Understanding Factors Affecting E-Government Adoption in Saudi Arabia:
The Role of Religiosity

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ABSTRACT

This study developed an integrated model to examine the main factors affecting e-government services adoption in Saudi Arabia context. The authors extended the UTAUT model to explore factors affecting Saudi Arabia citizens to use e-government services. Data were collected from 1,290 citizen and analysed using AMOS. The results indicated that all the variables of UTAUT model have a significant effect on intentions to use e-government services. The results also indicated that perceived awareness and self-efficacy have a significant effect on behavioural intentions. Moreover, religiosity moderates the link between perceived awareness, attitudes, self-efficacy, and behavioural intentions. The study demonstrated the implications and future research directions.

KEYWORDS

E-Government Adoption, Perceived Awareness, Perceived Self-Efficacy, Religiosity, UTAUT Model

1. INTRODUCTION

The advancement of information and communication technologies (ICTs) has facilitated the modernisation of internet-based services. Public services are one of the sectors that have benefited substantially from these advancements in the realm of information technology. The idea of e-government refers to the use of ICTs to improve the efficiency of governmental services. E-government was founded in the United States of America in 1993 and is concerned with modernising government procedures in order to take use of current information and communication technologies (Verkijika and De Wet, 2018). As of 2014, all 193 United Nations Member States had established national websites, and nearly 50 countries had established online portals, which have more than doubled in number since 2012. When the benefits of e-government are weighed against the disadvantages of the old method of providing government services, this increase in the number of e-government websites is unsurprising. Citizens enjoy 24-hour access to e-government services, which need just an active internet connection. Along with longer service hours, e-government has other advantages that conventional means cannot match, including transparency, more citizen-government interaction, cost savings, improved service quality, and speed (Mustaf, Ibrahim, and Mohammed, 2020).

Electronic governance helps not only citizens, but also a large number of people who live in a nation. We will use the word "client" to refer to all e-government beneficiaries (citizens, foreign employees, expatriates, pilgrims, and tourists, for example). The phrase "e-government" has been used many times in the literature with different degrees of emphasis. They all agree, however, that e-government

is the government's use of information technology to carry out its responsibilities and provide public services. According to the United Nations (Thompson, Mullins, and Chongsutakawewong, 2020), e-government encompasses everything from information retrieval to the use of an online service, such as renewing a driver's licence or passport. According to Husin, Loghmani, and Abidin (2017), e-government refers to the process of delivering services and information to consumers, workers, companies, and government agencies via the use of information technology in order to improve efficiency. As a result, for e-government to succeed, consumers must be willing to utilise the service. E-government also refers to the use of new technologies to assist changes in the operation and effectiveness of government, whose operations include the provision of electronic communications to provide information and services to consumers, companies, organisations, and enterprises. Not only that, these interactions enable the placement and receipt of orders and the completion of financial transactions, allowing governments to provide information and services to consumers much more quickly and easily, thus establishing a positive reputation with customers. On the other side, ineffective electronic governance may have a detrimental effect on governments, particularly those in wealthy nations. Thus, governments are obligated to foster consumer confidence, optimise administrative procedures and online services, enhance transparency, and combat corruption.

Numerous academics have done studies on e-government in different Arabian Peninsula nations. The first phase of the Saudi Arabian e-government was established in the middle of the first decade of the twenty-first century, and its accomplishments are detailed in (Alghamdi, and Beloff, 2016). Current information on the Saudi e-government may be found at (Almukhlifi, Deng, and Kam, 2019). Since its beginning, researchers in the KSA have examined many elements of e-government. Basahel and Yamin (2017). identified a number of barriers to e-government adoption in the KSA, including a lack of IT infrastructure in the public sector, a lack of public awareness about e-government, a lack of systems to ensure data security and privacy, and a shortage of qualified IT and government service expert personnel. Santa, MacDonald, and Ferrer (2019) highlighted cultural problems as a reason for the delayed adoption of e-government in the Kingdom of Saudi Arabia in his PhD Thesis titled: Factors Affecting Customers' Adoption of E-government Moderated by Socio-cultural Values in Saudi Arabia. We included a portion of his questionnaire into our analysis of this research. The writers of addressed e-government implementation problems in the Kingdom of Saudi Arabia. Ali et al (2019) stated that the success of e-government projects is contingent on the desire of consumers to utilise these services.

