Designing Delight: Exploring the Nexus of Interactive Design, User Experience, and Psychological Theory in Banking Chatbot

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This study explores the complex relationships among interactive design, linguistic variance, human characteristics, and users' interactions with banking chatbots. We examine the crucial connections revealed by empirical analysis using a sample of users who have previously engaged with bank chatbots. Our research emphasizes the essential impact of interactive design on influencing users' perceptions and interactions. Well-crafted design elements notably improve the overall user experience. We emphasize the significance of integrating language variation capabilities into chatbots to accommodate varied user demographics, as well as the influence of anthropomorphic design characteristics on enhancing user engagement and happiness. Our work provides crucial implications for building more intuitive and inclusive chatbot interactions in the banking sector by incorporating insights from psychological theories. Through thorough empirical investigation, this research enhances comprehension of the complex relationships among design, language, humanness, and user experiences in banking chatbots.

Keywords: Chatbots, Cultural Sensitivity, User Experience, Interactive Design, Language Variation, Humanness.

1. Introduction

Recent research has provided insight into the crucial significance of user experience (UX) design in improving the efficiency of chatbots in the banking industry (Chaves et al., 2021; Cheng & Jiang, 2020; Hultman & Zarki, 2021). With the advancement of technology, banking institutions have progressively adopted chatbots to optimize customer care interactions, providing timely replies and tailored support 24/7. Nevertheless, despite their potential advantages, the user experience of banking chatbots continues to be a subject of considerable apprehension and investigation in both academic and corporate spheres (Shwedeh, Salloum, Aburayya, Fatin, Elbadawi, Ghurabli, Muhammad, et al., 2024; Shwedeh, Salloum, Aburayya, Fatin, Elbadawi, Ghurabli, Murad, et al., 2024; N. Yas et al., 2024).

It is crucial to comprehend the user experience of banking chatbots since it directly links to client happiness and loyalty (Cheng & Jiang, 2020). The interaction design of these chatbots is crucial in molding user perceptions and impacting their ongoing involvement (Haugeland,

2020). Furthermore, in developing economies, where digital engagements are increasing, it is essential to understand how individuals from various demographics engage with banking chatbots (Mogaji et al., 2021).

Prior studies have identified persistent problems and difficulties users encounter while interacting with banking chatbots. These concerns encompass privacy issues, satisfaction levels, and overall influence on the digital customer experience (Hultman & Zarki, 2021; Hari et al., 2022). Moreover, research has demonstrated that differences in language structure and the level of human-like qualities integrated into chatbot conversations substantially impact user experience and behavior (Chaves et al., 2021; Jakobsen, 2021).

However, there is still a lack of complete knowledge in the existing literature about the user experience of banking chatbots, specifically in the context of the United Arab Emirates (UAE) (Følstad & Taylor, 2021). Although previous studies offer valuable insights into user satisfaction and behavioral patterns, a more thorough examination of user perceptions, emotions, and interactions is required to guide the design and deployment of more efficient chatbot systems (Kvale et al., 2020). Therefore, this study aims to fill this void by examining the intricacies of user experience design in banking chatbots. Using quantitative analysis methodologies, the objective is to reveal valuable information regarding user preferences and dissatisfaction areas and present enhancement opportunities (S. A. Salloum, Almarzouqi, Aburayya, Shwedeh, Fatin, Ghurabli, Dabbagh, et al., 2024; S. A. Salloum, Almarzouqi, Aburayya, Shwedeh, Fatin, Ghurabli, Elbadawi, et al., 2024; Shwedeh, Salloum, Aburayya, Kaur, Mohammad, Mazharul, Fatin, et al., 2024). Essentially, this investigation is vital for enhancing our comprehension of how to develop chatbot systems that fulfill consumers' practical requirements and provide smooth and gratifying encounters. This project seeks to strengthen the development of banking chatbots by connecting theoretical knowledge with practical implementation. The objective is to create chatbot interfaces that are more intuitive, sympathetic, and user-friendly (Saeed, M. D., & Khudhair, H. Y., 2024).

In light of these, the objectives of this investigation are:

i.   To examine the significant influence of interaction design of chatbots in banks in the UAE and consumers' user experience (UX).

ii.   To investigate the significant effect of language variation of chatbots in UAE banks and consumers' user experience (UX).

iii.   To investigate the impact of chatbot humanness level in UAE banks and consumers' user experience (UX).

Overview of the Importance of User Experience in Banking Chatbots

The banking industry has recently experienced a notable shift in customer service delivery by implementing chatbots powered by artificial intelligence (AI). Chatbots, conversational agents powered by artificial intelligence, have become essential tools for improving client experience and interaction in the banking industry (Aboelazm, K. S., 2023). Nicolescu and Tudorache (2022) argue that incorporating chatbots into customer service operations has transformed how humans engage with computers, providing a smooth and effective method for handling client queries and resolving problems. Bhattacharya and Sinha (2022) concur with this sentiment, emphasizing the crucial function of artificial intelligence in banking to

enhance customer experience. They underscore the growing acceptance of chatbots as indispensable elements of contemporary financial services (Shwedeh, Salloum, Aburayya, Fatin, Elbadawi, Ghurabli, & Dabbagh, 2024; H. Yas, Aburayya, et al., 2024; H. Yas, Dafri, et al., 2024).

