

# Examining the influence of cultural activities on chatbot intelligence perception: A detailed investigation of user viewpoints and preferences using the PLS-SEM technique

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## Abstract

This research explores the complex relationships among perceived ease of use, perceived usability, cultural factors, and perceived chatbot intelligence (PCI) within the UAE's service industry. Using structural equation modeling, the study analyzes data from service sector customers to identify intricate connections between these variables. The findings indicate that culture significantly moderates the relationship between perceived usefulness and PCI, underscoring the importance of cultural considerations in chatbot development and implementation. While the study provides valuable theoretical insights, it is limited by its reliance on self-reported data and the omission of certain contextual factors. The results offer practical implications for service providers and developers aiming to create more engaging and inclusive digital service experiences. Future research should address these limitations and further investigate the intricate relationship between culture, technology, and consumer perceptions in service contexts, thereby advancing service innovation and consumer engagement.

Keywords: Chatbot intelligence, Perceived usefulness, Human-computer interaction, User perception, Cultural influence.

## Background

Recent advancements in artificial intelligence (AI) have led to the extensive use of chatbots across various sectors such as education, government services, and customer support. Consequently, experts globally have concentrated on studying the impact of AI-driven chatbots on user interactions and experiences (Al-Sharafi et al., 2023; Ibrahim et al., 2023). The United Arab Emirates (UAE) has notably embraced AI technology, especially chatbots, which are used in areas ranging from educational assistance to the provision of government services (Alhalabi et al., 2022).

Adopting chatbots provides numerous benefits across all sectors, including higher efficiency, better customer service, and productivity. Chatbots improve communication processes by delivering fast responses to inquiries, decreasing the need for manual interaction, and shortening response times (Laranjo et al., 2018). Furthermore, chatbots function 24/7, ensuring customers' continuous availability and accessibility while increasing overall customer satisfaction (Hernandez et al., 2020). Chatbots can also handle numerous discussions simultaneously, optimizing resource allocation and allowing enterprises to manage large quantities of questions more efficiently (Hakkani-Tür et al., 2016). Furthermore, integrating AI-powered chatbots allows for more personalized interactions because they can assess user preferences and behavior and provide tailored responses and recommendations (Perez-Marcos et al., 2020). Chatbots improve communication procedures, user experience, customer engagement, and operational efficiency in various industries.

Despite the increasing use of chatbots, user perceptions of chatbot intelligence remain a significant issue worldwide, posing notable barriers to their widespread acceptance, particularly in educational and governmental settings. Cultural factors, such as individualism versus collectivism and power distance, influence how users perceive and interact with chatbots, potentially hindering their acceptance (Shin et al., 2022). Additionally, concerns about the reliability and security of AI technology, along with a lack of trust in chatbot capabilities, are major obstacles to adoption (Alsharhan et al., 2023). Moreover, the design and functionality of chatbots, including their conversational abilities and responsiveness, often fail to meet user expectations, leading to dissatisfaction and reluctance to use these systems (Al-Emran et al., 2023). Limited user experience and familiarity with AI-based technologies, particularly among older adults or those with low digital literacy, also contribute to apprehension about using chatbots for various purposes (Alhalabi et al., 2022). Addressing these challenges is essential to promote the effective use of chatbots in diverse contexts.

In the UAE, several factors contribute to the ongoing issue of user perceptions of chatbot intelligence. Cultural factors, such as individualism versus collectivism and power distance, significantly influence how users perceive and interact with chatbots (Shin et al., 2022). Additionally, chatbot design and functionality, including their conversational abilities and responsiveness, greatly impact user perceptions (Al-Emran et al., 2023). Trust in AI technology, along with concerns about privacy and security, affects the acceptance and utilization of chatbots (Alsharhan et al., 2023). This study considers perceived usefulness, perceived ease of use, trust, and cultural dimensions among the hurdles identified to chatbot adoption. The research has discovered these characteristics as essential predictors of user perceptions of chatbot intelligence (Shin et al., 2022; Al-Emran et al., 2023). The dependent variable (DV) will be how users perceive chatbot intelligence. Understanding how these elements influence user views is critical for increasing the effectiveness and acceptability of AI-based chatbots in the UAE setting. In addition to the chosen IVs, a moderating variable will be incorporated to improve the study's results. This moderating variable will concentrate on user experience with AI technology, such as previous experiences with chatbots and familiarity with AI-powered platforms. By considering the moderating effect of user experience, the study hopes to provide a more nuanced understanding of how different user attributes influence perceptions of chatbot intelligence in the UAE (Shwedeh, Aburayya, et al., 2022; Shwedeh, Hami, et al., 2022). Therefore, this investigation aims to answer the following:

**research questions:**

- i. Is there a strong correlation between chatbot perceived usefulness and intelligence?
- ii. Is there a correlation between perceived ease of use and chatbot intelligence?
- iii. Is there a correlation between trust and perceived chatbot intelligence?
- iv. Is there a correlation between culture (individualism and collectivism) and chatbot intelligence?

