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AI-POWERED VIRTUAL ASSISTANTS IN UAE E-GOVERNMENT: A UTAUT-BASED ASSESSMENT

Nora Azima Noordin (a)*, Puteri NE Nohuddin (b), Kholoud Walid Ibrahim Albloushi (c)
*Corresponding author

(a) Higher Colleges of Technology, Sharjah, United Arab Emirates, nazima@hct.ac.ae
(b) Higher Colleges of Technology, Sharjah, United Arab Emirates
(c) Higher Colleges of Technology, Sharjah, United Arab Emirates

Abstract

This study investigates the adoption of Artificial Intelligence-driven Virtual Assistants in public service platforms in the United Arab Emirates using the UTAUT model. A questionnaire was administered to 340 respondents from different demographic backgrounds via online methods. The results indicate that Behavioural Intention to adopt AI-VA is significantly influenced by Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, and Voluntariness of Use with a high reliability ranging from 0.89 to 0.94 and explain 79.6% of the variance in BI. ANOVA test results indicate there are significant differences regarding the adoption of AI-VA with respect to gender, age, and nationality. Through these results, the perceived usefulness, ease of use, social influences, and voluntariness turn out to be the main drivers that determine AI-VA adoption intentions. Further, these findings also mean that gender-sensitive design, age-friendly interfaces, and culture-sensitive strategies will be of utmost importance. This can support AI-VA adoptions in the UAE public services. As this research provides critical insights for policymakers and practitioners into ways of improving AI-VA integration in public service platforms, it covers current literature on the technology adoption phenomenon in the context of the UAE and similar contexts.

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Keywords: Artificial intelligence, virtual assistants, e-government, public services, UAE, UTAUT

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1. Introduction

Artificial Intelligence analytics uses the latest AI and machine learning technology to automate the process of data analysis, making it faster and less labor-intensive. AI can process both structured and unstructured data using Natural Language Processing (NLP), voice analytics, and computer vision, among other techniques. Converging hardware and software, AI technologies emulate both the problem-solving and learning abilities of humans, providing greater efficiency and effectiveness (Chan & Zary, 2019). Through its ability to analyze data and take corresponding action, it has an increasingly pervasive impact on the workings of government, business and the world (Sheikh et al., 2023). UAE plans to provide 100% AI driven administration by 2031, having already recognized AI as a key driver of operational efficiency across multiple sectors including education, transportation, energy and technology. One of the major components of this is the introduction of AI-based Virtual Assistants (AI-VA) in various public services. AI-VAs offer excellent user interaction, accessibility, and service delivery for users as per the vision of the UAE for digital transformation. Persuading the appropriate parties to adopt generative AI-VA in government services provides insight that is useful to policymakers and practitioners to best integrate generator AI-VA into government services.

Using the Unified Theory of Acceptance and Use of Technology (UTAUT) framework (Venkatesh et al., 2003), this study assesses AI-VA adoption in public service platforms in the UAE. Through simple random sampling and online questionnaire, data were collected from UAE residents (N = 340). This study investigates the influence of Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), and Voluntariness of Use (VU) towards Behavioural Intention (BI) to use the AI-VAs. It also investigates demographic variables like gender, age, and national profile for further understanding of the acceptance of technology. These findings help to understand the process of adoption of AI in public services, providing actionable insights for policymakers. The paper is organized as follows: Section 2 surveys the literature; Section 3 provides the research framework and hypotheses; Section 4 explains the methodology; Section 5 describes data analysis and results; Section 6 discusses results; and Section 7 concludes the analysis.

2. Literature Review

2.1. Innovative Deployment of Artificial Intelligence (AI) in the Public Service Sector

The UAE's public sector is crucial to economic and social development, delivering services related to healthcare, education, transportation, and municipal governance. It has a centralized federal system with a decentralized governance of the emirates which delivers services in an effective manner. Moreover, the UAE has initiated several initiatives such as the UAE National Strategy for AI 2031 and UAE Centennial 2071 in line with the digital transformation goals to streamline services and improve citizen satisfaction.