Evolution of Chatbots in Banking

Historical Development and Adoption of Chatbots in the Banking Industry

The proliferation and implementation of chatbots in the banking sector have been propelled by an increasing focus on improving customer service and operational effectiveness (Khudhair, H. Y., Jusoh, A., Mardani, A., Nor, K. M., & Streimikiene, D., 2019). The initial trials of chatbot technology can be traced back to the early 2000s (Alimour et al., 2024; Khadragy et al., 2022; Ravikumar et al., 2023). However, it was only in recent years that notable progress in artificial intelligence and natural language processing emerged, leading to its broad acceptance. Haugeland (2020) emphasizes the significance of comprehending the user experience of customer support chatbots through empirical investigations, elucidating how interaction design impacts user perceptions and contentment. Mogaji et al. (2021) offer significant insights into the interactions between banking chatbots and consumers in emerging markets, emphasizing the worldwide importance of this technological advancement (Alkashami et al., 2023; Dahu et al., 2022; Shwedeh, 2024).

In addition, the empirical research conducted by Cheng and Jiang (2020) and Følstad and Taylor (2021) thoroughly investigated the influence of AI-powered chatbots on user experience. These studies analyze several aspects, including gratifications, perceived privacy risk, satisfaction, loyalty, and continuing usage (Aburayya et al., 2023; Alkashami et al., 2023). These studies provide detailed and subtle insights into the complex nature of user interactions with chatbots and emphasize the significance of designing chatbots with a focus on the needs and preferences of users. In addition, Chaves et al. (2021) investigate the impact of linguistic variety on the user experience of chatbots, highlighting the importance of culturally sensitive design strategies to accommodate a wide range of user preferences (Alkashami et al., 2023; Dahu et al., 2022; Shwedeh, 2024).

Advancements in technology and AI have shaped the evolution of banking chatbots.

Artificial intelligence (AI) and modern technology have accelerated the transformation of client interactions and service delivery in the banking industry, resulting in the emergence of chatbots. This literature review examines the crucial influence of technical improvements on the development of banking chatbots, consolidating findings from several research studies to comprehend this transformational phenomenon fully (Dahu et al., 2022; Khadragy et al., 2022; Ravikumar et al., 2023).

The merging of technological advancements with customer-focused design approaches marks the evolution of chatbots in banking. Researchers such as Suhel et al. (2020) and Adamopoulou and Moussiades (2020) offer unique perspectives on the progression of chatbot technology, examining its origins and emphasizing significant milestones in its advancement. Chatbots have progressed from basic rule-based systems to advanced AI-powered conversational agents, capable of imitating human-like interactions and providing personalized and efficient customer support experiences (Shwedeh et al., 2020, 2023;

Shwedeh, Hami, et al., 2022).

The introduction of AI-powered technologies has significantly improved the functionality of banking chatbots, allowing them to carry out intricate operations and adjust to user preferences with exceptional accuracy. El-Gohary et al. (2021) highlight the significant influence of AI on customer experiences in the banking industry, emphasizing the potential of AI-powered chatbots to provide smooth and spontaneous interactions (Aboelazm, K. S., 2024). Similarly, Sheth et al. (2022) investigate the cutting-edge realm of AI-powered banking services, emphasizing the significance of tailored experiences in fostering client engagement and loyalty (Aburayya et al., 2023; S. Salloum et al., 2023; Shwedeh, Aburayya, et al., 2022).

The empirical research conducted by Gunathilaka (2022) and Haugeland et al. (2022) provides valuable insights into the capabilities of AI banking chatbots, revealing how these technologies boost convenience, accessibility, and efficiency to provide value for clients. In addition, the studies conducted by Cheng and Jiang (2020) and Følstad and Taylor (2021) investigate the influence of AI-powered chatbots on user experience, explicitly analyzing aspects such as gratifications, satisfaction, and sustained usage. These studies emphasize the crucial significance of user-centered design and seamless integration of AI technology in maximizing chatbot performance and usability (Dahu et al., 2022; Khadragy et al., 2022; Ravikumar et al., 2023).

Ultimately, the development of banking chatbots is closely linked with progress in technology and artificial intelligence, leading to innovation and reshaping customer service standards in the banking sector (Khudhair, H. Y., Jusoh, A., Mardani, A., Nor, K. M., & Streimikiene, D., 2019). This literature review offers unique insights into the revolutionary potential of AI-enabled chatbots by critically reviewing pertinent research findings. It also provides a roadmap for future study and development in this quickly growing subject (Shwedeh et al., 2023; Shwedeh, Aburayya, et al., 2022; Shwedeh, Hami, et al., 2022).

Overview of current trends and practices in banking chatbot deployment

The banking industry is shifting substantially as chatbots become increasingly prevalent, fueled by developments in artificial intelligence and machine learning technologies. Research conducted by Wube et al. (2022) and Nirala et al. (2022) emphasizes the increasing frequency of text-based chatbots, demonstrating their adaptability in improving customer interaction and optimizing service delivery procedures. Alnefaie et al. (2021) and Suhel et al. (2020) offer valuable information on conversational agent technologies' uses and potential future developments. Meanwhile, Luo et al. (2022) thoroughly evaluate cutting-edge chatbot designs, focusing on user-centered design principles and smooth integration with established banking platforms. The empirical studies conducted by Bhattacharya and Sinha (2022) and El-Gohary et al. (2021) highlight the significance of artificial intelligence in enhancing customer experiences in the banking sector. Additionally, the research conducted by Mogaji et al. (2021) and Sheth et al. (2022) investigates personalized banking experiences and the changing dynamics of emerging markets, providing insights into the strategic factors that drive the adoption of chatbots. Therefore, implementing chatbots in the banking sector signifies a significant change in how customer care is provided, utilizing artificial intelligence (AI) technology to improve the quality of service and operational effectiveness

(Khudhair, H. Y., Jusoh, A., Mardani, A., & Nor, K. M., 2019).