**Research Objectives**

The objectives of this investigation are listed below:

- i. To examine the significant role of perceived usefulness and chatbot intelligence.
- ii. To establish the significant relationship between chatbot perceived ease of use and chatbot intelligence.
- iii. To investigate the role of consumers' trust and chatbot intelligence.
- iv. To explore the significant role of culture (individualism and collectivism) on perceived chatbot intelligence.
- v. To examine the moderating role of culture on the relationship between perceived usefulness and

## Conceptual Evidence on Chatbots Usefulness

### **Overview of Chatbot Evolution**

Adamopoulou and Moussiades (2020) delineate the dynamic realm of chatbot intelligence, characterized by its flexible usefulness across different industries and supported by the AI algorithm developments shown by Albayrak, Ozdemir, and Zeydan (2018). Athota et al. (2020) and Divya et al. (2018) demonstrate that AI-powered chatbots can imitate human-like conversations, assisting in various tasks, including medical diagnostics and customer service. Hill et al. (2015) emphasize the importance of these chatbots in this context. Despite their growth, the advancement of chatbot intelligence remains a significant challenge, requiring additional research and creativity to handle user interface issues and improve functionalities (Adamopoulou & Moussiades, 2020). By harnessing the latest breakthroughs in artificial intelligence and fostering interdisciplinary collaboration, chatbot intelligence has the potential to transform digital communication spaces completely.

### **Service Technology and Chatbot Evolution**

The proliferation of chatbots across several sectors, such as education, government services, and customer assistance, can be attributed to the recent advancements in artificial intelligence (AI). The increase in integration indicates a significant change in how services are provided, influenced by the evolving technological environment (Andrikopoulos et al., 2011). Researchers have extensively studied the impact of AI-powered chatbots on user interactions and experiences, as evidenced by much international research (Al-Sharafi et al., 2023; Ibrahim et al., 2023). This research collaboration focuses on comprehending the diverse mechanisms that support the implementation of chatbots in existing service ecosystems.

The increasing scholarly discussion on AI-based chatbots provides valuable insights into technology's evolving roles and impacts in service environments (Adomavicius et al., 2007; Papazoglou, 2008). Academics endeavor to delineate the intricate intricacies of chatbot technology and its associated concerns by amalgamating various viewpoints from prominent publications such as Adamopoulou and Moussiades (2020) and Zerouani et al. (2022). Researchers like Aslam (2023) and Ukpabi et al. (2019) investigate the boundaries of chatbot adoption through empirical studies and theoretical investigations, shedding light on conceptual frameworks and practical ramifications for various domains. Moreover, Pantano and Pizzi (2020) and Paliwal et al. (2020) emphasize the disruptive capacity of AI chatbots in revolutionizing the digital realm, introducing a novel era of innovation and effectiveness in online customer service (Alimour et al., 2024; Shwedeh, 2024). Ultimately, the academic discourse surrounding AI-driven chatbots demonstrates the ever-evolving nature of technological advancements and underscores the significance of scholarly inquiry in comprehending its impact on contemporary service models (Aburayya et al., 2023; Shwedeh et al., 2023).

### **Benefits of Chatbot Adoptions**

Implementing chatbots brings numerous benefits, positioning them as indispensable assets in various sectors. Chatbots catalyze increased productivity, enhanced customer service, and improved efficiency (Lidén & Nilros, 2020). By promptly responding to inquiries, they improve communication processes by eliminating the need for human intervention and reducing response times (Laranjo et al., 2018). Chatbots operate

continuously to ensure customers can access and use them, enhancing user experiences and increasing consumer happiness (Hernandez et al., 2020). The constant availability of the service encourages prompt assistance and nurtures a sense of trust and reliability among clients, fostering continued engagement and loyalty to the provider.

In addition, the empirical studies undertaken by Malik et al. (2021) and Mydyti & Kadriu (2021) highlight the crucial importance of chatbots in aiding digital transformation and indicating a significant shift in the techniques of providing services. Organizations can improve their operational capabilities, foster innovation, and sustain competitiveness in an increasingly digitized environment by employing chatbots (Pillai & Sivathanu, 2020). However, Lopez and Qamber (2022) caution that despite the numerous benefits offered by chatbots, their implementation in higher education may pose challenges, particularly with the experiences of international students. Hence, while using chatbots presents significant opportunities, it is essential to exercise caution in evaluating contextual factors, and user needs to harness their capabilities and mitigate any possible drawbacks fully.

