effort, expertise and tangibles on joy and surprise. *Journal of Services Marketing*, 30(3), 277–289.
- Barua, Z., Aimin, W., & Hongyi, X. (2018). A perceived reliability-based customer satisfaction model in self-service technology. *The Service Industries Journal*, 38(7-8), 446-466.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Chin, W. W., & Newsted, P. R. (1999). Structural equation modeling analysis with small samples using partial least squares. *Statistical Strategies for Small Sample Research*, 1(1), 307–341.
- Christoforakos, L., Gallucci, A., Surmava-Große, T., Ullrich, D., & Diefenbach, S. (2021). Can robots earn our trust the same way humans do? A systematic exploration of competence, warmth, and anthropomorphism as determinants of trust development in HRI. *Frontiers in Robotics and AI*, 8, 640444.
- Cuddy, A. J. C., Fiske, S. T., & Glick, P. (2008). Warmth and competence as universal dimensions of social perception: The stereotype content model and the BIAS map. *Advances in Experimental Social Psychology*, 40, 61–149.
- El Hedhli, K., Zourrig, H., Al Khateeb, A., & Alnawas, I. (2023). Stereotyping human-like virtual influencers in retailing: Does warmth prevail over competence? *Journal of Retailing and Consumer Services*, 75, 103459.
- Fiske, A. P. (2002). Using individualism and collectivism to compare cultures—A critique of the validity and measurement of the constructs: Comment on Oyserman et al. (2002). *Psychological Bulletin*, 128(1), 78–88.

- Fiske, S. T., Cuddy, A. J. C., & Glick, P. (2007). Universal dimensions of social cognition: Warmth and competence. *Trends in Cognitive Sciences*, 11(2), 77–83.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
- Gao, W., Jiang, N., & Guo, Q. (2024). How cool virtual streamer influences customer in live-streaming commerce? An explanation of stereotype content model. *Journal of Retailing and Consumer Services*, 82, 104139.
- Gleim, M. R., McCullough, H., Gabler, C., Ferrell, L., & Ferrell, O. C. (2025). Examining the customer experience in the metaverse retail revolution. *Journal of Business Research*, 186, 115045.
- Goyal, S., Chauhan, S., Gajpal, Y., & Bhardwaj, A. K. (2023). Examining consumers' continuance and sharing intention toward food delivery apps. *Journal of Enterprise Information Management*, 36(6), 1677–1707.
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2010). *Multivariate data analysis (7th ed.)*. Pearson Prentice Hall.
- Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS path modeling in new technology research: Updated guidelines. *Industrial Management & Data Systems*, 116(1), 2–20.
- Hoffman, L. W. (1972). Early childhood experiences and women's achievement motives. *Journal of Social Issues*, 28(2), 129–155.
- Jeong, S. H., & Kim, H. K. (2023). Effect of trust in metaverse on usage intention through technology readiness and technology acceptance model. *Tehnički Vjesnik*, 30(3), 837–845.
- Jiang, Q., Kim, M., Ko, E., & Kim, K. H. (2023). The metaverse experience in luxury brands. *Asia Pacific Journal of Marketing and Logistics*, 35(10), 2501–2520.
- Jussim, L. (2012). *Social perception and social reality: Why accuracy dominates bias and self-fulfilling prophecy*. Oxford University Press.
- Ki, C., Chong, S. M., Aw, E. C., Lam, M. M., & Wong, C. W. (2024). Metaverse consumer behavior: Investigating factors driving consumer participation in the transitory metaverse, avatar personalization, and digital fashion adoption. *Journal of Retailing and Consumer Services*, 82, 104094.
- Kim, J. J., & Han, H. (2020). Hotel of the future: Exploring the attributes of a smart hotel adopting a mixed-methods approach. *Journal of Travel & Tourism Marketing*, 37(7), 804–822.
- Kim, J., & Bae, J. (2024). Influences of persona self on luxury brand attachment in the Metaverse context. *Asia Pacific Journal of Marketing and Logistics*, 36(9), 2068–2081.
- Kull, A. J., Romero, M., & Monahan, L. (2021). How may I help you? Driving brand engagement through the warmth of an initial chatbot message. *Journal of Business Research*, 135, 840–850.

