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-RESEARCH ARTICLE-

VIRTUAL DIGITAL HUMANS IN URBAN CULTURAL COMMUNICATION AND BRANDING: BUSINESS MODEL INNOVATION BASED ON MEME THEORY

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─Abstract─

Virtual Digital Humans (VDHs) are transforming digital communication interactions, particularly within the culturally and economically dynamic regions of the GBA. Moreover, VDHs present a highly suitable opportunity to enhance the communication of cultural elements within urban populations, strengthen brand loyalty, and optimise the omnichannel retail experience. This study evaluates the impact of VDHs on fostering cultural engagement, brand reliability, and the retail experience within the GBA, aiming to identify their strengths and limitations. A quantitative research approach was employed, with data collected from 80 participants comprising regular consumers, retail employees, and cultural sector professionals who completed structured questionnaires. Correlational and regression analyses were conducted to assess the influence of VDHs on cultural communication, brand perception, and customer experience. Findings indicate that VDHs enhance the accessibility of cultural narratives; however, their contribution to broadening cultural participation is minimal. In branding, VDHs facilitate the establishment of an initial level of consumer trust but do not influence long-term brand loyalty. Conversely, within the omnichannel retail framework, VDHs improve customer experience by enabling seamless interactive pathways. VDHs serve as effective support tools in urban cultural and branding initiatives, with their most significant impact observed in the retail sector. Nonetheless, integrating VDHs with cultural diversity strategies may be essential in maximising their engagement potential, particularly within the complex GBA environment.

Keywords: Virtual Digital Humans, Brand Building, Cultural Communication, Business Model, Meme Theory.

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INTRODUCTION

Virtual Digital Humans (VDHs) represent a pioneering development in an increasingly digitised world, fundamentally transforming communication and branding practices. VDHs are avatars or digital entities capable of replicating realistic, human-like interactions while remaining distinct from actual individuals. These digital constructs possess substantial potential to facilitate cultural exchange, particularly in metropolitan regions such as the Greater Bay Area (GBA), which boasts a rich socio-economic landscape and advanced technological infrastructure. VDHs have gained prominence in the entertainment sector and as marketing tools, enhancing customer experiences and strengthening brand perception. Sun et al. (2020) highlight the GBA's significance as a hub for pilot innovations, given its cultural diversity, robust economic foundation, and digital advancement. The introduction of VDHs in this context enhances cultural promotion and brand marketing, rendering urban interactions more immersive and engaging. Consequently, VDHs function as cultural and tourism ambassadors, transmitting regional cultural values and fostering cross-border interactions with global communities.

As one of China's largest economic regions, the GBA comprises 11 cities, including Hong Kong, Macao, Shenzhen, and Guangzhou, which serve as leading urban centres with substantial economic influence (Figure 1). According to Xuan and Jiawen (2019), continuous technological advancements and collaborative initiatives reinforce the GBA's status as an ideal environment for emerging technologies such as VDHs. Nonetheless, the region faces challenges, including cultural fragmentation and intercity competition. The integration of VDHs presents a potential solution by eliminating geographical constraints in urban experiences and enabling the dissemination of shared cultural narratives. The use of digital avatars offers a novel approach to communication, facilitating the transmission of cultural messages and contributing to the evolution of regional cultural identity.

Figure 1: Illustration of Virtual Digital Humans into the Urban Landscape of the Greater Bay Area

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The application of VDHs in innovation carries substantial implications for both academic research and practical implementation. Their primary significance lies in their capacity to transform urban cultural communication. Traditionally, the transmission of cultural messages has been geographically constrained, with face-to-face interactions yielding limited impact. However, VDHs enable dynamic and mobile engagement, reaching diverse audiences and thereby enhancing cultural dissemination within the GBA, as highlighted by Ye et al. (2021), given the region's highly interconnected urban environment. From a branding perspective, VDHs also hold considerable value. These digital entities function as active brand ambassadors, delivering unique and immersive brand experiences. By leveraging VDHs, companies within the GBA can effectively navigate cultural differences and localise content with greater ease, a particularly advantageous feature given the region's diverse calendar of cultural events. The incorporation of meme theory into the analysis of VDH applications provides an academic framework for understanding how cultural symbols propagate within societies. As noted by Yang et al. (2022), the adaptability of memes to digital formats enhances their transmission, further extending their reach to target audiences.

Despite the promising applications of VDHs across multiple domains, research remains limited regarding their specific role in brand development within urban cultural communication and business model innovation. Much of the existing literature focuses broadly on the advantages of digital technologies, without thoroughly investigating how VDHs can contribute to the GBA's status as a culturally diverse and economically dynamic urban hub, as discussed by (Huang & Zhang, 2022). Furthermore, an analysis of the current literature suggests a notable research gap concerning the application of meme theory in digital communication and marketing, particularly in relation to branding and the construction of urban cultural identity. This study seeks to address this gap by presenting quantitative findings on the applicability and commercial value of VDHs within this context.

Research Objectives

1. To investigate the impact of Virtual Digital Humans on enhancing Urban Cultural Communication in the Guangdong-Hong Kong-Macao Greater Bay Area
2. To analyse the effect of Virtual Digital Humans on Brand Building in the Guangdong-Hong Kong-Macao Greater Bay Area
3. To examine the effectiveness of Virtual Digital Humans in the retail industry, focusing on their role in Urban Cultural Communication and Brand Building

LITERATURE REVIEW

Virtual Digital Humans in Urban Cultural Communication

As a form of new media in urban cultural communication, VDHs enable cities and

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cultural institutions to innovate cultural dissemination by integrating digital representations with tangible heritage. A comprehensive literature review by Machidon et al. (2018) on the role of VDHs in heritage preservation highlights their effectiveness in enhancing user experiences within digital environments. Their findings indicate that animated avatars in cultural contexts can significantly increase user engagement and comprehension, although the researchers acknowledged that this may be attributed to the substantial investments and technical requirements necessary for developing highly realistic digital characters. Moreover, they identified technological limitations as a key challenge, as widespread deployment of VDHs is constrained in regions lacking a robust digital infrastructure.

Sylaiou et al. (2020) examined the application of VDHs in virtual museum storytelling, emphasising their capacity to evoke emotional responses among visitors. Their study concluded that avatars designed to replicate curators or security personnel could elicit various emotional reactions, thereby enhancing the overall visitor experience. However, they also noted a critical limitation: cultural representation through VDHs can be overly standardised, potentially leading to a sense of detachment or alienation among audiences. To mitigate this issue, scholars suggested that avatar customisation and cultural sensitivity are essential for effectively conveying cultural narratives.

Similarly, Karuzaki et al. (2021) explored the technological challenges associated with developing sophisticated VDHs for cultural heritage applications, proposing a workflow that incorporates contemporary wearable motion capture technology and advanced animation tools. Their findings demonstrate that despite recent advancements improving the realism of VDH models, challenges persist, including the requirement for technical expertise and the high cost of equipment. The authors recommended further development of these methodologies to enhance the accessibility and affordability of VDHs in cultural exchange initiatives. Welch (2012) introduced the concept of physical-virtual humans, which integrate physical and digital components. He argued that these hybrids could be utilised in urban cultural settings by combining animatronics with projection mapping and related technologies. However, he identified several critical challenges, including the complexity of animating physical figures through digital projections and the intricacies of synchronisation signals. Welch suggested that such barriers may limit the feasibility of physical-virtual humans for large-scale cultural events, whereas more conventional VDHs offer a more practical alternative for widespread implementation.