However, there is a significant vacuum in the KSA literature on the validation of other models such as EGAUM and UMEGA in the area. They may provide fresh light on the implementation of e-government. Unlike EGAUM, which is very complex and has many moderating connections, UMEGA is a more sparse and relatively simpler model that strikes a compromise between model complexity and explanatory power. UMEGA outperformed all other models in terms of explaining the behavioural intention to use e-government solutions during validation (Lallmahomed, Lallmahomed, and Lallmahomed, 2017). This research examines UMEGA as an important e-government adoption model that may shed fresh light on e-government adoption in KSA. As a result, the primary goals of this research are to verify UMEGA in the KSA context and to adapt it to include important e-government adoption characteristics for use in the KSA setting. It also explores the moderating role of religiosity.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. E-Government Adoption in KSA

Saudi Arabia is a world leader, a G20 member, and the world's biggest crude oil exporter. The KSA is also the most powerful member of the Gulf Cooperation Council (GCC), an organisation comprising the Arabian Peninsula's oil-rich countries. Several of the kingdom's projects and policies are also embraced by the GCC and other regional nations. Mensah (2019), one of its towns, is home to the

Kaaba, which draws over ten million international pilgrims each year (Zaied, Ali, and El-Ghareeb, 2017). Additionally, these millions of pilgrims depend on a variety of services offered by the monarchy through e-government. Apart from being a religious nation, some of its inhabitants trace their ancestors to Bedouin or nomadic tribes. Perhaps in part as a result of this, Saudi Arabia is often viewed as a conservative nation. This impression leads to a desire to learn more about the country's educational and technical advancements. To some, it may come as a surprise that Saudi Arabia is a highly sophisticated nation with a high proportion of individuals with doctorate degrees, frequently from western countries. Saudi Arabian women, whom many perceive as impoverished, have access to the same educational opportunities as their male counterparts. Indeed, Saudi Arabia is home to the world's biggest female-only institution, Abbassy and Mesbah (2016), which enrols over 50,000 students. Women also have access to certain exclusive services, such as shopping, leisure, banking, and sports, to mention a few. Females are also well represented in the country's administration, with a staggering 20% quota in the country's parliament (Kurfalı, Arifoğlu, Tokdemir, and Paçin, 2017).

Saudi Arabia's literacy rate was almost 95%, according to a 2015 UNESCO study (Alharbi, Papadaki, and Dowland, 2017). Given the kingdom's enormous educational efforts, the current figure may be closer to 98 percent. Despite this near-zero literacy rate, the population continues to lack Internet capabilities. This, however, is not uncommon and is consistent with the trend seen in a large number of industrialised and emerging nations. This issue is often associated with a lack of awareness and training initiatives. Indeed, carefully designed training programmes, ongoing assistance, and promotion by the government may help to mitigate, if not eradicate, this deficit. Governments that do so will increase productivity, confidence, and make better use of time, effort, and money. IT applications have grown at a rapid pace, resulting in significant advancements in a broad variety of sectors, including finance, industry, commerce, education, health care, and government. Saudi Arabia has been a leader in delivering high-speed internet through fibre optics, which has led in the development of many consumer apps and e-services. The Kingdom of Saudi Arabia places a premium on transformation and the delivery of government services through e-government. The government's 2030 strategy places a premium on good governance and openness, as well as involvement of all segments of society and organisational agility. The Saudi government's transformation strategy is outlined in the country's National ICT Strategy, which focuses on the potential of ICT to simplify and facilitate labour. Saudi e-government is being implemented with the goal of facilitating interactions and communications between Saudi citizens and government agencies, as well as between government departments themselves. For example, the government has implemented many programmes that have resulted in the reform and simplification of corporate procedures.