Compared with the private sector, AI adoption remains growing in the public sector. New technologies such as AI and cognitive computing are now being integrated into government functions, enabling better management of big data and improved decision-making (Al Mutawa & Rashid, 2020). That involves the design, implementation and assessment of AI systems with the aim of improving public

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management (Makasi et al., 2021). Addressing the technological innovation in public service governance, research suggests that widespread adoption of AI technologies will benefit the public sector through cost savings, reduced workload, increased productivity, better resource allocation, improved service delivery, and increased citizen satisfaction through personalized and 24/7 service availability (Androutsopoulou et al., 2019). The UAE government, through its AI, Digital Economy and Remote Work Applications fourth office, signed an agreement with the United Nations Development Program (UNDP) during the World Government Summit 2024 in Dubai to support AI research and talent development in the Arab region. This is in line with UAE vision to utilize AI For betterment of well-being and attainment of sustainable development. This partnership fosters the development of innovative, inclusive and human-centric change, enabling effective AI-based policy making activities underpinned by a strong ethical framework and effective data management, enhancing trust and adoption (United Nations in the United Arab Emirates, 2024).

2.2. Use of Artificial Intelligence-Powered Virtual Assistants (AI-VA) in the Global Public Services Sector

Integrating AI systems leads to better delivery of public service by offering personalized based on user characteristics and available data services through virtual agents and chatbots (Van Noordt & Misuraca, 2022). Such AI-based tools help organizations and governments to interact with users, handle queries, enable instant messaging, and service promotion (Hasan et al., 2021). VAs work independently, engaging in natural language conversations with multiple users simultaneously. They can serve as a replacement for less-experienced consultants but if they are used the right way, they can facilitate customer service, engagement, and nurture new clients (Patel & Trivedi, 2020). Such AI-powered VAs also create custom responses based on customer metadata, past conversations, knowledge bases, geolocation, and other data sources. The term e-government is used to describe the business process of how government interacts with their citizens and the way of providing services from the government to its citizens has become easier and more convenient than ever. In addition to information provision, VAs are also used as interactive interfaces for e-government platforms to help the citizens with such tasks as tax payments, form submission, and more. VAs as an emerging technology is also an ever-changing research issue that responds to written or verbal questions (Sandoval-Almazán & Gutiérrez-Alonso, 2009).

The Kingdom of Jordan is positioning itself as a regional leader in the adoption of AI, copying technology as an engine of economic growth, job creation as well as human development. It creates a friendly regulatory atmosphere for institutions and technology companies (Alqudah, 2021). Correspondingly, in 2017, Vienna launched into the services of a chat bot WienBot that by means of voice commands and questions provides quick answers to city service-related FAQs without the potential hassle of searching the relevant sections of the city portal. It provides information about more than 350 services in German, including dialects (City of Vienna, 2024). In 2018, Latvia introduced UNA, a digital assistant for businesses only available in Latvian and represents Latvian commitment in digital transformation and support for businesses (Nirala et al., 2022; Ministry of Justice of the Republic of Latvia, 2018).

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2.3. Adoption of AI-Powered Virtual Assistants in UAE Public Service Platforms

The UAE remains committed to exploring the potential of AI strategies in streamlining business operations, providing more effective government services, and aiding health-related services. The AI has been at the heart of the interaction between the public and government. AI is employed throughout public services in Dubai, including education, facilities and transportation as part of UAE National Strategy for AI 2031. DEWA was the first government entity to launch a Virtual Assistant known as Rammas. Rammas is an Arabic and English virtual customer service agent that imitates a real person who learns and evolves with each user contact. It offers 11 transactional services and provides information on 200 services to customers, developers and partners. Rammas has processed more than 6.8 million inquiries since its launch in January 2017 (Dubai Electricity and Water Authority, 2023). Artificial intelligence comes into play with the release of the FAHR's virtual assistance virtual body. FAHR's VA named Hamad (launched in 2019) received around 121,000 inquiries from early 2022 to October. The FAHR legal consultation team received around 2,000 inquiries in the first quarter of 2024 from ministries and federal entities, as well as the public through digital channels, within the Customer Happiness System, the FAHR Smart App and the unified contact center. The UAE introduced an AI-enabled chatbot called U-Ask for its one-stop government services during 2023, on its official portal. The 'U-Ask' (translated from Arabic) provides an avenue for receiving information on government services in Arabic and English and is developed in partnership with Microsoft and PwC Middle East. Provides personalized recommendations based on user preference, application requirement, and past interactions. It will also return an answer to both basic and complex queries through the chatbot itself, providing detailed guidance on government services (Federal Authority for Government Human Resources, 2023).