Virtual Digital Humans in Brand Building

In branding, VDHs serve as transformative tools that facilitate innovative audience engagement through interactive and immersive approaches. Riedl et al. (2014) employed brain imaging techniques to examine trust dynamics in human-avatar interactions, revealing that avatars can enhance perceptions of credibility in computer-

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mediated environments, albeit not to the same extent as human facial expressions. This limitation is significant, as emotional appeal remains a critical factor in fostering brand loyalty. The researchers suggested that an optimal avatar design could be achieved by integrating authentic human variables into virtual environments. Saad and Choura (2022) investigated the effectiveness of virtual reality (VR) technologies in entrepreneurship, concluding that anthropomorphic VDHs significantly enhance telepresence and user engagement compared to basic avatars. Their findings demonstrated that highly human-like VDHs could provoke strong psychological and emotional responses among consumers, a phenomenon increasingly evident in contemporary digital marketing strategies. However, they also highlighted ethical concerns related to emotional manipulation and simulated interactions, underscoring the importance of ethical considerations in marketing practices involving VDHs.

Tang and Bashir (2023) explored the relationship between avatar similarity and trust in human-robot interactions, observing that greater resemblance between the user and the avatar could enhance trust levels. Nonetheless, they found that this did not necessarily lead to improved cooperation or collaboration, raising concerns for brands that seek to use VDHs to build deeper consumer relationships. The study advised brands to carefully design avatars that align with consumer expectations and perceptions to maximise their effectiveness. Liu et al. (2023) reviewed research on the role of avatars in fostering creativity, particularly in influencing user behaviour through design and representation. Their study suggested that avatars exhibiting creative or authoritative traits could be strategically leveraged in digital marketing to enhance communication. However, they cautioned against the unintended consequences of the Proteus Effect, wherein users adopt behaviours that align with the characteristics they attribute to their avatars. The researchers emphasised the need for responsible implementation to prevent adverse psychological effects on consumers.

Retail Business Model: Omni-Channel Approach

Business Model Innovation (BMI) plays a pivotal role in transforming traditional retail practices, particularly through the integration of virtual systems such as VDHs. The BMI framework enables retailers to deconstruct and conceptualise value creation, capture, and delivery processes by leveraging VDHs to enhance consumer touchpoints and operational efficiency. Olifirov et al. (2019) examine the impact of digitalisation on the retail business model's value chain, highlighting the role of social media marketing and intelligent virtual assistants. The authors emphasise that an Omni-channel strategy, which integrates offline and online components, is a fundamental shift necessary for contemporary retailers to refine consumer interactions.

A business model particularly relevant to the application of VDHs is the Omni-channel Retail Model. This model focuses on achieving seamless multichannel integration, ensuring connectivity between online platforms, physical stores, and mobile

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experiences. Hänninen et al. (2017) assert that the Omni-channel approach employs data analytics and digital platforms to facilitate interactions between buyers and sellers. In this context, VDHs enhance the retail experience by assisting with purchases, providing real-time support, and engaging with consumers to create a more personalised and interactive shopping journey. Pantano and Servidio (2012) propose a framework for incorporating immersive technologies into retail, examining the transformative role of virtual avatars in point-of-sale interactions. Their study demonstrates that VDHs can positively influence the shopping experience by enabling virtual try-ons and offering tailored product recommendations (Figure 2). However, the practical implementation of such technologies requires substantial investment and a deep understanding of consumer behaviour, as not all customer segments may be comfortable engaging with digital avatars.

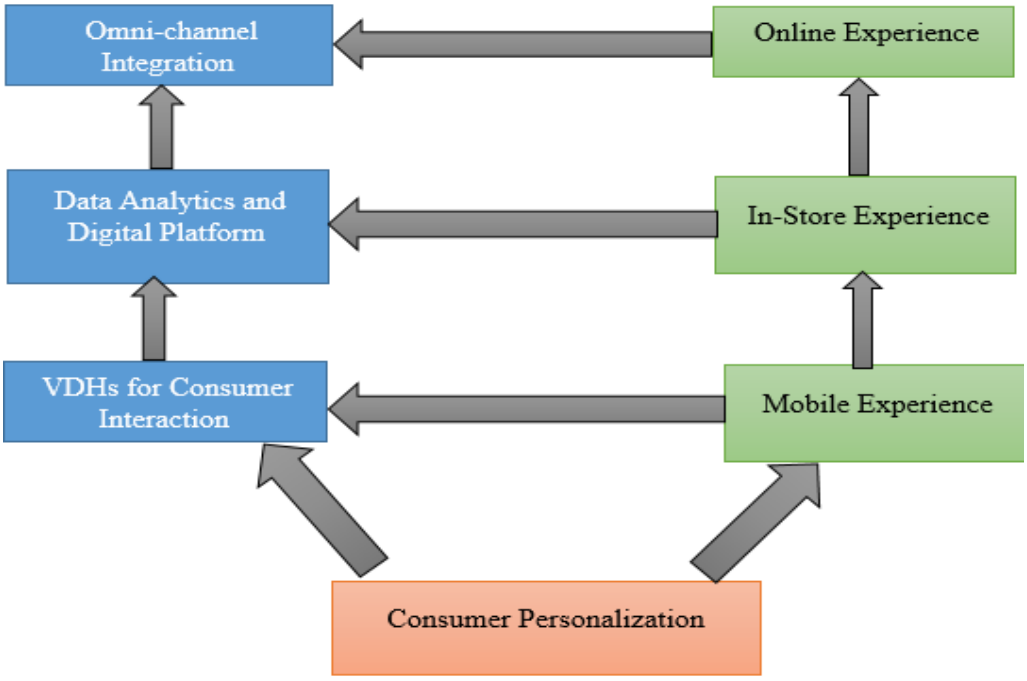

Figure 2: Omni-Channel Retail Model Framework Using VDHs

Theoretical Framework

Meme Theory in Cultural Communication

Dawkins' Meme Theory outlines the processes through which cultural artefacts are transmitted and replicated across populations. Gratch et al. (2013) applied meme theory to VDHs, demonstrating that these digital entities can function as cultural meme transceivers. The authors emphasise that designers must develop avatars that authentically replicate cultural characteristics to effectively convey cultural messages. However, they caution that improper design can lead to distortions or trivialisation of

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the cultural elements intended for communication. Liu et al. (2023) examine various aspects of the Proteus Effect, which describes how users' behaviours and perceptions are influenced by their avatars' characteristics. Avatar distinctiveness plays a crucial role in branding, as well-designed avatars can shape consumer perceptions and behaviours. However, critics argue that the Proteus Effect has limitations, particularly due to its assumption of a uniform psychological response. They contend that cultural and individual differences may significantly alter the effect, challenging its applicability across diverse populations. Advancements in avatar realism have progressed with improvements in AI algorithms. However, despite these developments, the photorealistic VDH industry continues to face challenges, including issues with lip synchronisation and texture quality. These deficiencies can hinder cultural communication, as audiences generally prefer interacting with avatars that closely resemble real humans (Figure 3). Ravichandran et al. (2023) further explore the ethical implications of hyper-realistic avatars, arguing that their use in marketing blurs the distinction between reality and virtuality, raising concerns about authenticity and consumer trust.