Factors Influencing User Experience in Banking Chatbots

Chatbots have become crucial to transforming client relationships within the constantly changing banking industry. Several aspects influencing user experience in banking chatbots have been shown through a comprehensive synthesis of varied studies. The studies conducted by Bhattacharya and Sinha (2022) and Wube et al. (2022) highlight the importance of text-based chatbots, specifically emphasizing their ability to improve customer engagement and enhance service efficiency. Adamopoulou and Moussiades (2020) and Nirala et al. (2022) examine the historical development and present uses of chatbot technologies, emphasizing their ability to bring about significant changes in banking operations (Yas, H., Mardani, A., & Alfarttoosi, A., 2020).

Artificial intelligence (AI) integration and interaction design are crucial to comprehending user experience. In-depth inquiries conducted by Haugeland et al. (2022) and Følstad and Taylor (2021) have provided valuable insights into the intricate dynamics of interactions between chatbots and users. These studies highlight the need to integrate AI seamlessly and adopt design principles that prioritize the needs and preferences of users. Furthermore, the research conducted by Cheng and Jiang (2020) and Gunathilaka (2022) highlights the various effects of AI-powered chatbots on user happiness, perceptions of privacy, and engagement with the company. This emphasizes the importance of understanding these effects to enhance user experiences.

Despite the ongoing progress in AI, there are still obstacles to overcome to enhance the efficiency and user-friendliness of banking chatbots. The studies by Jakobsen (2021) and Narula and Narula (2021) examine the complex relationship between human-like characteristics and user impressions, emphasizing the importance of achieving a well-balanced level of humanness in the design of chatbots. Furthermore, the empirical studies conducted by Hultman and Zarki (2021) and Hari et al. (2022) shed light on banks' intricate digital customer experiences, offering valuable ideas for reducing user concerns and cultivating enduring user-brand connections (Alimour et al., 2024; Shwedeh, 2024). Therefore, by doing a detailed analysis of these elements, this literature review thoroughly comprehends the various factors influencing user experiences in banking chatbots (Khudhair, H. Y., & Mardani, A., 2021).

Interaction Design and User Experience in Banking Chatbots

Interaction design in banking chatbots involves many approaches, including button-based interfaces and natural language processing (NLP) technologies. The research conducted by Haugeland et al. (2022) emphasizes the importance of interface design in influencing user experiences with chatbots. Button-based interfaces provide a straightforward and user-friendly experience, as demonstrated in research conducted by Wube et al. (2022). On the other hand, NLP-based systems facilitate more natural and interactive conversations, leading to increased user engagement and satisfaction, as Nirala et al. (2022) highlighted. The contrasting methodologies underline the significance of customizing interaction designs to accommodate user preferences and requirements (Yas, H., Mardani, A., Albayati, Y. K., Lootah, S. E., & Streimikiene, D., 2020). .

The significance of interaction design on user engagement and satisfaction cannot be exaggerated. The studies conducted by Følstad and Taylor (2021) and Cheng and Jiang (2020) prove that well-designed interfaces favor user perceptions, resulting in higher satisfaction and enhanced loyalty. In contrast, inadequate interaction design can lead to user annoyance and discontent, ultimately impacting brand perception and customer retention (Adamopoulou & Moussiades, 2020). Therefore, banks need to comprehend the complexities of interface design to provide their clients with seamless and satisfying chatbot experiences (Khudhair, H. Y., Jusoh, A., Nor, K. M., & Mardani, A., 2021).

Although there is potential for improving user experiences through developments in interaction design, there are still obstacles to overcome to optimize these designs for optimal performance. The studies conducted by Gunathilaka (2022) and Nicolescu and Tudorache (2022) explore the intricacies of human-computer interaction within chatbots, emphasizing the importance of ongoing improvement and adjustment of design principles (Shwedeh et al., 2020; Shwedeh, Hami, et al., 2022). Banks can gain helpful knowledge by creating interaction designs that promote meaningful engagement and happiness among users through thoroughly analyzing various approaches and insights derived from these studies. This will enable them to maintain a competitive edge in the banking industry, which is becoming more competitive. Given this, we propose a hypothesis that argues a significant relationship between interaction design and user experience in banking chatbots.

Language Variation and User Experience in Banking Chatbots

Using different linguistic styles, such as formal and casual, in chatbot conversations is an essential decision for banks to shape user experiences. The dichotomy between user perceptions and satisfaction is elucidated by the research conducted by Adamopoulou and Moussiades (2020) and Cheng and Jiang (2020). Their studies emphasize the impact of communication tone and style on user perceptions and satisfaction. Formal language can enhance professionalism and trustworthiness, as supported by Bhattacharya and Sinha (2022), but informal language can provide a sense of familiarity and approachability (Wube et al., 2022). Nonetheless, striking this equilibrium is essential, as excessively formal language may be perceived as distant, while excessively informal language could diminish the bank's credibility and reliability.