### **Users' Perceptions of Chatbot Usage**

Despite the increasing prevalence of chatbots in various industries, there remains a fundamental challenge in how users perceive the intelligence of chatbots globally, which affects their overall acceptance and adoption (Laranjo et al., 2018). This matter emphasizes the significance of comprehending users' expectations and interactions with chatbots. Zamora (2017) and Svenningsson and Faraon (2019) examine aspects of the perception of human-like qualities and social cognitive abilities in chatbots, offering a valuable understanding of the intricate nature of user perceptions and expectations. Mariacher et al. (2021) and Abd-Alrazaq et al. (2021) examine user attitudes and experiences with chatbots, specifically in mental health scenarios. They emphasize the challenges and opportunities for enhancing user acceptance and engagement. Although there have been advancements in chatbot technology, there are still challenges in matching user expectations with the capabilities and functions of chatbots. This requires ongoing efforts to enhance chatbot design and functionality to meet user expectations effectively.

In addition, although chatbots operate 24/7 to provide constant availability and accessibility for users, there are still challenges in optimizing their perceived utility and efficiency in information retrieval tasks (Tariverdiyeva, 2019). Wuenderlich and Paluch (2017) and Denecke et al. (2021) emphasize the need to develop chatbots that exhibit warmth, friendliness, and empathy, leading to favorable user experiences and establishing rapport. Nevertheless, there are still obstacles to overcome when utilizing artificial intelligence for chatbots in mental health settings. Significant barriers include privacy, confidentiality, and the reliability of chatbot help (Denecke et al., 2021). To tackle the diverse concerns of user perceptions of chatbot intelligence, it is necessary to have a comprehensive comprehension of user expectations and preferences. Additionally, continuous efforts must be made to enhance chatbot capabilities, usability, and effectiveness in different fields and contexts.

Although chatbots are being used increasingly in many industries, there is still a significant problem with how users perceive the intelligence of chatbots worldwide, significantly affecting their widespread acceptance. Shin, Chotiyaputta, and Zaid (2022) found that cultural traits, such as individualism versus collectivism and power distance, impact users' perception and interaction with chatbots, which may restrict their acceptance. The results of Alsharhan, Al-Emran, and Shaalan (2023) indicate that concerns regarding the reliability and security of AI technology and doubts about chatbot skills are significant obstacles to its adoption. In addition, according to Al-Emran et al.

(2023), chatbots often disappoint users due to issues with their design and functionality, particularly in terms of conversational skills and response. This dissatisfaction leads to a lack of willingness to use such systems. In addition, the lack of user experience and familiarity with AI-based technologies, especially among specific demographic groups, leads to uncertainty regarding using chatbots. This is supported by the findings of Alhalabi et al. (2022).

Given these challenges, it is evident that enhancing user perceptions of chatbot intelligence is crucial for boosting their adoption and utilization. To do this, it is imperative to analyze the cultural disparities that impact user engagement with chatbots and tailor their design accordingly. Moreover, it is crucial to prioritize technological advancements and rigorous testing to enhance chatbots' reliability, security, and capabilities (Alkashami et al., 2023; Salloum et al., 2023). These efforts are essential for alleviating user concerns and cultivating trust in these systems (Adamopoulou & Moussiades, 2020). Moreover, prioritizing user experience and implementing user-friendly designs that align with user expectations can mitigate dissatisfaction and resistance to adopting chatbots (Zerouani, Haqiq, & Bounabat, 2022).