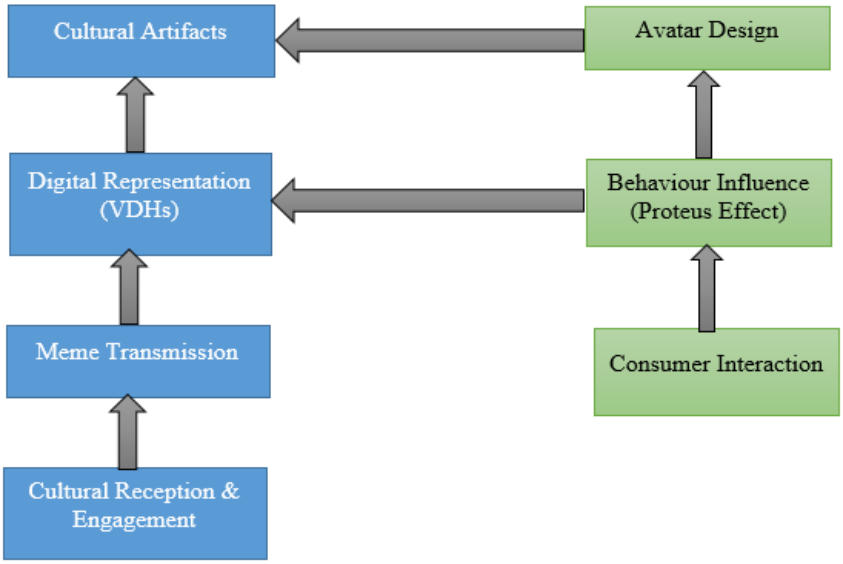

Figure 3: Theoretical process of VDHs in Cultural Communication

Literature Gap

Existing research on VDHs demonstrates considerable potential in enhancing user experience in urban cultural communication and increasing brand appeal and customer engagement in virtual and digital services, particularly within the GBA. As a technologically and culturally advanced hub, the GBA provides a unique environment for exploring the role of VDHs. However, several research gaps remain unaddressed, which this study aims to fill. Firstly, studies on VDHs in urban cultural communication have largely been confined to basic cultural narratives, including storytelling and visitor

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engagement in museums and virtual environments (Karuzaki et al., 2021; Sylaiou et al., 2020). Further research is required to examine whether and how VDHs facilitate deeper cultural interactions within the diverse and dynamic metropolitan areas of the GBA. The potential of VDHs to integrate multiple cultural narratives into a dynamic and immersive information flow, mitigate cultural disconnection, and enhance culture-sensitive messaging has yet to be thoroughly investigated.

In branding, VDHs are recognised for their capacity to establish an initial level of trust (Riedl et al., 2014; Saad & Choura, 2022). However, their effectiveness in fostering long-term brand loyalty, particularly in culturally heterogeneous consumer markets, remains underexplored. While VDHs can imbue brands with distinct personality traits, existing research has not sufficiently examined their impact on customer retention or their strategic role in competitive and multi-sector markets, such as the GBA. Finally, the integration of VDHs into Omni-channel retail structures has shown potential for enhancing customer satisfaction (Pantano & Servidio, 2012). However, studies have yet to provide comprehensive insights into the practical implementation of VDHs across both online and offline retail environments, particularly within culturally diverse and densely populated regions. Existing literature lacks a balanced evaluation of VDHs as key facilitators of seamless, customer-centric experiences in multi-channel retail settings across varied cultural contexts. This study addresses these gaps by examining the managerial implications of VDHs in cultural engagement, brand attachment, and retail environments within the GBA. It emphasises the need for culture-sensitive VDH strategies to optimise their effectiveness in these domains.

Hypothesis Development

H1: *VDHs significantly enhance urban cultural communication in the Guangdong-Hong Kong-Macao Greater Bay Area by improving audience engagement and making cultural narratives more accessible.*
H2: *The integration of Virtual Digital Humans positively impacts brand building in the Guangdong-Hong Kong-Macao Greater Bay Area by increasing brand loyalty and consumer trust.*
H3: *The application of Virtual Digital Humans in the retail industry within the Guangdong-Hong Kong-Macao Greater Bay Area leads to a more effective consumer experience, particularly in an Omni-channel retail model, by providing personalized and immersive interactions.*

METHODOLOGY

Research Methods and Design

A quantitative research methodology was adopted to examine the impact of VDHs on urban cultural exchange, brand establishment, and the Omni-channel experience within

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the Guangdong-Hong Kong-Macao Greater Bay Area retail sector. This approach was selected due to its suitability for analysing numerical data, enabling statistical evaluation of variable relationships and facilitating informed conclusions. A cross-sectional survey was conducted using a structured questionnaire to assess participants' perceptions and attitudes towards VDH applications across different domains. The questionnaire employed a Likert scale ranging from Strongly Disagree to Strongly Agree, ensuring a systematic capture of participant responses. This scaling method allowed for effective coding, categorisation, and an ordinal approach to data analysis, enhancing the study's analytical precision.

Data Collection Methods

This study employed a quantitative research methodology to investigate the role of VDHs in cultural exchange and communication, brand establishment, and the Omni-channel experience within the retail sector of the Greater Bay Area of Guangdong-Hong Kong-Macao. The study aimed to gather statistical data to identify correlations between various variables and derive conclusions free from subjective bias. To collect data from participants, a structured questionnaire survey was developed to measure their attitudes and perceptions regarding the integration of VDHs across different domains. Given that the study focused on the intensity of respondents' opinions, a Likert scale was employed, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). This scale facilitated a detailed assessment of participants' attitudes while allowing for the quantification of the data collected.

Sampling Technique

A purposive sampling technique was utilised to target participants with prior experience or interest in engaging with VDHs within the cultural or retail sectors of urban environments. The rationale for employing this technique was to selectively include participants who could provide relevant and valuable insights regarding the study's focus. The sample consisted of 80 participants, including regular consumers, retail industry personnel, and employees in cultural organisations. The purposive sampling approach was chosen to ensure diversity while maintaining specificity to accurately capture the experiences and perspectives of each group with respect to VDHs. The sample included 30 retail consumers who had interacted with VDHs online or in-store, 25 retail employees working in marketing, customer experience, or digital innovation teams, and 25 cultural sector professionals involved in cultural communication or digital heritage projects. This distribution provided a balanced perspective on the impact of VDHs across various sectors.

Samples

The demographic and background information collected from participants presented a

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broad spectrum of responses, providing a comprehensive overview of the various ways in which VDHs influence areas linked to urban settings and commerce. The group of retail consumers included individuals with varying degrees of exposure to digital retail environments. This group comprised both frequent online shoppers and those who had expressed complaints or feedback regarding their experiences with VDHs in physical retail settings. Retail industry professionals, on average, possessed 5 to 10 years, or more, of experience in fields such as marketing, brand management, or customer service, with many respondents having contributed to projects incorporating digital or virtual elements. Cultural institution professionals, such as museum curators, cultural event coordinators, and digital communication officers, were targeted for their 3 to 15 years of experience in their respective professions, particularly in facilitating cultural engagement through digital platforms. This varied sampling approach enabled the collection of diverse experiences and perspectives, ensuring that the research questions were addressed from a wide range of viewpoints.