3. Research Framework and Hypotheses Development

3.1. Research Framework

The UTAUT model shown in Figure 1, is widely used to predict system adoption and guide technology-related decisions. It has been applied across various fields, including interactive education tools, near-field communication, mobile health, home healthcare services, and Enterprise Resource Planning (ERP) software (Chauhan & Jaiswal, 2016). The UTAUT framework integrates multiple Technology Acceptance Models (TAMs) to explain IT and IS adoption. Developed by Venkatesh et al. (2003), it forecasts technology acceptance in corporate settings. García de Blanes Sebastián et al. (2022) examined its extension known as UTAUT2, in the context of Virtual Assistants (VAs). The model has also been used to assess AI adoption, particularly in social development organizations, where AI-based tools enhance teamwork efficiency and productivity (Ruchika Jain et al., 2022).

UTAUT synthesizes eight theoretical models, including the Theory of Reasoned Action (TRA), TAM, Motivational Model (MM), Theory of Planned Behaviour (TPB), Model of PC Utilization (MPCU), Diffusion of Innovations Theory (DOI), and Social Cognitive Theory (SCT). It explains user intentions and actual system usage through four key factors: Performance Expectancy (PE), Effort Expectancy (EE), Facilitating Conditions (FC), and Social Influence (SI). PE refers to the belief that a system improves job performance, while EE represents the perceived ease of use (Zeebaree et al., 2022). FC assesses the

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availability of organizational and technical support, and SI measures the influence of social perception on adoption. EE originates from the TAM's perceived ease of use factor (Chang, 2012; Venkatesh et al., 2003). Choosing UTAUT as the research framework aligns with the study's objectives.

3.2. Hypotheses Development

3.2.1. Performance Expectancy (PE)

PE refers to individual beliefs about the degree to which using a system would improve their job performance (Venkatesh et al., 2003). PE has been separately described by researchers as believing that using certain technology will be beneficial or improve performance (Lee et al, 2017; Maznorbalia & Awalluddin, 2021). In the context of this study, it is possible that PE could assist people in performing better in searching information from the public services platform through AI-VA technology. These findings are consistent with studies conducted by Mansoori et al. (2018) and Nur Salam Man and Abdul Manaf (2024). So, to see how the PE plays an effect on the BI, H1 is created as follows:

H1: Performance Expectancy (PE) has a positive influence on the Behavioural Intention (BI) to adopt AI-VA in the UAE public services platforms.

3.2.2. Effort Expectancy (EE)

EE refers to a system's ease of use and that an individual perceives that the system will help in performing the task (Alshehri et al., 2013; Venkatesh et al., 2003; Zeebaree et al., 2022). EE is one of the utmost important factors in the UTAUT model concept for user expectation to use of the technology in public service platforms and technology must be easy to use and user friendly. Adapted from the TAM by Davis (1989), the user always believes that technology should be needs to require less effort and be useful. For instance, as explained by Alshehri et al. (2013), previous studies generally confirmed that one of positive impact of EE is on the BI to make use of e-government services. Results also closely align with the results of Maznorbalia and Awalluddin (2021), and Zeebaree et al. (2022). Based on the research of how the EE construct in AI-VA technology may influence the model, we propose H2 as follows:

H2: Effort Expectancy (EE) has a positive influence on the Behavioural Intention (BI) to adopt AI-VA in the UAE public services platforms.