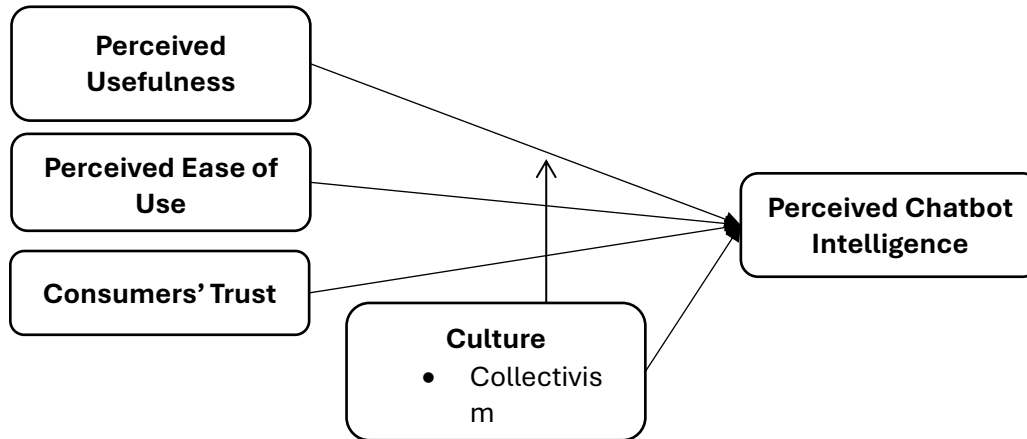
The formation of perspectives on chatbot intelligence is significantly influenced by culture, affecting individuals' interactions with and comprehension of these AI-driven systems (Shin et al., 2022; Haoyue & Cho, 2024). Cultural value orientations, including individualism and collectivism, significantly influence the attitudes and actions of consumers concerning chatbots (Fatima et al., 2024). For instance, members of collectivist societies prioritize cooperation and group cohesion when resolving issues; therefore, they prefer chatbots, emphasizing coordination and collaboration (Müller et al., 2023). In contrast, individualistic societies place a premium on personal accomplishments and goals, seeking chatbots that can be tailored and customized to suit specific users' preferences (Shin et al., 2022). Cultural value orientation disparities impact how users perceive chatbots' intelligence, subsequently influencing their inclination to interact with human chatbots (Haoyue & Cho, 2024). Therefore, it is crucial to understand the impact of culture on the intelligence of chatbots to develop effective and culturally sensitive chatbot systems that accommodate the diverse preferences and expectations of users (Huang & Wang, 2023).

Moreover, enhancing user education and familiarity with AI-based technologies is crucial, especially among disadvantaged demographic groups. This is essential for building trust and ensuring comfort while utilizing chatbots for various purposes (Aslam, 2023). Collaborative efforts are required to overcome the challenges and leverage the potential of chatbots to enhance digital interactions and optimize processes in various industries.

**Given this, the hypotheses are given as follows:**

- There is a notable connection between how useful people perceive a chatbot to be and the chatbot's perceived intelligence.
- The ease with which users find the chatbot to be useful significantly affects their views on the chatbot's intelligence.
- A significant link exists between consumers' trust and how intelligent they believe the chatbot is.
- Cultural factors, such as individualism and collectivism, significantly impact the perceived intelligence of the chatbot.
- Culture significantly influences the relationship between perceived usefulness and the perceived intelligence of the chatbot.

Figure 1: Research Framework



### Methodology

This study utilized a cross-sectional research design, achieving its aims by distributing pre-designed survey questionnaires to the target participants. The participants were bank customers who had interacted with service chatbots in various industries over the past few months. Marshall (2005) recommends using questionnaires for data collection, and Galpin (1987) supports the effectiveness of surveys for this purpose (Dahu et al., 2022; Khadragy et al., 2022). Patten (2016) provides practical advice on questionnaire research, validating the study's method. The selected industries included banks, education, health service providers, and government agencies in the UAE. The study's questionnaire items were measured on a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The pre-designed questionnaires were randomly distributed to respondents in educational institutions, service providers, and government agencies that automate their customer service processes (Dahu et al., 2022; Khadragy et al., 2022). The items for measuring chatbot intelligence were derived from the characteristics defined in previous studies (Aburayya et al., 2023; Shwedeh et al., 2023). Chatbot intelligence involves using natural language processing and machine learning to interpret and respond to user queries in a human-like manner (Adamopoulou and Moussiades, 2020; Albayrak et al., 2018). This study assesses chatbot intelligence based on its capability to answer questions as a human would. Consequently, six items were adapted from relevant sources (Adamopoulou & Moussiades, 2020; Adomavicius et al., 2007). The chatbot's ability to understand and respond appropriately to user inquiries reflects its intelligence.

- i. Users' perception of the chatbot's capacity to learn from interactions and adapt responses indicates its intelligence level.
- ii. The chatbot effectively provides relevant and accurate information, demonstrating its intelligence in analyzing and processing users' requests.
- iii. The chatbot can engage in natural and human-like conversations, thus reflecting its intelligence in mimicking human communication.
- iv. The chatbot can manage complex tasks and problem-solving scenarios, demonstrating intelligence and cognitive capacities.
- v. Users' impression of the chatbot's overall effectiveness and utility in assisting with various tasks measures its intelligence and practicality.

Perceive usefulness is measured in this research as the effectiveness and efficacy of chatbots in answering queries and aiding productivity. Given this, the items used in the construct measurements are adapted from the studies that include (Al-Emran et al., 2023; Athota et al., 2020; Alhalabi et al., 2022; Divya et al., 2018; Ibrahim et al., 2023).