Data Analysis Technique

The data gathered through the questionnaire survey encompassed participants' responses to each item within the survey. Frequency analysis was employed to examine the demographic data collected from the sample, providing an overview of the participants' general responses to each survey item. To further understand the distribution of the data, means, medians, and standard deviations were calculated. Correlation analysis was conducted to explore the relationships between VDHs and the dependent variables: urban cultural communication, brand development, and the retail consumer experience. In addition, regression analysis was utilised to assess the predictive relationships between the independent variable, VDHs, and each dependent variable. The use of SPSS enabled efficient data management, description, and analysis, ensuring the application of the most appropriate statistical tests to evaluate all research hypotheses. The results of these analyses are discussed in subsequent sections to determine whether the hypotheses were supported.

Ethical Consideration

To ensure the protection of participants' data and uphold their rights, informed consent was obtained from each participant prior to the administration of the survey. Stakeholders were provided with a detailed information letter outlining the study's objectives, emphasising participant anonymity, and clarifying their right to withdraw from the study at any time without the need for justification. Privacy was maintained throughout the data collection process, as no personally identifiable information was collected, ensuring that no individual’s identity would be linked to the data. The data were electronically stored and secured on password-protected devices, with access restricted to members of the research team. Ethical clearance for the study was granted by the relevant institutional review board, and all research procedures adhered to the

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established ethical guidelines for social research.

RESULTS

In the Results section, the findings derived from the structured questionnaire survey are presented, focusing on the data collected from retail consumers, retail industry professionals, and cultural institution experts. The questionnaire, based on a Likert scale, was designed to gauge participants' perceptions of VDHs, specifically in relation to urban cultural communication, brand image development, and Omni-channel retail experiences. Frequency analysis was conducted to provide an overall summary of participant responses. Correlation analysis was employed to examine the relationships between VDHs and the dependent variables, while regression analysis was used to assess the predictive validity of VDHs for each outcome. All statistical analyses were carried out using SPSS, enhancing the reliability and validity of the findings.

Table 1: Missing Values

Statistics					
		Gender	**Affiliations**	**Year of Experience**	**Frequency of Interaction with Digital Technologies**
N	Valid	80	80	80	80
	Missing	0	0	0	0

The demographic variables provide an overview of how all 80 participants responded to the survey items, with no missing data. The demographic information included in the dataset encompasses factors such as gender, participants' professional specialisation, years of work experience, and their level of interaction with digital technologies. This data pertains to various groups, including retail consumers, retail industry professionals, cultural institution employees, and other participants with an interest in the retail sector (Table 1). The thoroughness of the collected data establishes a robust foundation for analysing the impact of Virtual Digital Humans on the research variables.

Demographics

The demographic distribution of gender among respondents reflects a diverse representation: 25% identified as female, 38.8% as male, and 36.3% chose not to disclose their gender (Table 2). This distribution is considered reasonable, with a notable proportion opting for non-disclosure (Figure 4). The variety in gender responses enhances the comprehensiveness of the study, as it captures perspectives from individuals with different gender identities, thereby enriching the analysis of the effects of Virtual Digital Humans.

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Table 2: Frequencies Distribution of Gender of Respondents

Gender					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Female	20	25.0	25.0	25.0
	Male	31	38.8	38.8	63.7
	Prefer Not to Say	29	36.3	36.3	100.0
	Total	80	100.0	100.0	

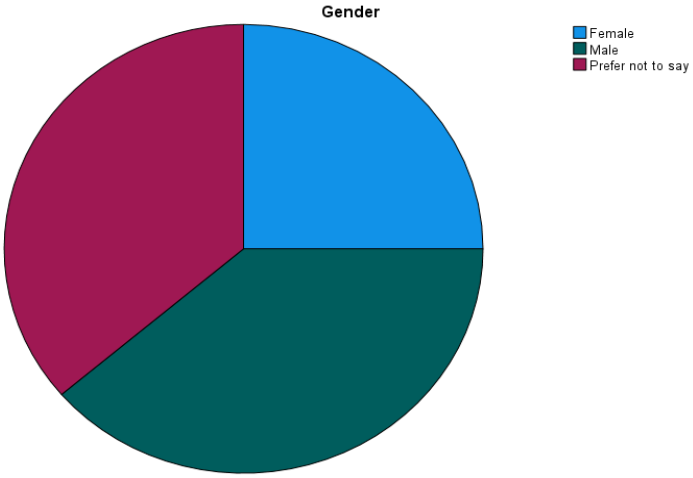

Figure 4: A Pie chart of Gender of the Respondents

The affiliations of respondents indicate a diverse sample: 37.5% are affiliated with cultural institutions, 36.3% are retail consumers, and 26.3% are retail industry professionals (Table 3). This distribution ensures an equitable representation of all key stakeholders, offering a comprehensive perspective on the role of Virtual Digital Humans in urban cultural communication, brand creation, and the impact on retail experiences. The varied affiliations provide valuable insights into the application of VDHs across different sectors.

Table 3: Frequencies Distribution of Affiliations

Affiliations					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Cultural Institution Professional	30	37.5	37.5	37.5
	Retail Consumer	29	36.3	36.3	73.8
	Retail Industry Professional	21	26.3	26.3	100.0
	Total	80	100.0	100.0	

The distribution of years of experience among respondents reveals a balanced range: 27.5% have 6-10 years of experience, 26.3% have more than 10 years, and 26.3% have 2-5 years of experience (Table 4). Additionally, 20% of respondents reported having less than two years of experience. This variety in experience levels, encompassing both

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newer and more seasoned professionals, contributes positively to the study by providing diverse perspectives on Virtual Digital Humans across different stages of career development (Figure 5).

Table 4: Frequency Distributions of Years of Experience

Years of Experience					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	2-5 years	21	26.3	26.3	26.3
	6-10 years	22	27.5	27.5	53.8
	Less than 2 years	16	20.0	20.0	73.8
	More than 10 years	21	26.3	26.3	100.0
	Total	80	100.0	100.0	

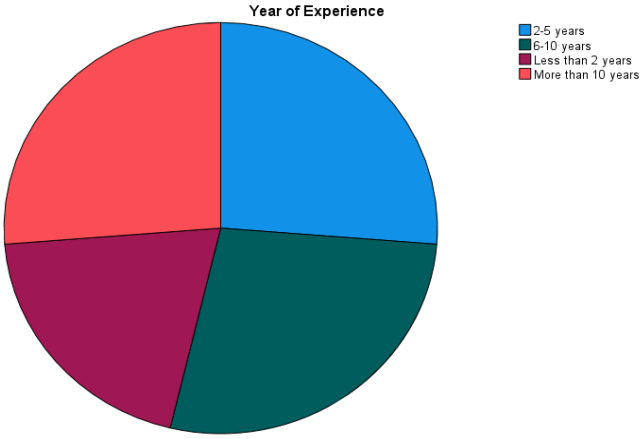

Figure 5: A Pie chart of Respondents of Year of Experience

The frequency of respondents' interactions with digital technologies demonstrates a diverse range: 31.3% use digital technologies daily, 31.3% use them sparingly, 25.0% engage with them weekly, and 12.5% use them monthly (Table 5). This distribution indicates that the participants represent a broad spectrum of users, ranging from high to low levels of digital technology usage. This diversity in digital interaction frequency enhances the study by capturing a wide range of familiarity and comfort with digital technologies, thus providing a comprehensive understanding of participants' attitudes toward Virtual Digital Humans.