Cultural issues make language design in chatbot interactions more complex, requiring awareness of various linguistic norms and preferences. The studies conducted by Alnefaie et al. (2021) and Suhel et al. (2020) highlight the importance of incorporating cultural adaptation into language design. They recognize that linguistic subtleties differ throughout different locations and cultures. Mogaji et al. (2021) and Sheth et al. (2022) examine how cultural context influences user perceptions and behaviors, emphasizing the importance of banks customizing their language techniques to connect with their intended audiences effectively. Banks can improve user engagement and satisfaction by carefully assessing these cultural characteristics and ensuring that chatbot interactions align with cultural norms and sensitivities (Shwedeh et al., 2020).

Although the distinctions between formal and informal language and cultural factors provide difficulties in designing chatbot language, they also offer prospects for creativity and distinctiveness. The studies conducted by Gunathilaka (2022) and Nicolescu and Tudorache

(2022) investigate how language variation can provide value for customers. They propose that individualized and culturally relevant interactions have the potential to enhance customer connections and encourage brand loyalty. By incorporating knowledge from these studies into their language design strategies, banks can create user experiences beyond language barriers and connect with diverse audiences. This can lead to increased customer satisfaction and loyalty in a banking industry that is becoming more globalized. Therefore, based on the reviewed literary evidence, we posit a significant relationship between language variation and user experience in banking chatbots.

Level of Humanness and User Experience in Banking Chatbots

Integrating human-like traits into chatbot interactions is a crucial step toward improving user experiences in the banking industry. The studies conducted by El-Gohary et al. (2021) and Haugeland et al. (2022) investigate the complex characteristics of being human, explicitly examining how chatbots can imitate human traits like empathy and conversational subtleties to establish more profound interactions with users. Banks strive to enhance client interactions and satisfaction levels by imbuing chatbots with human-like characteristics, thus bridging the divide between automation and personalization. Nevertheless, attaining an ideal degree of human-like qualities presents difficulties, as demonstrated by the investigations conducted by Alnefaie et al. (2021) and Suhel et al. (2020). These studies emphasize the significance of maintaining a careful equilibrium between genuineness and effectiveness in the design of chatbots.

The impact of human-like characteristics on user perceptions and attitudes towards chatbots is complex, affecting several aspects of the user experience. The research conducted by Mogaji et al. (2021) and Sheth et al. (2022) provides insight into how chatbots with human-like qualities might generate favorable feelings and impressions, promoting trust and active involvement from users. In contrast, Gunathilaka's (2022) study emphasizes the possible drawbacks of placing excessive importance on human characteristics, such as user skepticism and disengagement. Through a rigorous analysis of these data, banks can enhance their chatbot strategies to maximize user experiences while minimizing any downsides linked to the integration of human-like attributes.

While acknowledging the potential advantages, it is crucial to recognize the constraints of integrating human-like qualities into chatbot interactions. Nicolescu and Tudorache (2022) and Følstad and Taylor (2021) emphasize the necessity of rigorous evaluation approaches to quantify the influence of humanness on user experiences appropriately. Additionally, the research conducted by Narula and Narula (2021) and Hultman and Zarki (2021) emphasizes the significant influence of cultural and environmental aspects on how users perceive humanness. Banks must address methodological and contextual factors to integrate humanness into chatbot interactions effectively. This will enhance user pleasure and loyalty in the constantly developing field of digital banking. Hence, we propose a significant relationship between the level of humanness and user experience in banking chatbots.

2. Theoretical Framework

Definition and Components of user experience (UX) in the context of chatbots

To comprehend chatbot user experience (UX), it is necessary to analyze its definition and components. Researchers like Haugeland et al. (2022) and Følstad and Taylor (2021) have done this. By conducting experimental tests and qualitative assessments, these researchers have identified crucial factors contributing to the total user experience (UX), such as usability, effectiveness, user pleasure, and emotional involvement. In addition, Borsci et al. (2022) created the Chatbot Usability Scale, which offers a standardized instrument for evaluating the usability of conversational bots based on artificial intelligence. Combining these studies makes it clear that chatbots' user experience (UX) comprises a range of aspects that jointly influence user perceptions and interactions.

Nevertheless, although progress has been achieved in delineating and quantifying user experience elements, difficulties persist in implementing these frameworks with efficacy. The study by Chaves et al. (2021) provides insight into how language variety affects user experiences, emphasizing the importance of customized strategies to suit a wide range of linguistic preferences and cultural subtleties. In addition, Følstad and Brandtzaeg (2020) highlight the significance of integrating user comments and preferences into the design processes of chatbots to enhance user experience outcomes. Through a careful analysis of these approaches and insights, researchers and professionals can improve their comprehension of user experience elements within the framework of chatbots, hence boosting user pleasure and engagement in conversations driven by artificial intelligence.

Theoretical perspectives on UX design and its implications for banking chatbots

Theoretical approaches to User Experience (UX) design are crucial in defining interactions and user perceptions in banking chatbots. Theoretical frameworks in Human-Computer Interaction (HCI), as explained by Rogers (2022) and Issa and Isaias (2022), offer a fundamental comprehension of how users interact with technology. These frameworks highlight vital themes such as usability, accessibility, and cognitive burden. In addition to HCI, User-Centered Design (UCD) concepts, as investigated by Good and Omisade (2019), provide a structure for creating intuitive and user-friendly interfaces customized to meet users' needs and preferences. These theories emphasize the significance of prioritizing people in design processes, which aligns with the primary objective of improving user pleasure and efficiency in banking chatbot engagements.