In total, five (5) items were adapted in this regard.

- i. Using the chatbot increases my productivity when completing activities or obtaining knowledge.
- ii. The chatbot offers crucial aid in answering my questions or issues.
- iii. Using the chatbot improves my overall efficiency.
- iv. The chatbot is a terrific tool for retrieving relevant and exact information.
- v. The chatbot improves my overall experience and satisfaction with the service.

Perceived ease of use of a chatbot refers to users' evaluation of the effort needed to interact with the chatbot system and complete tasks competently and efficiently. It includes elements such as the ease of using the chat interface, clarity of responses, and convenience of acquiring necessary information (Albayrak et al., 2018).

- i. The chatbot interface is intuitive and straightforward to navigate.
- ii. I comprehend the chatbot's responses with ease.
- iii. Interacting with the chatbot demands little cognitive exertion on my side.
- iv. Mastering the effective utilization of the chatbot is a simple task.
- v. In general, I find the chatbot system to be straightforward and user-friendly.

On consumers' trust, the construct is described as the confidence and belief that the product or service is reliable and dependable and the willingness to engage with such (Al-Emran et al., 2023; Athota et al., 2020 Adamopoulou & Moussiades, 2020). Hence, five items are adapted from earlier investigations in this regard. The items are:

- i. I depend on the chatbot to provide precise and reliable information.
- ii. I am at ease disclosing personal information to the chatbot.
- iii. I am confident that the chatbot upholds my privacy and maintains confidentiality.
- iv. Based on our past conversations, I have confidence in the chatbot's reliability.
- v. I rely on the chatbot to aid me with essential tasks or choices.

Culture is molded by social norms, traditions, and past experiences (Shin et al., 2022; Müller et al., 2023). Six survey questions were adjusted from earlier studies (Haoyue & Cho, 2024; Fatima et al., 2024; Müller et al., 2023; Shin et al., 2022) to measure the perceived impact of cultural characteristics (collectivism and individualism) on chatbot intelligence. These items examine the respondents' perceived cultural values' influence on chatbot intelligence. This will reveal how cultural attitudes affect chatbot intelligence evaluation.

- i. I prefer chatbots that promote collective efforts and cooperation above personal accomplishments.
- ii. The customization options for the chatbot should be tailored to individual preferences rather than collective preferences.
- iii. Chatbots must adhere to cultural norms when interacting with users.

- iv. The level of personalization in chatbot interactions significantly influences my opinion of their cognitive capabilities.
- v. I favor chatbots that promote peace and teamwork when resolving problems.
- vi. Chatbots' level of autonomy and independence significantly influences my perception of their usefulness.