Table 5: Frequency Distribution of Interaction with Digital Technologies

Frequency of Interaction with Digital Technologies					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Daily	25	31.3	31.3	31.3
	Monthly	10	12.5	12.5	43.8
	Rarely	25	31.3	31.3	75.0
	Weekly	20	25.0	25.0	100.0
	Total	80	100.0	100.0	

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Correlation Analysis

The Pearson correlation coefficient was used to examine the quantitative relationships between VDHs and Urban Cultural Communication (UCC), Brand Building, and the Retail Industry. The correlation between VDHs and Retail Industry experiences yields a coefficient of r = 0.226, with a p-value of 0.044, suggesting a weak but statistically significant relationship between these two variables. In contrast, the correlations between VDHs and UCC (r = -0.006) and VDHs and Brand Building (r = 0.060) are minimal and statistically insignificant, with p-values of 0.960 and 0.597, respectively. Similarly, the correlation between UCC and Brand Building is practically non-existent (r = 0.026) and statistically insignificant (p = 0.816). These findings indicate low combined variance for these indicators in the current sample (Table 6).

Table 6: Correlation Analysis of by Pearson Correlation Coefficient

Correlations					
		VDH	**UCC**	**Brand Building**	**Retail Industry**
VDH	Pearson Correlation	1	-.006	.060	.226*
	Sig. (2-tailed)		.960	.597	.044
UCC	Pearson Correlation	-.006	1	.026	-.152
	Sig. (2-tailed)	.960		.816	.178
Brand Building	Pearson Correlation	.060	.026	1	.123
	Sig. (2-tailed)	.597	.816		.277
Retail Industry	Pearson Correlation	.226*	-.152	.123	1
	Sig. (2-tailed)	.044	.178	.277	

*. Correlation is significant at the 0.05 level (2-tailed).

Regression Analysis

Regression Model 1: Impact of VDHs on Urban Cultural Communication

The Model Summary of the Regression Analysis is presented in Table 7. The regression model used to assess the impact of VDHs on Urban Cultural Communication (UCC) exhibits very low coefficients of determination.

Table 7: Model Summary of Regression Analysis

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.006[a]	.000	-.013	1.1761

a. Predictors: (Constant), VDH

As shown in the model summary (Table 8), the R-square value is 0.000, indicating that VDHs account for virtually none of the variance in UCC. The Adjusted R-square value of -0.013 further highlights the poor fit of the model.

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Table 8: Analysis of Variance of Regression Model

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	.004	1	.004	.003	.960[b]
	Residual	107.884	78	1.383		
	Total	107.887	79			

a. Dependent Variable: UCC
b. Predictors: (Constant), VDH

This lack of significance is reinforced by the ANOVA table (Table 9), which shows an F-value of 0.003 and a p-value of 0.960, indicating no statistically significant influence.

Table 9: Coefficient of Regression Model

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	2.982	.412		7.241	.000
	VDH	-.006	.121	-.006	-.050	.960

a. Dependent Variable: UCC

Regression Model 2: Impact of VDHs on Brand Building

Additionally, Table 10, which presents the coefficients, reveals an unstandardized coefficient for VDHs of -0.006 and a p-value of 0.960, confirming that VDHs do not have a measurable impact on UCC in this model. The regression analysis examining the effect of VDHs on Brand Building also reveals a low predictive capacity.

Table 10: Model Summary of Regression Analysis

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
2	.060[a]	.004	-.009	1.1537

a. Predictors: (Constant), VDH

The model summary in Table 11 indicates that VDHs account for only 0.004, or 0.4%, of the variance in Brand Building, with an Adjusted R-square value of -0.009, suggesting minimal predictive ability.

Table 11: Analysis of Variance of Regression Model

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
2	Regression	.375	1	.375	.282	.597[b]
	Residual	103.825	78	1.331		
	Total	104.200	79			

a. Dependent Variable: Brand Building
b. Predictors: (Constant), VDH

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Table 12 presents the ANOVA results, where the F-value is 0.282 and the p-value is 0.597, both indicating that the relationship between VDHs and Brand Building is statistically insignificant.

Table 12: Coefficient of Regression Model

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
2	(Constant)	2.897	.404		7.170	.000
	VDH	.063	.119	.060	.531	.597

a. Dependent Variable: Brand Building

Regression Model 3: Impact of VDHs on Retail Industry (Omni-channel)

The coefficients table (Table 13) shows an unstandardized coefficient of VDH = 0.063 with a p-value of 0.597, indicating that VDHs have no significant impact on brand building in this model. The lack of statistical significance further supports the conclusion that VDHs do not play a meaningful role in brand building within the context of this study.

Table 13: Model Summary of Regression Analysis

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
3	.226[a]	.051	.039	1.1077

a. Predictors: (Constant), VDH

The regression equation testing the effect of VDH on the Retail Industry-Specific Omni-channel reveals a small but statistically significant correlation. The model summary in Table 14 shows an R-squared of 0.051, indicating that VDHs account for only 5.1% of the variability in Retail Industry outcomes. The Adjusted R-squared of 0.039 suggests a slight predictive power.

Table 14: Analysis of Variance of Regression Model

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
3	Regression	5.142	1	5.142	4.191	.044[b]
	Residual	95.705	78	1.227		
	Total	100.847	79			

a. Dependent Variable: Retail Industry
b. Predictors: (Constant), VDH

The ANOVA table (Table 15) yields an F value of 4.191 with a p-value of 0.044, which

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indicates statistical significance at the 0.05 alpha level. In the coefficients table (Table 16), the unstandardized coefficient for VDH is 0.233, with a p-value of 0.044, providing evidence that VDHs have a positive impact on the Retail Industry in an Omni-channel environment.

Table 15: Coefficient of Regression Model

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	**Std. Error**	**Beta**		
3	(Constant)	2.454	.388		6.326	.000
	VDH	.233	.114	.226	2.047	.044

a. Dependent Variable: Retail Industry

Hypothesis Table

Table 16: Hypothesis Accepted or Rejected

Hypothesis	Null Hypothesis (H0)	Alternate Hypothesis (H1)	Outcome (Accepted\Rejected)
H1	Virtual Digital Humans do not significantly enhance Urban Cultural Communication in the Guangdong-Hong Kong-Macao Greater Bay Area.	VDHs strongly contribute to optimizing urban cultural communication in the Guangdong-Hong Kong-Macao Greater Bay Area by improving the audience's engagement and cultural narratives.	Rejected (since it yields low variances, which indicates low R-squared and non-significant significance level for Urban Cultural Communication).
H2	Integration of VDHs does not significantly impact on Brand Building in the Guangdong-Hong Kong-Macao Greater Bay Area.	Integration of VDHs positively impact on Brand Building by increasing consumer trust in the Guangdong-Hong Kong-Macao Greater Bay Area.	Rejected (low value of R-square and non-significant value of p is less than 0.05, hence not supporting Brand Building).
H3	VDHs do not improve consumer experience in the retail industry under the Omni-channel concept.	The application of VDHs enhances the consumer experience in the retail industry within the Greater Bay Area, especially in an Omni-channel model, by providing personalized and immersive interactions.	Accepted (weak but statistically significant correlation and p-value showing a slight positive effect on the Retail Industry experience).