2.2. Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh, Morris, Davis, and Davis created the UTAUT model of technological acceptance (2003). The model is a compilation of eight prior theoretical models of technological adoption, the most significant of which are briefly described above (Alharbi, Papadaki,and Dowland, 2017). The UTAUT constructs are defined via a study and refinement of these eight models with the goal of comprehending intention as the dependent variable (Rodrigues, Sarabdeen, and Balasubramanian, 2016). Nonetheless, we made certain modifications (see Figure1) to make it more appropriate for this study's setting.

Performance expectancy, effort expectancy, and social influence are three factors that were initially conceptualised in the UTAUT to assess technology adoption in an organisational context (Rodrigues, Sarabdeen, and Balasubramanian, 2016) and were later adopted and used in the development of the UATUT2 to broaden their applicability in a consumer context (Alharbi, Papadaki,and Dowland, 2017). The term "performance expectation" refers to an individual's belief that using a certain technology will allow him or her to enhance their performance on a particular activity or work position (Al-Zahrani, 2020). This indicates that an individual's view of how utilising an e-government system would assist them in completing a government-provided service can affect their attitudes and willingness to utilise the system. Effort expectation refers to the "degree of ease associated with consumers'

use of technology" (Verkijika and De Wet, 2018), implying that a person is more likely to embrace an e-government solution that takes little effort to utilise. The term "social influence" refers to an individual's belief that important people (family, friends, and co-workers) would adopt a certain technology (Verkijika and De Wet, 2018). This implies that people will usually embrace a system if significant others (family, friends, and co-workers) approve of its use.

Figure 1. Conceptual model
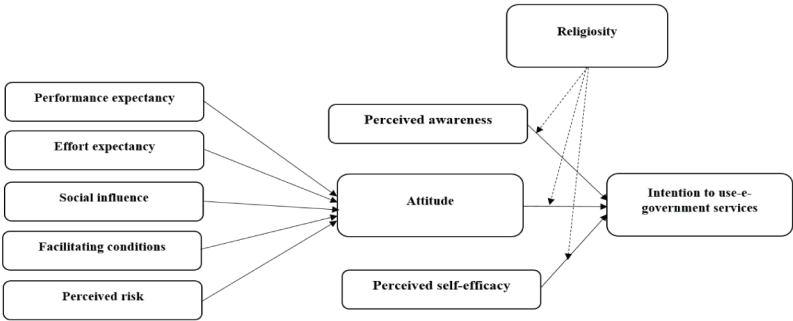
Numerous studies have shown that performance expectations have a significant impact on the adoption of e-government (Gupta, Bhaskar, and Singh, 2016; Rabaa'i, 2017). This relationship has not always been ubiquitous, as Mustaf, Ibrahim, and Mohammed (2020) found no evidence of a significant relationship between performance expectation and e-government adoption in India. Additionally, while effort expectancy (Al-Swidi and Faaeq, 2019) and social influence (Obaid et al., 2020) have been shown to influence technology adoption, Sawalha, Al-Jamal, and Abu-Shanab (2019) were unable to find evidence for both effort expectancy and social influence having a significant positive effect on behavioural intention to Similarly, Chen and Aklikokou (2020) found little evidence to suggest a major role for social impact in the adoption of e-government in Saudi Arabia. Disparities in results may be explained by the theoretical notion that performance expectation, effort expectancy, and social influence all affect behavioural intention through the mediating function of an individual's views about adopting a particular technology (Almaiah and Nasereddin, 2020; Dwivedi et al., 2017; Lallmahomed, Lallmahomed, and Lallmahomed, 2017). As such, UMEGA established and verified the theoretical notion that social influence, performance expectations, and effort expectations all affect behavioural intention through their favourable effects on attitudes toward adopting a certain e-government system (Mensah and Adams, 2020). Thus, this research makes the following recommendations:

H1: Performance expectancy is positively related to attitudes toward using an e-government system.
H2: Effort expectancy is positively related to attitudes toward using an e-government system.
H3: Social influence is positively related to attitudes toward using an e-government system.