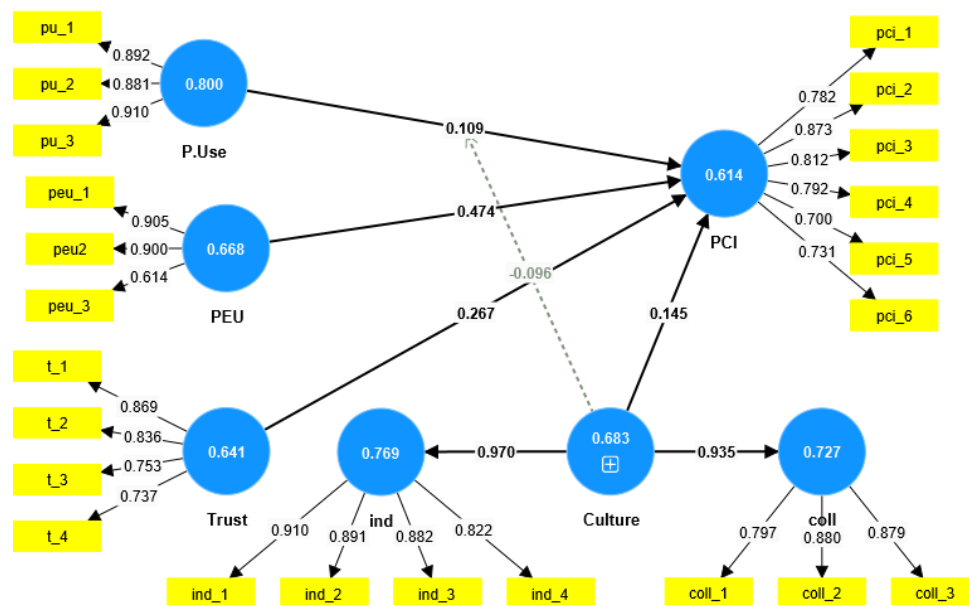
**Data Analysis**

A total of 400 responses were initially collected, but 10% (40 responses) were excluded because the respondents indicated no interaction with chatbots. Thus, 360 responses were available for analysis. Among these 360 respondents, the majority were female, comprising 59.1% (213 respondents), while the remaining 41.9% (147 respondents) were male. All respondents (100%) were familiar with chatbots used in the banking sector in the UAE. The results show that 80% (288 respondents) have been interacting with various bank chatbots for over three years, while 10% (36 respondents) have had interactions for less than three years. Most respondents, 55% (198 respondents), reported interacting with educational chatbots. Additionally, 15% (54 respondents) interacted with health service chatbots, 20% (80 respondents) with bank chatbots, and the remaining 10% (36 respondents) with government agency chatbots..

**Data Analysis and Discussion**

We employed the SEM analysis tool to analyze the significant relationship between the investigated constructs: perceived usefulness, perceived ease of use, customers' trust on perceived chatbot intelligence, and the moderating role of culture. Hence, we assess the measurement and structural model because it can accommodate data that assume no normal distribution assumptions (Chin, Marcolin & Newsted, 2003; Ringle, Wende & Becker, 2015). Considering the measurement model, we examined the construct reliability and model validity before proceeding to access the structural model, where the relationships were tested. Moreover, since we have a higher-order construct, we explore the model using a reflective-reflective model (Ringle et al., 2015).

**Hypthesis Testing**





**Figure 2 Measurement Model Assessment**

Construct	Item	Item Loadings	CR	AVE	Discriminant Validity
PCI	pci_1	0.782	0.905	0.614	YES
	pci_2	0.873			
	pci_3	0.812			
	pci_4	0.792			
	pci_5	0.7			
	pci_6	0.731			
P.Use	pu_1	0.892	0.923	0.8	YES
	pu_2	0.881			
	pu_3	0.91			
PEU	peu_1	0.905	0.855	0.668	YES
	peu_2	0.9			
	peu_3	0.614			
Trust	t_1	0.869	0.877	0.641	YES
	t_2	0.836			
	t_3	0.753			
	t_4	0.737			
coll	coll_1	0.797	0.889	0.727	YES
	coll_2	0.88			
	coll_3	0.879			
ind	ind_1	0.91	0.93	0.769	YES
	ind_2	0.891			
	ind_3	0.882			
	ind_4	0.822			

Meanwhile, Figure 2 and Table 1 reveal the construct and convergent validity for the first-order construct conditions to be met in this investigation because the CR for the constructs is greater than 0.7. Also, the AVE for these constructs is greater than 0.5. Given this, the CR(culture), a higher-order construct, is calculated using:

$$CR_{\text{culture}} = \frac{0.970+0.935}{2} = \frac{1.905}{2} = 0.953$$

$$AVE_{\text{culture}} = \frac{\sum_{i=1}^M l_i^2}{M} = \frac{0.970^2+0.935^2}{2} = \frac{0.9409+0.8742}{2} = \frac{1.815}{2} = 0.908$$

Given the fact that the AVE exceeds 0.5 (0.908) and CR is greater than 0.7 (0.953)

	P.Use	PCI	PEU	Trust	coll	Ind
PCI	0.831					
PEU	0.524	0.046				
Trust	0.713	0.862	0.814			

coll	0.565	0.785	0.906	0.56		
Ind	0.787	0.853	0.885	0.651	0.532	
Culture x P.Use	0.123	0.425	0.338	0.384	0.379	0.271

Furthermore, we assess the model's discriminant validity by accessing Heterotrait Monotrait construct correlations. As proposed by (Hair et al., 2021), the construct intercorrelations should not exceed 0.9. Table 2 Presents the HTMT construct correlations; the value in this table is less than 0.9. given this, it is believed that the discriminant model is valid.

Table 3 Collinearity (VIF) for Inner model, R-Sq. And Effect Size (F2)

	VIF	R-square	R-square adjusted	F2
		PCI	0.838	0.835
Culture -> PCI	2.57			0.026
P.Use -> PCI	2.786			0.364
PEU -> PCI	3.814			0.223
Trust -> PCI	1.981			0.05
Culture x P.Use -> PCI	1.276			0.041

Furthermore, we examine the existence of collinearity issues using the Variance Inflated Factor (VIF). According to Dormann et al. (2013), there is a collinearity issue in the data or model if the VIF value is greater than five (5). Insights into Table 3 show that the VIF is less than 5; hence, it is concluded that the model is free from collinearity issues. Considering this, we proceed to access the model structural model. Additionally, we examine the variance explained using  $r^2$ . The  $r^2$  value in the model shows 0.38, implying that the independent variables in this investigation explain 83.8% variance of the dependent variable PCI.