DISCUSSION

Interpretation of the Findings

This study aimed to assess the role of VDHs in urban cultural communication and brand building in the GBA, focusing on their potential to facilitate cultural exchange and brand

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loyalty in a strategic, multicultural region. The findings suggest that while VDHs hold potential in certain contexts, their effectiveness is inconsistent. The first hypothesis (H1) posited that VDHs could positively contribute to cultural communication in the GBA by making cultural narratives more accessible and engaging. However, the results showed that although VDHs can enhance some cultural interaction, they did not significantly impact cultural communication. This finding aligns with (Sylaiou et al., 2020), who argued that while avatars may foster shallow social presence, they cannot replicate deep cultural exchanges. This highlights the need for urban planners and digital communicators to view VDHs as supplementary tools in cultural knowledge sharing, rather than replacements for traditional methods.

The second hypothesis (H2) examined VDHs' ability to build brands in the GBA market. The data revealed no significant impact on brand loyalty, suggesting that VDHs do not foster long-term brand associations. This finding aligns with (Pagliari et al., 2022), who noted that while avatars may establish initial trust, they fall short in fostering brand loyalty in markets requiring high levels of personalisation. Thus, VDHs should be integrated with other brand strategies to strengthen trust among diverse demographics. The third hypothesis (H3) investigated VDHs' role in retail, particularly within the Omni-channel strategy. The analysis found a statistically significant positive effect, though less pronounced than expected. This suggests that VDHs enhance customer experience in Omni-channel retailing by providing engaging, interactive sensory experiences. These results support (Hänninen et al., 2017), who highlighted the role of digital avatars in integrated retail experiences, indicating that VDHs are most effective on formal online retail platforms where customers expect high levels of assistance. The results partially support the study's objectives, indicating that VDHs are useful in cultural and retail contexts within urban environments but may not significantly enhance brand loyalty when used independently. The findings highlight the necessity of adopting a community engagement model, where VDHs are integrated with other engagement methods to optimise their effectiveness.

Comparison with the Previous Studies

Cultural Communication

Previous research suggests that VDHs have the potential to enhance the meaningful exchange of cultural cues. However, the current study reveals limitations in their effectiveness, particularly regarding the rich interpersonal interaction styles necessary for deeper cultural engagement. While VDHs facilitate cultural narratives in the GBA urban context, their contribution is limited to initial cultural contact rather than fostering deeper, more contextualised interactions. This finding aligns with (Sylaiou et al., 2020), who found that avatars can evoke emotions through storytelling in virtual museums, but the current study indicates that VDHs in the GBA only initiate cultural interactions without significantly enriching them. Additionally, research by Peng et al. (2025)

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emphasises that VDHs must be culturally sensitive to resonate with their target audience. In culturally diverse areas like the GBA, this study highlights the failure of VDHs to be truly effective unless they are adapted to the specific cultural context. This study also contrasts with Falloon (2010) view that avatars in learning settings can create superficial interactions that support knowledge retention. While the immersive environment of the GBA supports such experiences, this research demonstrates that cultural avatars in such diverse urban regions can be limited unless specifically tailored. Furthermore, Arasaratnam (2015) identified that VDHs excel in presenting simple cultural scenarios in a technological setting, but fail to capture the complexity and multi-layered nature of culture.

Brand Building

The study highlights the limited effectiveness of VDHs in building brands when used alone, which aligns with some literature but contrasts with other findings. Research by Foster et al. (2022) suggests that avatars can positively influence brand attributes, and this study partially supports those findings. While VDHs enhanced consumer engagement, they failed to generate long-term brand loyalty independently. This underscores the need for a more integrated approach, combining VDHs with other marketing strategies to enhance brand credibility, particularly in markets like the GBA, where consumers value face-to-face interactions. The findings also partially align with (Rane et al., 2023), who discussed the Proteus Effect, showing that avatars can influence consumer behaviour. However, in the GBA, while VDHs were well-received initially, they did not foster lasting loyalty. This is consistent with (Tang & Bashir, 2023), who found that while initial trust may be gained through identity similarity, sustained loyalty requires relational cues. Therefore, brands aiming to use VDHs for customer loyalty must ensure these avatars align with cultural and psychological preferences. Furthermore, Guo et al. (2023) found that anthropomorphic avatars in retail environments increase trust due to their human-like traits. Although VDHs positively influenced brand perception in the GBA, the study reveals they lack the emotional depth that human interaction offers. Thus, while VDHs serve as effective brand ambassadors, brands in culturally diverse regions like the GBA may need to complement VDHs with genuine human interaction to build stronger, long-term loyalty.

Retail Business Model and Omni- Channel Integration

The integration of VDHs within Omni-channel retail frameworks is supported by existing literature on digital avatars, which highlights their role in enhancing customer experience. Hänninen et al. (2017) demonstrated that digital avatars contribute to creating consistent, program-aligned Omni-channel brand experiences across both online and offline touchpoints. This research provides evidence that VDHs enhance the GBA's Omni-channel retail engagement by facilitating a seamless interface for customers. This aligns with the findings of (Pantano & Servidio, 2012), who noted that

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avatars in retail foster satisfying shopping experiences through mass-to-mass interaction, providing timely assistance that meets customer expectations. However, several concerns must be addressed when implementing VDH models in culturally diverse markets. Belanche et al. (2020) warn that avatars can have counterproductive effects if they lack cultural sensitivity, potentially leading to negative user experiences. This study found that while VDHs effectively facilitated retail interactions in the GBA, their impact could diminish if not properly localised to account for cultural differences. This aligns with (Chu et al., 2019), who argue that an effective digital avatar should remain culturally neutral, especially in multicultural settings. Furthermore, Sung et al. (2021) support these retail findings, asserting that avatars in Omni-channel retail environments can increase customer loyalty through the integration of brand-consistent images. This conclusion is corroborated by research in the GBA, which found that VDHs maintained brand coherence through both online interactions and in-store presence. Consequently, it may be beneficial for brands in the GBA to optimise VDH designs by incorporating local cultural values and references, ensuring they cater to diverse market segments while maintaining a unified brand message.

Implications for Urban Cultural Communication and Brand Building

The discussion of this study contributes to the understanding of urban cultural communication and branding theory, particularly in relation to VDHs in multicultural cities. The concept derived from this study supports meme theory, validating the notion that digitally created avatars function as cultural memes that convey symbolic or narrative urbanism, as noted by (Rossolatos, 2018). VDHs represent a new form of cultural preservation, effectively integrating regional values into urban discourses. This is significant in contexts like the GBA, where VDHs can enhance the city's identity by bridging cultures and offering exceptional experiences through the spread of symbols in both the digital and physical realms. In practice, VDHs can act as virtual cultural ambassadors, engaging city populations through culturally familiar communication patterns. For brands, this presents an effective means of engaging with consumers by conveying culture. As Miao et al. (2022) assert, avatars enhance user experience through processes of individualisation, particularly in cultures that respond to such approaches. Therefore, urban brands in the GBA could utilise avatars tailored to local masculinities to increase engagement, providing consumers with personalised experiences. This approach could also offer a competitive advantage in the GBA's multicultural and highly competitive market, ensuring that brand narratives align with regional values. For brand building, VDHs offer a significant opportunity to maintain customer attention from an Omni-channel perspective. By ensuring a consistent message across all touchpoints, VDHs help cultivate brand loyalty. This is particularly valuable in digital retail environments, where VDHs enhance the customer experience by offering timely assistance and recommendations, as noted by (Pantano & Servidio, 2012). Recommendations for branding and advertising in the GBA include

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incorporating VDHs as a key element within a comprehensive strategy focused on fostering loyalty and satisfaction in culturally diverse markets, where avatars can reflect the technology and cultural nuances of the region.