3.2.3. Social Influence (SI)

SI was defined by Curtis and Payne (2008) as consideration for an individual's perceptions of subjective culture and social system. According to Venkatesh et al. (2003) SI refers to the extent to which an individual perceives that important others believe he or she should use the system. On the other hand, Zeebaree et al. (2022) characterize SI to be whether the user cares about the effect of third parties to actualize the system. In the public services platform, we adopted this SI as a source of exogenous influence on AI-VA, that is the influence that comes from the external source from the community or from the social circle such as colleagues, close friends or family. Based on the above, H3 was formulated to explore the impact of SI on the use of AI-VA as follows:

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H3: Social Influence (SI) has a positive influence on the Behavioural Intention (BI) to adopt AI-VA in the UAE public services platforms.

3.2.4. Facilitating Conditions (FC)

FC pertains to the degree to which an individual perceives that the organizational and technical infrastructure supports system use (Venkatesh et al., 2003). According to Davis (1989), FC refers to the extent to which an individual perceives that technology infrastructures are required to be used and that the intended system is prepared and available. In the context of using AI-VA in public service platforms, FC is known as support, availability of helpdesk, and service response as conditions that encourage the use of government services, especially the websites, and return to use them (Al Sayegh et al., 2023; Chen et al., 2011). To determine the influence of FC on the BI to use AI-VA, the fourth hypothesis is developed as follows:

H4: Facilitating Conditions (FC) have a positive influence on the Behavioural Intention (BI) to adopt AI-VA in the UAE public services platforms.

Apart from the four primary constructs, this research also investigates four moderating effects, including demographic factors like age, gender, and nationality, alongside the voluntariness of AI-VA usage among UAE residents. Depending on the study focus, the VU may be substituted or supplemented with another moderating variable (Venkatesh et al., 2012).

3.2.5. Voluntariness of Use (VU)

In the UTAUT framework, Voluntariness of Use (VU) refers to the degree to which an individual perceives the use of technology or system as optional rather than mandatory. It reflects users' perceived freedom of choice when adopting and using technology. In UTAUT, VU functions as a moderating factor that can influence the strength of the relationship between Social Influence (SI) and Behavioral Intention (BI). In other words, the effect of social influence on an individual's intention to adopt a technology may vary depending on the extent to which the use of that technology is perceived as voluntary. In the context of this study, VU is therefore examined as a moderator of the relationship between SI and BI in the adoption of AI-based virtual assistants (AI-VA) in UAE public-service platforms. Thus, H5 is formulated as follows:

H5: Voluntariness of Use (VU) positively moderates the relationship between Social Influence (SI) and Behavioral Intention (BI) to adopt AI-VA.

3.2.6. Gender Factor

Gender has been recognized as an important determinant in the acceptance and use of e-government systems (Al-Shafi & Weerakkody, 2010; Al Athmay, 2015; Venkatesh et al., 2003). Male users have a higher level of computer experience compared with females, and gender differences have been gleans on the adoption of new technologies. In the context of using AI-VA in public service platforms, this study would like to determine if gender moderates the influence of using the technology. H6 is proposed below to explain the differences in gender preferences towards using the technology.

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H6: There are significant differences between genders that influence the adoption of AI-VA in the UAE public services platform.

3.2.7. Age factor

Several studies found age to be a notable independent determinant of utilization of e-government services (Al-Shafi & Weerakkody, 2010; Rhee & Kim, 2004; Venkatesh et al., 2003). Generally, younger age tends to use technology more than older age groups. To examine the impact of age as a moderating variable in using AI-VA in public service platforms, this study proposes the following hypothesis:

H7: There are significant differences between age groups that influence the adoption of AI-VA in the UAE public services platform.