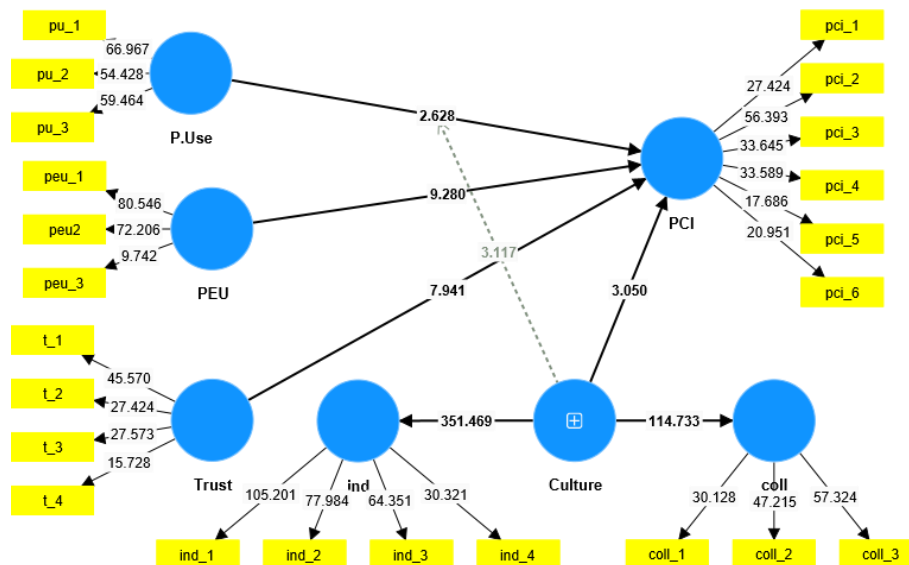


Figure 3 Structural Model Assessment

Table 4 Hypothesis Testing

Hypothesis	Relationships	$\beta$	STDEV	T stat	P values
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H1	P.Use -> PCI	0.109	0.041	2.628	0.009
H2	PEU -> PCI	0.474	0.051	9.28	0
H3	Trust -> PCI	0.267	0.034	7.941	0
H4	Culture -> PCI	0.145	0.048	3.05	0.002
H5	Culture x P.Use -> PCI	-0.096	0.031	3.117	0.002

### Direct Relationship

The analysis results present a significant relationship between chatbot perceived usefulness (P.Use) and Perceived Chatbot Intelligence (PCI) having (P.Use) ( $\beta = 0.109$ , T-value 2.628),  $p < 0.05$ ; Hence we accept H1. Perceived Ease of Use (PEU) significantly influences PCI having ( $\beta = 0.474$ , T-value 9.28),  $p < 0.05$ ; hence, H2 was accepted. The relationship between perceived customer trust (Trust) significantly influences perceived chatbot intelligence (PCI) having (Trust) ( $\beta = 0.267$ , T-value 7.941),  $p < 0.05$ ; therefore, H3 was accepted. We also examine the influence of culture on PCI. The findings present a significant relationship between culture and PCI having (Culture) ( $\beta = 0.145$  T-value 3.05),  $p < 0.05$ ; therefore, H4 was accepted.

### Moderating Relationship

Finally, we examine the moderating role of culture on the relationship between perceived usefulness on PCI. The result shows a significant relationship having (Culture x P.Use) ( $\beta = -0.096$  T-value 3.117),  $p < 0.05$ ; therefore, we accept the fifth hypothesis even though this finding is negative.

### Discussion

This study highlights the substantial influence of many aspects on how intelligent chatbots are perceived in higher education. The analysis shows a strong and positive correlation between users' perception of chatbot utility (P.Use) and their perception of chatbot intelligence (PCI), suggesting that consumers view chatbots as more intelligent when they find them helpful. This discovery is consistent with prior studies conducted by Haoyue and Cho (2024) and Fatima et al. (2024), highlighting the significance of utility in influencing perceptions of chatbot intelligence. The study emphasizes the significant impact of perceived ease of use (PEU) in shaping views of chatbot intelligence, where higher degrees of ease of use are linked to increased perceived intelligence. This discovery aligns with Huang and Wang's (2023) meta-analysis, indicating that user-friendly interfaces enhance the persuasiveness of AI technology (Shwedeh, Aburayya, et al., 2022; Shwedeh, Hami, et al., 2022). The research explains how cultural elements affect how intelligent chatbots are regarded, showing a notable connection between culture and PCI. This emphasizes the significance of taking cultural subtleties into account while creating and executing chatbot systems, as emphasized by Müller et al. (2023) and Shin et al. (2022). Organizations can improve the usefulness and acceptance of chatbot technology among varied user communities by recognizing and adapting to cultural differences. The results provide useful information for educators, developers, and policymakers looking to improve the design and implementation of chatbots in higher education environments. Institutions can develop chatbot systems that are seen as intelligent and promote positive user experiences by considering factors like perceived usefulness, ease of use, trust, and cultural sensitivity (Ravikumar et al., 2023; Shwedeh et al., 2020). This can enhance engagement and support knowledge sharing in educational settings.