Facilitating conditions capture users' views of the resources and assistance accessible to them while engaging in a particular activity (Venkatesh et al., 2016). In an e-government context, enabling circumstances may refer to individuals' perceptions of the availability of sufficient resources to enable them to use an e-government service. Venkatesh et al. (2016) claimed in the creation of UTAUT that enabling circumstances had a negligible impact on technology adoption in an organisational setting when performance and effort expectations were taken into account. However, in the consumer environment, enabling circumstances become significant in predicting behavioural intention even when performance and effort expectations are present, as shown in the development of UTAUT2

(Riyadh, Alfaiza, and Sultan, 2019). This view has been bolstered by research on citizen adoption of e-government systems, with several studies (Alharbi, Papadaki, and Dowland, 2017; Almaiah and Nasereddin, 2020; Kumar, Sachan, and Mukherjee, 2018) demonstrating that facilitating conditions significantly influenced a citizen's intention to adopt e-government systems. Qaid, Samikon, and Al Fahmi (2021) expanded on this idea in UMEGA by demonstrating that facilitating conditions had an indirect impact on attitudes about e-government through their effect on effort expectation. As such, it is asserted in this research.

H4: Facilitating conditions are positively related to attitudes toward using an e-government system.
H5: Facilitating conditions are positively related to effort expectancy.

Perceived risk is a broad term that refers to emotions of uncertainty or worry connected with the use of a certain information system as a result of expected consequences (Bhuasiri et al., 2016). Perceived risk may be defined in the context of e-government as a citizen's belief that he or she would suffer some kind of loss as a result of utilising an e-government system. Given that systems such as e-government websites need Internet connection, some people may be hesitant to engage with these websites owing to the danger connected with the Internet. For instance, previous research shows that over 80% of Internet users are very worried about disclosing their personal information on the online (De Kerviler, Demoulin, and Zidda, 2016; Tseng and Wang, 2016). As a result, citizen engagement with transactional e-government websites may be limited. Prior research shows that perceived risk has a major effect on consumers' attitudes toward adoption of these technologies, with consumers with high risk perceptions being less inclined to embrace e-government solutions (Roy et al., 2017; Yi, Yuan, and Yoo, 2020). As so, this research asserts the following:

H6: Perceived risk is negatively related to attitude toward using an e-government system.

The attitude toward a certain information system is described as an individual's favourable or negative assessment of a particular action (Verkijika and De Wet, 2018). Individuals that have a favourable opinion of an e-government system will have a high intention of adopting it, and vice versa. The relationship between attitudes and behavioural intentions has been confirmed in a number of e-government research (Zhang and Zhu, 2020), including the UMEGA study (Kurfalı et al., 2017). As such, this research will evaluate the following:

H7: An individual's attitude toward using an e-government system is positively related to intention to use the system.

Perceived awareness is described as "accumulating and acquiring information, education, and consciousness to the extent that users believe is necessary to understand the features of a system, utilise it proficiently, and grasp its strategic functioning, competitive advantages, and drawbacks" (Seo and Bernsen, 2016). Perceived awareness is believed to influence the adoption of e-Government services, since educating people about these services, their advantages, and the system's legitimacy would ultimately result in the system's adoption (Mensah, 2018). Thus, in a freshly established e-Government service when people are only starting to form beliefs, awareness of the services offered by e-Government will cause citizens to form an attitude toward utilising the system (Chen and Aklikokou, 2020). Numerous academics (Ziba and Kang, 2020) argue that a lack of knowledge is a significant barrier to adoption of e-Government services. ElKheshin and Saleeb (2020) discovered a significant correlation between perceived awareness and behavioural intention. As a result, we assert that:

H8: Perceived awareness is positively related to behavioural intention.