3.2.8. Nationality factor

To date, there are limited studies focusing on nationality as the moderating effect of using technology in public service platforms. Some previous research examined the impact of ethnicity and citizens on internet adoption in the USA (Boone, 2012). Al-Hussaini et al. (2013) and Alawadhi and Morris (2008) investigated the impact of e-government in the public sector in Kuwait. Meanwhile, a recent study by Tremblay-Cantin et al. (2023) identified the factors that influence the adoption of e-government services by citizens. Considering that the UAE has different nationalities of residents, it is interesting to study how this variable could influence AI-VA use in public service platforms. As of June 2024, UAE nationality is divided into 11.50% Emirati and 88.5% expatriate residing in the seven Emirates (Ministry of Foreign Affairs & International Cooperation, 2023). Therefore, it is expected that there are differences among nationalities to moderate the influence of AI-VA adoption in the UAE public services platform. H8 is formulated as follows:

H8: There are significant differences between nationalities that influence the adoption of AI-VA in the UAE public services platform.

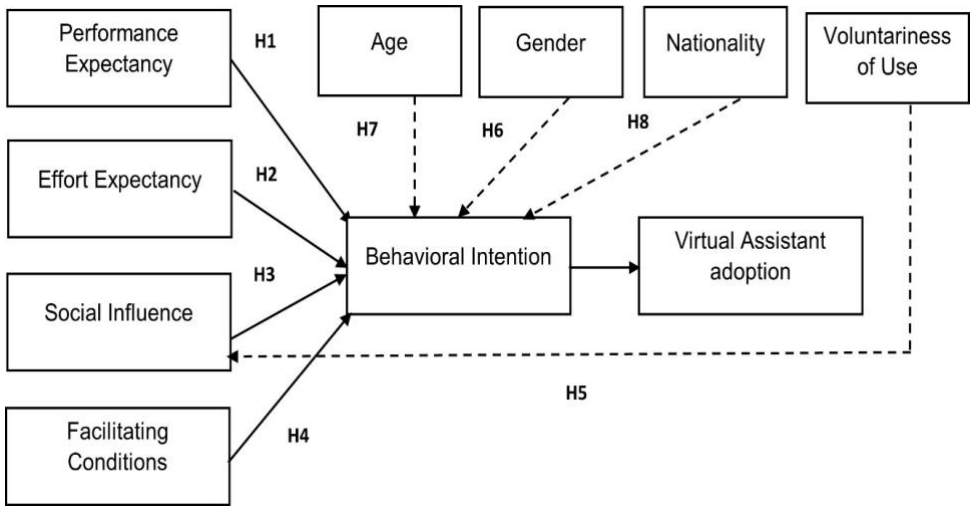

Figure 1. Proposed research framework adapted from the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003)

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4. Research Design and Methodology

4.1. Methods

We used a simple random sampling to cover for the representativity of a wide range of users in the UAE. We used online survey methods to access all demographics of UAE residents. This study investigates casting and mediation constructs validated from various consumer technology acceptance models since a decade in the context of AI-VA adoption in UAE public services platform. On the other hand, the target population is randomly taken from the society without specifying emirate or location. The items in the questionnaire were modified based on the UTAUT model by Venkatesh et al. (2003). A descriptive analysis was performed to evaluate the general background of the respondents demographics and reliability testing was used to test the construct items of the survey. Linear regression was performed to analyze the relationship between dependent and independent variables, and the significance of moderating effects and sub-group differences was calculated with Analysis of Variance (ANOVA).

4.2. Data Collection

The demographic sample included 340 respondents from various racial and educational backgrounds in the UAE. The respondents consisted of 65% females and 35% males. Approximately 68% of the respondents identified as Emirati, and 32% were of other nationalities. Within the sample, 49.7% of respondents were aged between 21 and 30, 22% were aged between 31 and 40, 16% were aged between 18 and 20, and only 12% were over the age of 40. The results of the descriptive analysis are presented in Table 1 below.