Moreover, psychological theories on user behavior and perception provide insight into the fundamental mechanisms that drive user involvement and decision-making. Doherty and Doherty (2018) explore the notion of engagement in HCI, highlighting its complex nature that includes cognitive, emotive, and behavioral aspects. Designers may create chatbot experiences that catch users' attention and encourage continuous connection by comprehending the elements influencing user engagement. In addition, MacKenzie (2024) offers empirical research insights that provide approaches for evaluating and assessing user behavior in the context of banking chatbots. By incorporating psychological theories into UX design frameworks, banks can utilize a more profound understanding of user motivations and preferences, enhancing chatbot encounters to meet customers' demands more effectively.

Although theoretical approaches provide valuable insights into UX design, there are still obstacles to applying them to real-world circumstances. As Chaves et al. (2021) explored, language variety and cultural differences require flexible design solutions to guarantee

inclusivity and efficacy among varied user groups. Furthermore, the ever-changing characteristics of technology and human preferences necessitate the ongoing adjustment and improvement of UX design concepts. Through a rigorous assessment of these theories and their consequences, banking institutions may effectively negotiate the intricacies of UX design and utilize chatbots as potent instruments for augmenting client engagement and pleasure in the digital world.
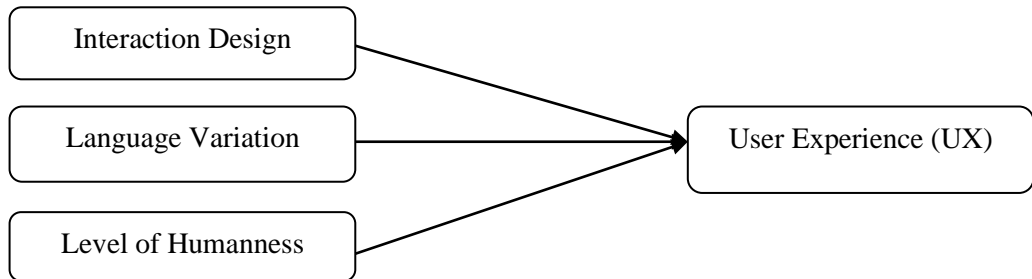

Figure 1: Research Framework

3. Methodology

We used purposive sampling to choose a varied group of volunteers from different cultural backgrounds in the United Arab Emirates (UAE). The survey included individuals who have interacted with bank chatbots, assuring a diverse representation of various age groups, genders, educational backgrounds, and nationalities. Recruitment activities were conducted via several Internet platforms and banking institutions to target multiple demographics. Using a 5-point Likert scale, the survey tool was created to measure factors such as interactive design, language diversity, and level of humanness in users' experience when chatting with banking chatbots. Data was collected through an online survey platform, social networking platforms, and pertinent online discussion boards. The survey responses were anonymized and saved securely for further study.

The items used in measuring the constructs were adapted from earlier investigations. For example, five items measuring interaction design were adapted from the studies of Borsci et al. (2022), Følstad & Brandtzaeg, 2020), and Haugeland et al. (2022). Moreover, five (5) items measuring language variation were adapted from investigations that include Adamopoulou and Moussiades (2020), Chaves et al. (2021), Narula and Narula (2021) and Gunathilaka (2022). Also, five items measuring humanness were adapted from Alnefaie et al., 2021), Haugeland et al. (2022), and Nicolescu and Tudorache (2022). Items measuring users' experience were adapted from the User Experience Questionnaire (UEQ)

4. Analysis Findings

A PLS-SEM analytic tool was used to analyze the collected data and confirm the proposed hypotheses in this study. Given this, two primary analyses were performed. These include the measurement model and the structural model. On the measurement model, the Average Variance Extracted (AVE), Composite Reliability (CR), and item loadings were observed, as

posited by Hair Jr, Howard, and Nitzl (2020). Based on Ab Hamid, Sami, and Sidek's (2017) proposition, the AVE value must exceed 0.5. Meanwhile, the item loading values influence the AVE values (Ab Hamid, Sami & Sidek, 2017). Therefore, the CR value was used to examine the instruments' replicability (Hancock & Mueller, 2001).