It has been shown that perceived self-efficacy has an effect on the behavioural intention, effort, and determination needed to carry out behaviours (Alalwan et al., 2016). Perceived self-efficacy is described as "a subjective assessment of one's capacity to utilise technology to accomplish a certain job" (Hsu et al., 2019). Perceived self-efficacy was omitted from the UTAUT model since it grew insignificant over time as a function of behavioural intention. According to Jugert et al. (2017), the impact of perceived self-efficacy diminishes when effort expectancy captures it. Rahman et al. (2016) discovered a favourable correlation between self-efficacy and perceived ease of use and usefulness in their research on e-purchasing behaviour. Williams et al. (2020) discovered a strong positive connection between self-efficacy and effort expectation in their study on obligatory e-Government adoption. According to the aforementioned research, perceived self-efficacy benefits may diminish as users get more acclimated to the system. We propose that evaluating the computer self is essential in freshly created systems when users have no previous knowledge. As a result, we assert the following:

H9: Perceived self-efficacy is positively related to behavioural intention.

Religion is a major cultural element worth studying (Agag and El-Masry,2016), since it has been shown that religion has a big influence in influencing people' views, knowledge, and attitudes, as well as altering their lives (Agag and El-Masry, 2016). Aziz et al (2019) confirmed that religion is a cultural factor that influences people's behaviour. Prior empirical research has shown religion as a significant determinant of consumer attitudes and behaviours (e. g., Agag and Colmekcioglu, 2020). Additionally, religiosity is seen as a major factor in influencing consumers' intents and choices (Agag and Colmekcioglu, 2020). For example, Mortimer, et al., (2020) discovered that religion, as a predictor of both idealism and relativism, has an indirect effect on the beliefs and behaviours of consumers. Additionally, the TPB identifies religion as one of many potential contextual variables influencing consumers' subjective norms and attitudes (Raggiotto, Mason, and Moretti, 2018). Additionally, religion conveys sufficient information about one's own beliefs to be regarded a significant component in many research (e.g., Arli, Gil, and van Esch, 2020). When it comes to the development of attitudes, values are critical (Bukhari et al., 2020).

H10: Religiosity moderates the link between attitude, perceived self-efficacy, perceived awareness, and intention.

3. METHODOLOGY

3.1. Data Collection and Sampling

This article used a quantitative method in order to evaluate our conceptual framework. In May 2021, data were gathered through a survey questionnaire. Saudi Arabia citizens comprised the research population. Respondents freely participated in the research. We sent the link to a random sample of 2,000 Saudi Arabian residents drawn from a marketing company database that included a representative sample of 1.4 million registered Saudi Arabia citizens. After removing 15 surveys that were not completed, a total of 1290 responses were kept. The Mann-Whitney-U-Test in the Statistical Package for the Social Sciences (SPSS) IBM Statistics version 24 software was used to assess non-response bias for early responses (first 150 respondents) and late responses (last 150 respondents), after the questionnaires were distributed over nearly a four-week period. The findings indicated that none of the differences between the two groups were statistically significant (Hair et al., 2021). As a result, non-response bias did not exist in this sample.

3.2. Measurement Instruments

The items for behavioural intentions, performance expectancy, effort expectancy, social influence, and facilitating conditions were adapted from Dwivedi et al. (2017), Kurfali et al. (2017) and Venkatesh et al. (2016). Items for attitude and perceived risk were adapted from Dwivedi et al. (2017), while items for computer-self efficacy were adapted from Lallmahomed et al. (2017). Finally, religiosity scale was adopted from Agag and El-Masry (2016). Each question was evaluated on a five-point scale ranging from 1 (strongly agree) to 5 (strongly disagree).

3.3. Data Analysis

The obtained data were analysed using SPSS 24.0 and AMOS 22.0 SEM methods. To begin, we determined the normality of the data. Second, we examined the demographic features of our sample. Third, we evaluated the measurement model in order to determine the validity and reliability of the variables in the current research. Fourth, we assessed the structural model to see if the study's assumptions were correct (Hair et al., 2021). Prior to applying the measurement model, the data were checked for outliers and normality in order to meet the general linear model's assumption of normality. To detect outliers, the Cook's distance was computed. In accordance with Stevens's (1992) recommendation that answers with a Cook's value greater than 1 be removed, a total of five outliers were excluded from the final research. We conducted a normality test on each item based on its kurtosis and skewness. Kurtosis and skewness values for all variables were less than three and ten, respectively (Hair et al., 2021). (see Table 1).