Studying how culture influences the connection between perceived usefulness and Perceived Chatbot Intelligence (PCI) provides a detailed understanding of how users'

views are influenced in different cultural settings. The connection between culture and perceived usefulness (P.Use) in chatbot systems highlights the intricate relationship between cultural orientations and the effectiveness of these systems, notwithstanding the negative aspects of the relationship. This discovery aligns with the research conducted by Sandu and Gide (2019) and Malik et al. (2021), highlighting the importance of taking cultural aspects into account while implementing and assessing the efficacy of chatbot technology. The negative moderation indicates that cultural factors can somewhat reduce the influence of perceived utility on PCI. This emphasizes the importance of customizing chatbot systems to match cultural tastes and expectations. Educators, developers, and policymakers can enhance the design and implementation of chatbot systems in higher education by recognizing the impact of culture and adopting culturally sensitive approaches. It involves acknowledging and adapting to various cultural norms, communication styles, and preferences to improve the significance and efficiency of chatbot interactions in diverse cultural environments. It highlights the significance of carrying out culturally sensitive evaluations and adjustments across the entire development process of chatbot technology. Organizations can enhance chatbot effectiveness by recognizing cultural diversity as a critical factor. This approach can lead to more inclusive and engaging educational experiences that appeal to users from different cultural backgrounds, thereby supporting the advancement of digital learning environments in higher education (Alimour et al., 2024; Shwede, 2024).

#### **Theoretical Contribution**

This study provides a substantial theoretical addition by clarifying the complex relationship between perceived usefulness, cultural influences, and Perceived Chatbot Intelligence (PCI) in the higher education setting (Alkashami et al., 2023; Salloum et al., 2023). This study enhances our comprehension of how cultural orientations influence users' views on chatbot intelligence by revealing a substantial moderating effect of culture on the connection between perceived usefulness and PCI. The study highlights the significance of incorporating cultural differences into the development and execution of chatbot systems to improve user engagement and efficacy. This theoretical insight enhances the theoretical foundations of chatbot research. It guides the creation of culturally customized educational technology, aiding in the progression of digital learning environments in higher education.

#### **Practical Contribution**

This work provides practical contributions to higher education and technology implementation, as well as its theoretical implications. The study emphasizes how culture influences the connection between perceived usefulness and Perceived Chatbot Intelligence (PCI), offering practical guidance for educators, developers, and policymakers working on chatbot system development and implementation. By acknowledging the impact of cultural aspects, stakeholders can implement culturally sensitive strategies to customize chatbot interactions according to user preferences and expectations. This practical instruction helps create chatbot technologies that are seen as more intelligent, engaging, and relevant in many cultural settings. The study's practical contributions lead to developing more efficient and comprehensive digital learning environments in UAE's service sectors, ultimately improving the quality and accessibility of service experiences (Ravikumar et al., 2023; Shwede et al., 2020).

#### **Limitations and Conclusions**

While this study contributes valuable insights into the relationship between perceived usefulness, cultural factors, and Perceived Chatbot Intelligence (PCI) in higher education, several limitations warrant consideration. Firstly, the research focused solely

on the moderating role of culture, overlooking other potential contextual variables that may influence chatbot perceptions. Future studies could explore additional factors such as individual differences, technological infrastructure, and educational context to provide a more comprehensive understanding. Secondly, the study's reliance on self-reported data may introduce common method bias and social desirability effects, potentially impacting the accuracy of responses. Employing mixed-method approaches or experimental designs could mitigate these limitations and offer more robust findings. Despite these constraints, the findings underscore the importance of cultural sensitivity in chatbot design and implementation, offering practical implications for educators and developers aiming to enhance user engagement and effectiveness in digital learning environments. In conclusion, this research advances our theoretical understanding of chatbot perceptions within diverse cultural contexts and provides practical guidance for developing more inclusive technologies the UAE service sectors. Moving forward, addressing these limitations and continuing to explore the complex interplay between culture, technology, and user perceptions will be crucial for advancing the field and facilitating meaningful global service experiences.

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