LIMITATIONS OF THE STUDY

This research has several implications, particularly regarding sample size, the generalisation of results, and the methods used. Despite the diversity of the sample, the study's relatively small size of 80 participants may limit the generalisability of the findings to the broader population's perceptions of VDHs in urban and retail contexts. This sample size constraint suggests that future studies should aim to utilise a larger and more representative sample, particularly considering the cultural diversity of the GBA. Additionally, the focus on the advanced GBA region limits the applicability of the findings to areas with less technological development. The successful application of VDHs relies on a supportive digital ecosystem, which is present in the GBA but may not be available in less-developed regions. This highlights the need for cross-regional comparisons to assess how varying levels of technological readiness impact VDH effectiveness in promoting urban culture and brand identity. In terms of methodology, while the quantitative analysis used in this study is effective for statistical comparisons, it may not fully capture the nuanced user experiences with VDHs. Qualitative methods, such as interviews or focus groups, could provide deeper insights into users' perspectives, beliefs, and emotions regarding VDHs. Such qualitative data would enrich the study by complementing the quantitative findings and offering a more comprehensive understanding of how VDHs operate within urban cultural and brand-building contexts. Specifically, it would provide a richer exploration of emotional and cultural connections.

CONCLUSION

This research examined the role of VDHs in enhancing urban cultural communication and branding within the GBA. The findings indicate that VDHs, while useful as cultural intermediaries and brand ambassadors, do not always yield positive outcomes. In the cultural sector, VDHs are effective for storytelling and explaining regional cultures in the digital age, but their ability to deliver authentic cultural experiences is limited due to the gap between virtual and real interactions. Hence, VDHs are best used as complementary tools rather than primary means of cultural exchange. From a branding perspective, VDHs facilitate initial consumer trust and engagement but fall short in building long-term brand loyalty. This aligns with previous literature, which suggests that while VDHs can create an engaging brand experience, they need to be complemented by deeper, personalised connections to foster lasting loyalty. In culturally diverse markets like the GBA, VDHs can serve as initial brand touchpoints, but additional culturally relevant campaigns are necessary. The most notable use of

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VDHs is in the retail sector, particularly within an Omni-channel framework. VDHs enhance customer experience by providing seamless transitions across online and offline touchpoints, offering timely assistance and personalisation. The study found that VDHs positively impacted retail experiences, though the effects were small and dependent on cultural relevance and technological sophistication. Retailers should adapt VDHs to local cultural norms and ensure advanced technological solutions to maximise effectiveness. In conclusion, VDHs hold potential as digital agents for urban cultural exchange and brand promotion, but their effectiveness is enhanced when integrated into broader, cross-media communication strategies. Qualitative insights suggest that VDHs should be supplemented with conventional communication methods for deeper cultural and brand connections.

FUTURE WORK

Based on the findings of this study, further research is needed to explore how VDHs can be personalised according to the unique cultural and demographic characteristics of the GBA. Enhancing the cultural sensitivity of VDHs could foster more meaningful relationships, which represents a potential area for further development identified in this research. Additionally, longitudinal studies investigating the long-term impact of VDHs on brand loyalty could provide valuable insights into their effectiveness in sustained brand-building. Future research should also incorporate qualitative methods, such as interviews or focus groups, to gain a deeper understanding of users' emotional perceptions of VDHs. Such data would offer a clearer understanding of the psychological and cultural barriers to accepting and using VDHs across various sectors. Lastly, this study could be extended to examine similar VDH applications in other geographical locations with differing cultural and technological infrastructures, thus broadening the generalisability of the findings and enhancing the development of more effective VDH applications for urban cultural marketing and brand promotion.

REFERENCES

Arasaratnam, L. A. (2015). Research in intercultural communication: Reviewing the past decade. *Journal of International and Intercultural Communication*, *8*(4), 290-310. https://doi.org/10.1080/17513057.2015.1087096

Belanche, D., Casaló, L. V., Flavián, C., & Schepers, J. (2020). Service robot implementation: a theoretical framework and research agenda. *The Service Industries Journal*, *40*(3-4), 203-225. https://doi.org/10.1080/02642069.2019.1672666

Chu, X., Luo, X. R., & Chen, Y. (2019). A systematic review on cross-cultural information systems research: Evidence from the last decade. *Information & Management*, *56*(3), 403-417. https://doi.org/10.1016/j.im.2018.08.001

Falloon, G. (2010). Using avatars and virtual environments in learning: What do they

have to offer? *British Journal of Educational Technology*, *41*(1), 108-122. https://doi.org/10.1111/j.1467-8535.2009.00991.x

Foster, J. K., McLelland, M. A., & Wallace, L. K. (2022). Brand avatars: Impact of social interaction on consumer–brand relationships. *Journal of Research in Interactive Marketing*, *16*(2), 237-258. https://doi.org/10.1108/JRIM-01-2020-0007

Gratch, J., Hartholt, A., Dehghani, M., & Marsella, S. (2013). Virtual humans: a new toolkit for cognitive science research. Proceedings of the Annual Meeting of the Cognitive Science Society, https://escholarship.org/uc/item/9j9404c3

Guo, Y.-M., Ng, W.-L., Hao, F., Zhang, C., Liu, S.-X., & Aman, A. M. (2023). Trust in virtual interaction: The role of avatars in sustainable customer relationships. *Sustainability*, *15*(18), 14026. https://doi.org/10.3390/su151814026

Hänninen, M., Smedlund, A., & Mitronen, L. (2017). Digitalization in retailing: multi-sided platforms as drivers of industry transformation. *Baltic Journal of Management*, *13*(2), 152-168. https://doi.org/10.1108/BJM-04-2017-0109

Huang, Y., & Zhang, H. (2022). Analysis of Informatization on Economic Development of Guangdong-Hong Kong-Macao Greater Bay Area. *Scientific and Social Research*, *4*(5). https://doi.org/10.26689/ssr.v4i5.3871

Karuzaki, E., Partarakis, N., Patsiouras, N., Zidianakis, E., Katzourakis, A., Pattakos, A., Kaplanidi, D., Baka, E., Cadi, N., & Magnenat-Thalmann, N. (2021). Realistic virtual humans for cultural heritage applications. *Heritage*, *4*(4), 4148-4171. https://doi.org/10.3390/heritage4040228

Liu, J., Burkhardt, J.-M., & Lubart, T. (2023). Boosting creativity through users' avatars and contexts in virtual environments—a systematic review of recent research. *Journal of Intelligence*, *11*(7), 144. https://doi.org/10.3390/jintelligence11070144

Machidon, O. M., Duguleana, M., & Carrozzino, M. (2018). Virtual humans in cultural heritage ICT applications: A review. *Journal of Cultural Heritage*, *33*, 249-260. https://doi.org/10.1016/j.culher.2018.01.007