In this investigation, the proposed values were achieved. That is, the AVE values are greater than 0.5. likewise, the item loadings are greater than were higher enough to produce the needed AVE. Similarly, the CR for the constructs exceeds 0.7. These are presented in Figure 2 and Table 1.
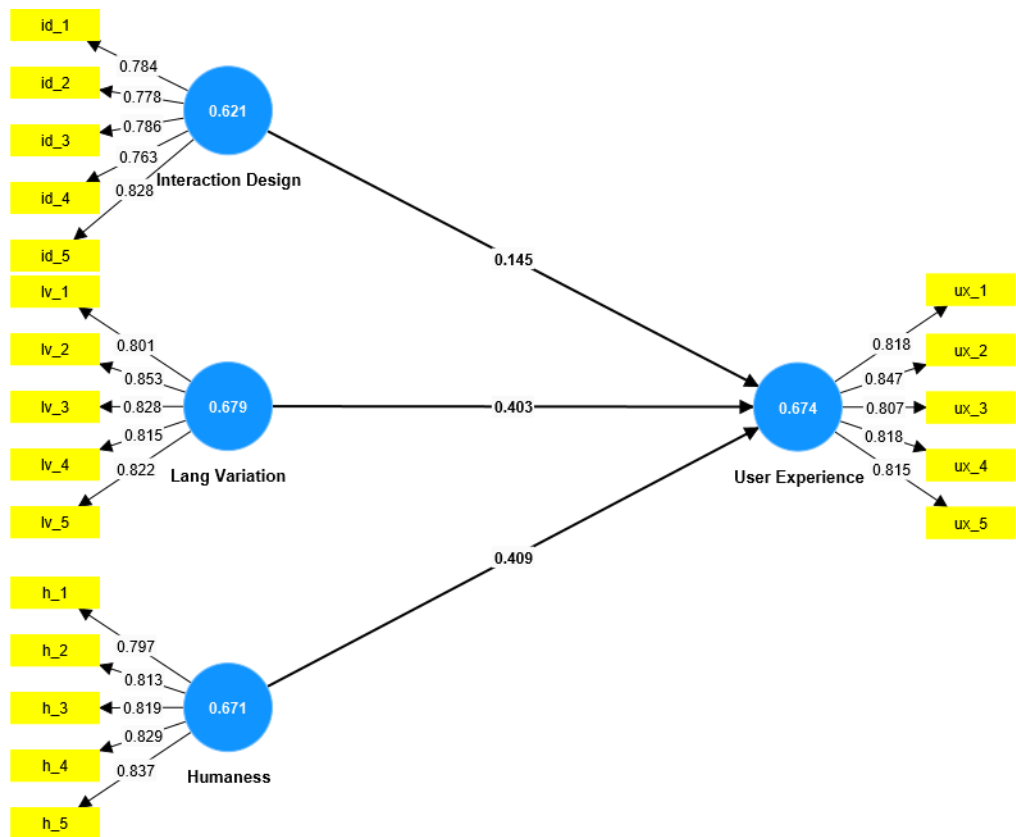

Figure 2 Measurement Model

Table 1. Measurement Model

Construct	Items	Item Loadings	CR	(AVE)
Humanness	h_1	0.797	0.878	0.671
	h_2	0.813		
	h_3	0.819		
	h_4	0.829		
	h_5	0.837		
Interaction Design	id_1	0.784	0.849	0.621

	id_2	0.778		
	id_3	0.786		
	id_4	0.763		
	id_5	0.828		
Lang Variation	lv_1	0.801	0.882	0.679
	lv_2	0.853		
	lv_3	0.828		
	lv_4	0.815		
	lv_5	0.822		
User Experience	ux_1	0.818	0.879	0.674
	ux_2	0.847		
	ux_3	0.807		
	ux_4	0.818		
	ux_5	0.815		

Similarly, we examined the model's discriminant validity using Hetrotrait Montrait (HTMT) correlation. According to Hensler et al. (2015), the maximum threshold for HTMT correlation is 0.9. Likewise, as evidenced by the study of Hensler et al. (2015), the Fornel Larcker criterion has no practical use. Given this, we restrict our discriminant assessment to using HTMT correlation only. As evident from Table 2, the HTMT construct correlations are less than 0.9. given this, we conclude that the model discriminant validity is achieved. Thus, we proceed to hypothesis testing.

Table 2. HTMT Correlations

Construct	Humanness	Interaction Design	Lang Variation
Interaction Design	0.409		
Lang Variation	0.386	0.519	
User Experience	0.593	0.391	0.392

Meanwhile, we assess the collinearity of the model by using Variance Inflated Factor (VIF). As proposed by (Thompson, Kim, Aloe & Becker, 2017), the VIF values should be less than 5—table 3 and Table 6 present the VIF of the inner and outer models. The VIF values in Tables 5 and 6 were less than 5. Given this, we conclude that the model is free from collinearity issues that might influence the variance in the model.

Table 3. Collinearity Table (Inner Model)

Items	VIF
h_1	1.886
h_2	1.981
h_3	2.065
h_4	2.123
h_5	2.157

id_1	1.777
id_2	1.787
id_3	1.831
id_4	1.762
id_5	2.141
lv_1	1.925
lv_2	2.371
lv_3	2.108
lv_4	1.994
lv_5	2.021
ux_1	2.104
ux_2	2.408
ux_3	2.013
ux_4	2.037
ux_5	1.999

Table 4. Collinearity Table (Outter Model)

Construct	User Experience
Humanness	2.485
Interaction Design	1.011
Lang Variation	2.07

Table 5

Variance (R2)			Effect Size (F^2)		Model Fit (Q^2)		
	R-square	R-square adjusted	Construct	User Exp		Saturated model	Estimated model
User Ex	0.823	0.822	Human	0.21	SRMR	0.044	0.044
			Interaction Design	0.04	d_ULS	0.41	0.41
			Lang Variation	0.195	d_G	0.244	0.244
					Chi-square	670.122	670.122
					NFI	0.904	0.904

Meanwhile, we do not only stop at assessing the relationship between the investigated variables. We also examine the variance explained. The model shows r2 to be 0.823. This implies that the variables under investigation, namely, interaction design, language variation, and level of humanness, explain a vast 82.3% variance in users' experience using bank chatbots for their banking services.