- Lee, G., & Kim, H. Y. (2025). Algorithm fashion designer? ascribed mind and perceived design expertise of AI versus human. *Psychology & Marketing*, 42(1), 255-273.
- Li, J., Huang, J., & Li, Y. (2023). Examining the effects of authenticity fit and association fit: A digital human avatar endorsement model. *Journal of Retailing and Consumer Services*, 71, 103230.
- Li, Y., Hou, R., & Tan, R. (2024). How customers respond to chatbot anthropomorphism: the mediating roles of perceived humanness and perceived persuasiveness. *European Journal of Marketing*, 58(12), 2757-2790.
- Mari, A., Mandelli, A., & Algesheimer, R. (2024). Empathic voice assistants: Enhancing consumer responses in voice commerce. *Journal of Business Research*, 175, 114566.
- Marini, M. M. (2022). Does gender moderate the influence of emotions on risk-taking? The meta-analysis reloaded. *Journal of Behavioral and Experimental Finance*, 35, 100700.
- Morgan, R. M., & Hunt, S. D. (1994). The commitment-trust theory of relationship marketing. *Journal of Marketing*, 58(3), 20–38.
- Nunnally, J. C. (1978). *Psychometric theory (2nd ed.)*. McGraw-Hill.
- O'Brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & Quantity*, 41(5), 673–690.
- Park, S. M., & Kim, Y. G. (2022). A metaverse: Taxonomy, components, applications, and open challenges. *IEEE Access*, 10, 4209–4251.
- Rahman, S. M., Chowdhury, N. H., Bowden, J. L., & Carlson, J. (2024). Metaverse platform attributes and customer experience measurement. *Journal of Retailing and Consumer Services*, 83, 104159.
- Richter, S., & Richter, A. (2023). What is novel about the Metaverse? *International Journal of Information Management*, 73, 102684.
- Roy, R., & Naidoo, V. (2021). Enhancing chatbot effectiveness: The role of anthropomorphic conversational styles and time orientation. *Journal of Business Research*, 126, 23-34.
- Statista (2024). Metaverse worldwide. <https://www.statista.com/outlook/amo/metaverse/worldwide/> (Accessed February 2025)
- Tashakkori, A., & Teddlie, C. (2009). *Foundations of mixed methods research*. Sage Publications.
- Wang, M., Cho, S., & Denton, T. (2017). The impact of personalization and compatibility with past experience on e-banking usage. *International Journal of Bank Marketing*, 35(1), 45–55.
- Wei, Y., Gáti, M., & Simay, A. E. (2024). How consumers' privacy perceptions influenced mobile payment acceptance during the COVID-19 pandemic. *International Journal of Bank Marketing*, 42(7), 2051–2074.
- Wu, L., Wang, C., & Rouyer, E. (2019). The opportunity and challenge of trust and decision-making uncertainty. *International Journal of Bank Marketing*, 38(1), 199–218.

- Yan, Z., Balasubramanian, K., Konar, R., Chen, L., & Wei, Y. (2024). Smart hotel in the eyes of the silver: Developing and testing the silver tourists' behavioural intention scale. *Current Issues in Tourism*, 1–20. <https://doi.org/10.1080/13683500.2024.2381249>
- Yoganathan, V., Osburg, V. S., Kunz, W. H., & Toporowski, W. (2021). Check-in at the Robo-desk: Effects of automated social presence on social cognition and service implications. *Tourism Management*, 85, 104309.

Appendix: Qualitative Interview Questions

1. Can you describe your experience related to shopping on a metaverse-based retail platform?
2. What did you like most or least about the platform?
3. What are your views about the platform's performance and functioning?
4. Was there anything about the platform that made you feel confident or unsure while using it?
5. Can you talk about any characteristic of the platform that, according to you, was advanced in comparison to the regular shopping apps?
6. Was the platform more mechanical or more personal based on your interaction?
7. Was the experience felt human-like in any way?
8. Did the platform recommend things that were more relevant to you?
9. How comfortable were you while transacting on the platform?
10. Do you trust these platforms and why?
11. What is your birth year?
12. Do you want to share anything else about your experience of using the metaverse-based retail platform?