4. RESULTS

4.1. Descriptive Statistics

According to Table1, male participants comprised the majority (58.0 percent) of the 1290 cases, while female participants constituted the remainder (42.0 percent). The majority of them were between the ages of 30 and 39. The average age of the participants was 34.5 years. The majority of interviewees said that their annual income was less than $20,000 (40.0 percent). The majority had a bachelor's degree (49.0 percent). Additionally, these respondents were drawn from various regions across Saudi Arabia.

4.2. Measurement Model

To begin, we evaluated the measuring instrument's reliability and validity utilising content, reliability, and convergent validity criteria. Our survey instrument's content validity was proven in two methods. To begin, the constructs and measurements utilised in this study have all been verified in prior research, since they were all drawn from the current literature. Second, the findings of the pre-test with subject-matter experts established the survey instrument's content validity. Cronbach's alpha was utilised to determine the scale's dependability and internal consistency (Cronbach, 1970). According to Hair et al.(2021), the scale is considered reliable if the Cronbach's alpha value for each construct is equal to or higher than 0.70. Cronbach's alpha values for the constructs included in the study's model varied from 0.70 to 0.86, as shown in Table 2. To assess convergent validity, the Composite Reliability (CR) and Average Variance Extracted (AVE) tests were used. Fornell and Larcker (1981) recommended that the CR value for each concept should be more than0.70, while the AVE value should be greater than 0.50 to ensure convergent validity. All of the components included in the research model have CR and AVE values that are above acceptable limits. Additionally, all indicators had standardised path loadings greater than 0.55; therefore, they are all significant (Fornell and Larcker, 1981). As such, this study meets the content validity, reliability, and convergent validity requirements for the measuring instrument. When the square root of the AVE from the construct is higher than the correlation between the construct and the other constructs in the model, discriminant validity is demonstrated (Hair et al., 2021). The discriminant validity of the measuring instrument is established

in this research, since the square root of the AVE from each construct is greater than the square root of all other cross-correlations with other constructs (see Table 2).

4.3. Structural Model

The findings of the research hypotheses H1-H11 are shown in Fig. 2. The suggested model allocates 39% of the variance to attitudes and 68% to intents, indicating a high ability for prediction. Additionally, the model fits the data well (X2=1429.483, df=814, p0.001, X2/df=1,764, RMSEA=0.076, CFI=0.994, IFI =0.991, and TLI = 0.990). To demonstrate the proposed model's superiority in assessing customers' intents, we compared it to the UTAUT model. The findings indicate that our suggested model fit indices (X2=1429.483, df=814, p0.001, X2/df=1,764, RMSEA=0.076, CFI=0.994, IFI =0.991, TLI =0.990) are appropriate. are superior than the fit indices for the UTAUT model (X2=1089.342, df=783, p.001, X2 /df=1,39, RMSEA=0.092, CFI=0.943, IFI =0.962, TLI = 0.969). Additionally, our suggested model's predictive ability (R2 =0.683) is superior to that of the UTAUT predictive model. The findings supported all the suggested hypotheses (H1-H10). First, the relationships among the UTAUT variables (i.e., performance expectancy, effort expectancy, social influence, facilitating conditions, attitudes, and intentions) were assessed. As suggested, the links were significant. Second, the links among perceived risk, perceived awareness, perceived self-efficacy, and intentions were evaluated. As proposed, the links were significant. Finally, attitude has a significant effect on intentions.

The current research examined the moderating effect of religion on the relationship between perceived awareness, perceived self-efficacy, attitudes, and intentions using a two-group model. The variations in route coefficients between subgroups were calculated using Henseler and Fassott (2010)'s method. The results indicate that religion acts as a moderator of the relationship between these factors.