Similarly, the effect of each construct on the endogenous variable was examined using Cohen's (1988) effect size proposition. The effect size between User Experience and

humanness suggests a small-to-medium effect ($f^2 = 0.21$), highlighting the impact of humanness characteristics on user experience. Interaction design has a lesser effect size (d = 0.04), indicating a less significant influence on User Experience. Language Variation has an effect size of d = 0.195, indicating a small-to-medium impact on User Experience. The findings provide valuable insights into the practical significance of these linkages, helping researchers quantify standardized differences and comprehend their implications in banking chatbot interactions.

Additionally, we assess the model's predictive relevance in Q^2 for the model. Table xx shows that the Q2 value using d_ULS is 0.41, greater than zero. As posited by Jony and Serradell-López (2021) and Yusif, Hafeez-Baig, Soar, and Teik (2020), the model has predictive relevance if d_ULS > zero. As evidenced by this postulation, we conclude that the model in this investigation is of predictive relevance.

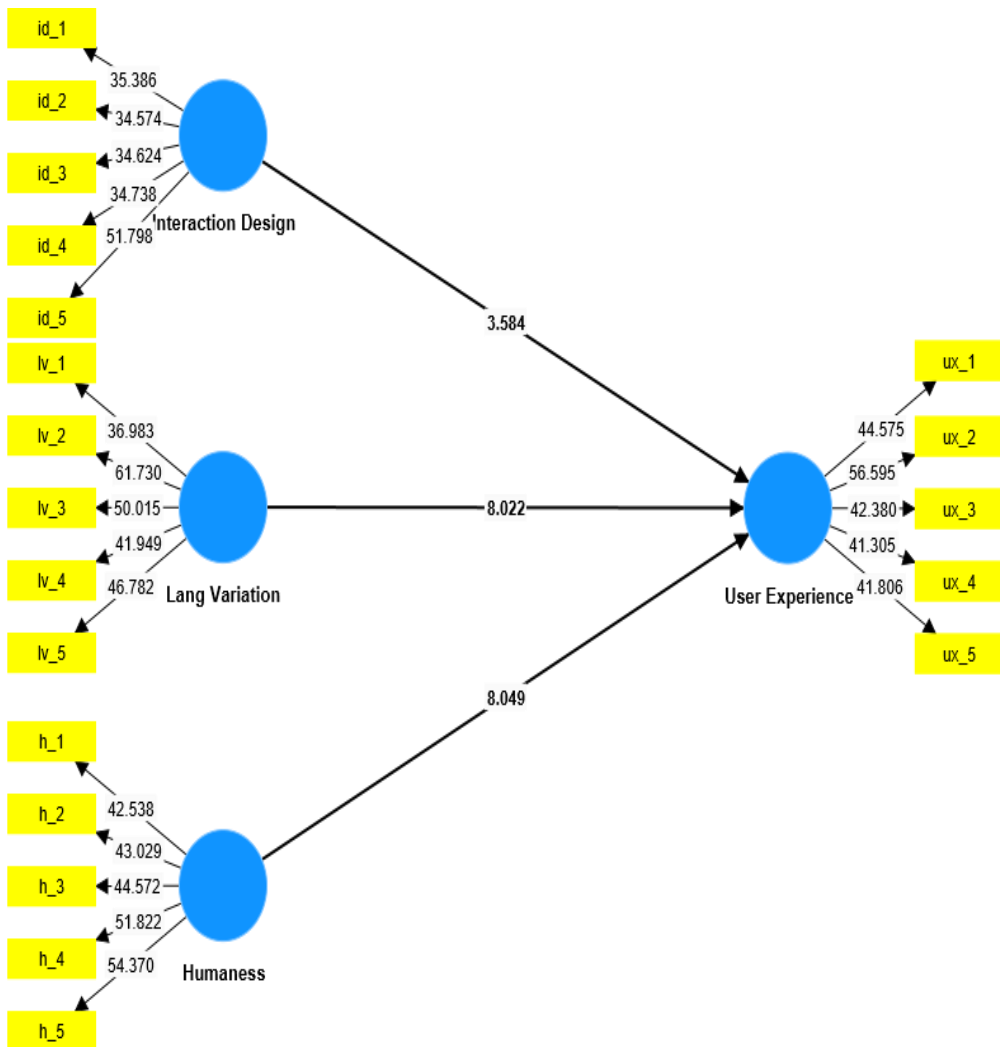
Figure 3. Structural Model (Hypothesis Testing)

Table 6. Hypothesis Testing

Hypothesis	Relationship	β	STD	T stat	P values
H1	Humanness -> User Experience	0.409	0.051	8.049	0
H2	Interaction Design -> User Experience	0.145	0.041	3.584	0
H3	Lang Variation -> User Experience	0.403	0.05	8.022	0

The first hypothesis in this investigation examines the significant relationship between interactive design and users' experience, which was found to be significant among the samples surveyed having (interactive design ($\beta = 0.145$, T = 3.584) p < 0.05. The quality of interaction design significantly impacts users' experience with bank chatbots. If the interactive design of the chatbot is well-executed, users are more likely to have a favorable experience. The strong correlation between interactive design and users' experience with bank chatbots emphasizes the crucial role of interface quality in influencing user interactions. This discovery is consistent with the concepts of usability and human-computer interaction, highlighting the influence of design on user happiness and engagement.