Miao, F., Kozlenkova, I. V., Wang, H., Xie, T., & Palmatier, R. W. (2022). An emerging theory of avatar marketing. *Journal of Marketing*, *86*(1), 67-90. https://doi.org/10.1177/0022242921996646

Olifirov, A., Makoveichuk, K., & Petrenko, S. (2019). Transformation of business models in the digital economy. *International Journal of Open Information Technologies*, *7*(4), 85-91. http://injoit.ru/index.php/j1/article/view/725

Pagliari, M., Chambon, V., & Berberian, B. (2022). What is new with Artificial Intelligence? Human–agent interactions through the lens of social agency. *Frontiers in psychology*, *13*, 954444. https://doi.org/10.3389/fpsyg.2022.954444

Pantano, E., & Servidio, R. (2012). Modeling innovative points of sales through virtual and immersive technologies. *Journal of Retailing and Consumer Services*, *19*(3), 279-286. https://doi.org/10.1016/j.jretconser.2012.02.002

Peng, Y., Cowan, K., & Lo Ribeiro, J. (2025). Into the virtual worlds: conceptualizing the consumer-avatar journey in virtual environments. *Psychology & Marketing*, *42*(2), 374-394. https://doi.org/10.1002/mar.22129

Rane, N., Choudhary, S., & Rane, J. (2023). Metaverse for enhancing customer loyalty: effective strategies to improve customer relationship, service, engagement, satisfaction, and experience. *Service, Engagement, Satisfaction, and Experience (November 1, 2023)*. https://dx.doi.org/10.2139/ssrn.4624197

Ravichandran, S., Texler, O., Dinev, D., & Kang, H. J. (2023). Synthesizing photorealistic virtual humans through cross-modal disentanglement. Proceedings of the IEEE/CVF conference on computer vision and pattern recognition, https://doi.org/10.1109/CVPR52729.2023.00445

Riedl, R., Mohr, P. N., Kenning, P. H., Davis, F. D., & Heekeren, H. R. (2014). Trusting humans and avatars: A brain imaging study based on evolution theory. *Journal of Management Information Systems*, *30*(4), 83-114. https://doi.org/10.2753/MIS0742-1222300404

Rossolatos, G. (2018). Brand image re-revisited: A semiotic note on brand iconicity and brand symbols. *Social Semiotics*, *28*(3), 412-428. https://doi.org/10.1080/10350330.2017.1329973

Saad, S. B., & Choura, F. (2022). Effectiveness of virtual reality technologies in digital entrepreneurship: a comparative study of two types of virtual agents. *Journal of Research in Marketing and Entrepreneurship*, *24*(1), 195-220. https://doi.org/10.1108/JRME-01-2021-0013

Sun, Q., Huang, F., & Lei, D. (2020). Construction and Thinking of Guangdong - Hong Kong - Macao Greater Bay https://doi.org/10.25236/icbdem.2020.022 https://doi.org/10.25236/icbdem.2020.022

Area International Science and Technology Innovation Centre. *2020 International Conference on Big Data Application & Economic Management (ICBDEM 2020)* https://doi.org/10.25236/icbdem.2020.022

Sung, E. C., Bae, S., Han, D.-I. D., & Kwon, O. (2021). Consumer engagement via interactive artificial intelligence and mixed reality. *International journal of information management*, *60*, 102382. https://doi.org/10.1016/j.ijinfomgt.2021.102382

Sylaiou, S., Kasapakis, V., Gavalas, D., & Dzardanova, E. (2020). Avatars as storytellers: affective narratives in virtual museums. *Personal and Ubiquitous Computing*, *24*, 829-841. https://doi.org/10.1007/s00779-019-01358-2

Tang, L., & Bashir, M. (2023). Exploring the influence of self-avatar similarity on human-robot trust. 2023 32nd IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), https://doi.org/10.1109/RO-MAN57019.2023.10309431

Welch, G. (2012). Physical-virtual humans: challenges and opportunities. 2012 International Symposium on Ubiquitous Virtual Reality, https://doi.org/10.1109/ISUVR.2012.13

Xuan, W., & Jiawen, Y. (2019). City network by mobility and attention indices: A comparison of Guangzhou and Shenzhen. *Progress in Geography*, *38*(12), 1843-1853. https://doi.org/10.18306/dlkxjz.2019.12.002

Yang, W., Fan, F., Wang, X., & Yu, H. (2022). Knowledge innovation network externalities in the Guangdong–Hong Kong–Macao Greater Bay Area: borrowing size or agglomeration shadow? *Technology Analysis & Strategic Management*, *34*(9), 1020-1037. https://doi.org/10.1080/09537325.2021.1940922

Ye, W., Hu, Y., & Chen, L. (2021). Urban innovation efficiency improvement in the Guangdong–Hong Kong–Macao Greater Bay Area from the perspective of innovation chains. *Land*, *10*(11), 1164. https://doi.org/10.3390/land10111164

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APPENDIX

Variables

IV: Virtual Digital Humans

DVs: Urban Cultural Communication, Brand Building, retail industry (Omni-channel)

Questionnaire Survey

Demographics

Gender

- Male
- Female
- Prefer not to Say
- Others

Affiliations

- Retail Consumer
- Retail Industry Professional
- Cultural Institution Professional

Year of Experience

- Less than 2 years
- 2-5 years
- 6-10 years
- More than 10 year

Frequency of Interaction with Digital Technologies

- Daily
- Weekly
- Monthly
- Rarely

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Perceptions of Virtual Digital Humans (VDHs) (IV)

	1: Strongly Disagree	**2: Disagree**	**3: Neutral**	**4: Agree**	**5: Strongly Agree**
VDHs provide a more engaging digital experience compared to traditional methods.					
The use of VDHs in communication feels natural and immersive.					
VDHs can effectively personalize interactions based on user preferences.					
I perceive VDHs as an innovative addition to digital platforms.					

Urban Cultural Communication (Dependent Variable)

	1: Strongly Disagree	**2: Disagree**	**3: Neutral**	**4: Agree**	**5: Strongly Agree**
VDHs make cultural content more engaging and relevant to diverse audiences.					
The use of VDHs enhances my understanding and appreciation of cultural heritage.					
VDHs create a more interactive and memorable cultural experience.					
I believe VDHs effectively promote cultural narratives across different urban environments.					

Brand Building (Dependent Variable)

	1: Strongly Disagree	**2: Disagree**	**3: Neutral**	**4: Agree**	**5: Strongly Agree**
VDHs increase my trust and loyalty towards a brand.					
Brands utilizing VDHs appear more innovative and forward-thinking.					
I am more likely to engage with brands that use VDHs in their marketing strategies.					
VDHs enhance the memorability and distinctiveness of a brand.					

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Retail Industry (Omni-channel Experience) (DV)

	1: Strongly Disagree	**2: Disagree**	**3: Neutral**	**4: Agree**	**5: Strongly Agree**
VDHs improve my shopping experience across different platforms (online, in-store, mobile).					
VDHs provide personalized product recommendations that enhance my retail experience.					
The use of VDHs in retail makes transactions more efficient and enjoyable.					
I am more likely to revisit or recommend a store that utilizes VDHs for customer assistance.					