Table 1. Descriptive analysis of respondents' demographic

Items	Category	Frequency (respondent)	Percentage
Gender	Male	119	35%
	Female	221	65%
Age	18 – 20 years	55	16%
	21 – 30 years	169	49.7%
	31 – 40 years	75	22%
	Above 40 years	41	12%
Nationality	Emirati	231	68%
	Expatriates	109	32%

5. Data Analysis and Results

5.1. Reliability Test

Reliability testing, such as Cronbach's Alpha, is essential in research to assess the internal consistency and reliability of measurement scales or constructs. It evaluates whether the items on a scale consistently measure the same underlying construct. A high-reliability coefficient (typically above 0.70) indicates that the items within a construct are strongly correlated, suggesting that they are reliable measures

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of the intended concept. This ensures that the data collected is consistent and dependable, enhancing the validity of the study's findings and conclusions.

Table 2. Cronbach's alpha reliability results

Construct	Cronbach's Alpha	Number of items	Result
PE	0.92	3	High reliability
EE	0.94	4	High reliability
SI	0.91	3	High reliability
FC	0.89	3	High reliability
BI	0.94	3	High reliability

The reliability test for the study constructs items demonstrated high reliability with Cronbach's Alpha coefficients ranging from 0.89 to 0.94, exceeding the commonly accepted threshold of 0.70. Results of the reliability analysis in Table 2 indicate that the items within each construct consistently measure the same underlying concept, ensuring the reliability of the measures used in the study.

5.2. Multiple Linear Regression

The study used multiple linear regression analysis in JASP statistical software to examine the relationship between the dependent and independent variables. This method estimates how changes in independent variables affect the dependent variable and is useful for analyzing multiple predictors (Bevans, 2020). In this study, PE, EE, SI and FC were independent variables, while BI was the dependent variable. Separate regression analyses were conducted to evaluate the impact of each construct on BI.

The results presented in Tables 3 and 4 showed that the independent variables had significant effects on BI, while VU demonstrated a significant moderating effect on the relationship between SI and BI. The model summary reported an R-value of 0.892, indicating a strong relationship between the selected variables and BI in adopting VAs. The adjusted R^2 was 0.796, meaning the model explained 79.6% of the variance in BI. Further regression analyses assessed each construct's contribution, showing a significant relationship between all predictors and BI (Rodrigues et al., 2016).

Table 3. Model summary

Model	R	R^2	Adjusted R^2	RMSE
H1	0.892	0.796	0.793	0.531

Table 4. Results of multiple linear regression and moderation analysis

Model		Unstandardized	Standard Error	Standardized β	t	p
H1	PE-BI	0.81	0.03	0.82	26.19	.000
H2	EE-BI	0.86	0.03	0.85	29.75	.000
H3	SI-BI	0.84	0.03	0.80	24.77	.000
H4	FC-BI	0.91	0.03	0.85	29.88	.000
Moderating effect						
H5	SI × VU → BI	1.44	0.11	0.58	13.18	.000

5.3. Analysis of Variance (ANOVA) Test

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A one-way ANOVA test was conducted to examine the impact of Gender, Age and Nationality on VA adoption. These factors were the independent variables, while VA adoption was the dependent variable. The results in Table 5 showed a significant effect of gender (Male or Female) on VA adoption ($F = 16.12$, $p < .001$). Age also influenced adoption across different groups (18–20, 21–30, 31–40, and over 40 years old) ($F = 4.37$, $p = .005$). Additionally, nationality (Emirati or International) significantly affected VA adoption ($F = 12.94$, $p < .001$).

All moderating variables; Gender, Age, and Nationality had statistically significant effects on BI to adopt VA, as indicated by p-values below .001. This suggests that demographic differences play a crucial role in shaping individuals' intentions to adopt VA technology.

Table 5. Results of ANOVA tests for demographic differences

Demographic Variable	Sum of Square	df	Mean Square	F	p
Gender	21.10	1	21.10	16.12	<.001
Age	17.42	3	5.80	4.37	0.005
Nationality	17.09	1	17.09	12.94	<.001

6. Discussion

Table 6 summarizes the hypothesis testing results using multiple linear regression and ANOVA. The findings provide insights into factors influencing AI-VA adoption in UAE public services. Most hypotheses were supported, reinforcing the relevance of UTAUT in predicting technology adoption.