Likewise, the significant relationship between language variation and users' experience using bank chatbots having language variation ($\beta = 0.403$, T = 8.022), p < 0.05. Incorporating language variation that can address diverse customers' language barriers throughout the chatbot explicitly improves consumers' experience. Users typically have a more positive experience when the chatbot can comprehend and reply in many linguistic styles or dialects. Language variance significantly affects how users interact with banking chatbots, as highlighted by recent studies (Chaves et al., 2021; Haugeland et al., 2022). This underscores the increasing acknowledgment of linguistic diversity in interactions between humans and computers (Kvale et al., 2020). Chatbots' capacity to adjust to various language styles improves customer happiness and facilitates efficient communication (Bhattacharya & Sinha, 2022).

The relationship between humanness and users' experience shows that humanness significantly influences users' experience in using banking chatbots having humanness ($\beta = 0.409$, T = 8.049), p < 0.05. Adding human-like attributes or traits to the chatbot greatly enhances consumers' experience. Users are more inclined to connect favorably with a chatbot with human-like features, like empathy, comprehension, and natural language processing skills. The impact of human-like characteristics on users' experience highlights the crucial role of anthropomorphic design in chatbot interaction (Jakobsen, 2021; Haugeland et al., 2022). Incorporating human-like characteristics into chatbots improves user interaction and cultivates a feeling of connection, which aligns with user-centered design principles.

5. Theoretical Implications

Our findings highlight the theoretical significance of interactive design in shaping users' experiences with banking chatbots, which is consistent with principles from Human-Computer Interaction (HCI) and User-Centered Design (UCD) as articulated by Rogers (2022), Issa and Isaias (2022), and Good and Omisade (2019). Our findings, which emphasize usability, accessibility, and user-centricity, underscore the importance of well-

executed interactive design in encouraging intuitive, user-friendly interfaces and fostering enjoyable user interactions. Furthermore, our findings are consistent with psychological theories on user behavior and engagement investigated by Doherty and Doherty (2018), demonstrating how understanding engagement components in HCI can inform the design of captivating chatbot interactions and improve overall user experience. Integrating insights from psychological theories, such as those offered by MacKenzie (2024), into UX design frameworks provides banks with valuable tools for better understanding user motivations and preferences, ultimately optimizing chatbot interactions to meet client demands. However, understanding the challenges of implementing theoretical ideas in practice, particularly with language variances and cultural distinctions, highlights the need for adaptive design solutions to ensure efficacy and inclusivity across varied user groups.

6. Practical Implications

The crucial discoveries on interactive design, linguistic diversity, and human-like qualities in banking chatbots have important practical implications for designers and practitioners. Emphasizing intuitive and user-friendly interactive design features is essential, highlighting the importance of comprehensive usability testing to ensure consistency with user expectations. Integrating multilingual capabilities into chatbots is crucial to serving diverse user demographics. This involves incorporating natural language processing techniques to communicate smoothly across various languages and dialects. Furthermore, incorporating anthropomorphic design elements like empathy and natural language processing can significantly improve user engagement and happiness, emphasizing the significance of developing chatbots that connect with consumers on a human level.

Continuous evaluation and improvement require empirical research approaches to understand user behavior and preferences. Embracing agile development approaches can help promote quick iteration and modification of chatbot functionality in response to changing user needs and technical improvements. Flexible design solutions are crucial to cater to cultural and linguistic variety among user groups. Thorough research is necessary to comprehend the language and cultural preferences of the target audience to ensure inclusion and effectiveness across varied populations.

By utilizing these practical consequences and embracing a user-centric approach to design and development, professionals may develop chatbot solutions that boost user engagement, pleasure, and the entire banking experience. Implementing these observations into the design and operation of banking chatbots can result in more intuitive, comprehensive, and efficient interactions, eventually benefiting both users and financial institutions.

7. Limitations and Recommendations for Future Investigation

One weakness of the current study is its use of cross-sectional data, which may limit the capacity to establish causation and temporal correlations between interactive design, linguistic diversity, humanness, and users' experiences with bank chatbots. Future studies should use longitudinal designs to evaluate changes in users' experiences over time and look into the dynamic interplay between these aspects. Furthermore, while this study focused on

users' interactions with banking chatbots, future research might investigate the influence of contextual elements, such as cultural differences and user demographics, in shaping user perceptions and behaviors. Furthermore, more qualitative research is required to understand better consumers' subjective experiences and impressions of banking chatbots, which will supplement quantitative findings with rich qualitative data. By addressing these constraints and looking deeper into the complexities of user interactions with banking chatbots, future research can provide a more thorough understanding of how to develop and enhance chatbot experiences to match users' different requirements and preferences.

8. Conclusion

Finally, our findings highlight the crucial importance of interactive design in molding users' experiences with banking chatbots, providing significant insights based on theoretical frameworks such as Human-Computer Interaction (HCI) and User-Centered Design (UCD). Well-executed interactive design, which prioritizes usability, accessibility, and user-centricity, can dramatically improve the entire user experience by encouraging intuitive interfaces and enjoyable interactions. Furthermore, our findings highlight the necessity of using insights from psychological theories to understand better user behavior and engagement, which will ultimately drive the design of captivating chatbot encounters. Moving forward, putting these theoretical methods into practice necessitates adaptive design solutions to meet problems like language variances and cultural distinctions while assuring efficacy and inclusivity across varied user groups. Banking institutions can use these data to improve client engagement and satisfaction in the digital environment, ultimately leading to advances in the design and deployment of chatbot solutions.

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