H1 proposed that PE positively influences BI. The results confirmed a significant relationship, showing that users are more likely to adopt AI-VA if they believe it enhances job performance, aligning with previous research (Maznorbalia & Awalluddin, 2021; Zeebaree et al., 2022). H2 suggested that EE affects BI, which was supported. When users find AI-VA easy to use, they are more inclined to adopt it, reinforcing the importance of user-friendly interfaces (Alshehri et al., 2013; Al-Azmi et al., 2024; Nur Salam Man & Abdul Manaf, 2024). H3 confirmed that SI significantly impacts BI, showing that peer influence and societal norms shape AI-VA adoption. This supports the role of social environments in technology acceptance (Al-Azmi et al., 2024; Maznorbalia & Awalluddin, 2021). H4 examined FC's effect on AI-VA adoption, which was supported. Adequate resources and infrastructure increase adoption likelihood, aligning with prior research (Al Sayegh et al., 2023; Ramirez-Madrid et al., 2024). H5 showed that VU positively moderates SI. When AI-VA use is perceived as voluntary, social pressures for adoption increase, supporting findings from Alshehri et al. (2013) and Zeebaree et al. (2022).

H6, H7, and H8 explored the impact of Gender, Age, and Nationality. ANOVA results showed significant differences. Gender differences indicate varying AI-VA acceptance levels, influencing design considerations. Age differences highlight the need for age-appropriate interfaces. Nationality differences suggest cultural influences on adoption, underscoring the importance of context-aware implementation. These findings align with Alshehri et al. (2013), Athmay (2015), and Al-Azmi et al. (2024).

Table 6. Summary of the hypothesis results

Hypothesis	Results

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H1: Performance Expectancy (PE) has a positive influence on the Behavioural Intention (BI) to adopt AI-VA.	Positive and significant
H2: Effort Expectancy (EE) has a positive influence on the Behavioural Intention (BI) to adopt AI-VA.	Positive and significant
H3: Social Influence (SI) has a positive influence on the Behavioural Intention (BI) to adopt AI-VA.	Positive and significant
H4: Facilitating Conditions (FC) has a positive influence on AI-VA adoption.	Positive and significant
H5: Voluntariness of Use (VU) positively moderates the relationship between Social Influence (SI) and Behavioral Intention (BI) to adopt AI-VA.	Positive and significant
H6: There are significant differences between genders that influence the Behavioural Intention (BI) to adopt AI-VA in the UAE public services platform.	Positive and significant
H7: There are significant differences between age groups that influence the Behavioural Intention (BI) to adopt AI-VA in the UAE public services platform.	Positive and significant
H8: There are significant differences between nationalities that influence the Behavioural Intention (BI) to adopt AI-VA in the UAE public services platform.	Positive and significant

7. Conclusion

The findings of this research validate the UTAUT model in the context of AI-VA adoption in the public services of the UAE. The notable and positive relationships of BI with PE, EE, SI and FC show the complex nature of technology adoption. Moreover, the substantial moderating effects of gender, age, nationality, and VU highlight the importance of demographic factors in the strategy for technology implementation. Nevertheless, these findings provide valuable insights for policymakers and practitioners aiming to enhance the adoption and utilization of AI-powered technologies in public services in the UAE specifically and globally.

Author Contributions

Nora Azima Noordin: Conceptualization, Methodology, Writing – Original Draft.
Puteri NE Nohuddin: Data Curation, Formal Analysis, Visualization.
Kholoud Walid Ibrahim Albloushi: Investigation, Data Collection.
Nora Azima Noordin: Writing – Review & Editing, Validation.
All authors reviewed and approved the final manuscript.

Conflict of Interest Statement

The authors declare that there is no conflict of interest.

Ethical Statement

This research did not require Institutional Review Board approval because this study did not involve any experimental procedures requiring formal ethics committee approval. All participants were informed of the study's purpose and voluntarily agreed to participate. Data was collected anonymously, and confidentiality of respondent information was maintained throughout the research process.

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