5. DISCUSSION AND CONCLUSION

5.1. Key Findings

The current research examined the variables that influence the adoption of e-government in Saudi Arabia using a model presented in the literature. The research shed light on the fundamental variables influencing the adoption of e-government. The findings show that all of the original UTAUT model's variables, including performance expectancy, effort expectancy, social influence and facilitating condition were related to behavioural intentions. Additionally, our research found that other factors (perceived awareness, perceived self-efficacy, and perceived risk) are associated with intentions. Finally, our findings indicate that religion acts as a moderator in the connection between perceived awareness, perceived self-efficacy, attitude, and intentions.

In terms of factors that significantly predict attitudes, it was discovered that performance expectancy (= 0.36; p < 0.001), effort expectancy (= 0.41; p < 0.001), social influence (= 0.31; p < 0.001), facilitating conditions (= 0.56; p < 0.001), and computer self-efficacy (= 0.44; p < 0.001) all had a positive and significant effect on attitudes. These results corroborated the Performance Expectancy-System Use Attitude, Social Influence-System Use Attitude, and Computer Self-Efficacy-System Use Attitude hypotheses, respectively. The support for performance expectancy and social influence is consistent with the expectations validated in UMEGA (Verkijika and De Wet, 2018), whereas the support for computer-self efficacy demonstrates the importance of including computer self-efficacy when determining e-government adoption in Saudi Arabia, as previous research (Fassott, Henseler, and Coelho, 2016) has demonstrated this factor to be a significant antecedent factor. Additionally, perceived risk had a negative and substantial direct effect on attitudes toward e-government service uptake (= - 0.19; p < 0.05). This result corroborated the Perceived Risk System Use Attitude Hypothesis (H6) and was consistent with previous research (Mensah, Cater-Steel,

**Table 1. Measurement statistics of construct scales**

Construct/Indicators	SFL	Mean	Standard deviation	Cronbach's α	CR	AVE	t-values	Skewness	Kurtosis
Behavioural intentions (INT)	0.830	3.342	1.345	0.932	0.973	0.580	6.345	-1.345	1.123
INT1	0.912	3.012	1.123				13.293	-0.450	1.031
INT2	0.893	2.190	1.028				21.209	-0.549	1.208
INT3									
Attitude (ATT)	0.734	3.093	1.473	0.931	0.954	0.630	5.490	-1.453	1.302
ATT1	0.902	3.234	1.200				9.238	-0.783	1.455
ATT2	0.873	2.938	1.134				23.290	-1.209	1.209
ATT3	0.881	3.021	1.029				21.283	-1.284	1.672
ATT4									
Perceived awareness (AWR)	0.809	3.123	1.367	0.932	0.961	0.702	8.324	-1.47	2.12
AWR1	0.834	2.189	1.234				7.380	-0.89	1.39
AWR2	0.783	3.029	1.092				23.203	-1.29	2.01
AWR3									
Perceived self-efficacy (SUP)	0.894	3.290	1.049	0.934	0.967	0.593	23.290	-1.839	1.456
SFF1	0.923	2.834	1.056				19.380	-1.378	2.212
SFF2	0.956	3.478	1.237				15.382	-1.031	1.783
SFF3									
Performance expectancy (EXP)	0.785	3.297	1.029	0.915	0.938	0.509	6.438	-1.02	2.01
EXP1	0.810	3.120	1.710				11.289	-1.27	1.67
EXP2									
EXP3									
Effort expectancy (EFF)	0.908	3.340	1.093	0.827	0.914	0.529	10.392	-1.45	1.03
EFF1	0.844	3.430	1.226				7.993	-1.12	1.69
EFF2	0.916	3.310	1.172				11.456	-1.33	1.05
EFF3									
Social influence (SOL)	0.840	3.234	1.120	0.921	0.973	0.637	10.580	-1.89	1.74
SOL1	0.839	2.783	1.366				4.489	-1.12	1.34
SOL2	0.912	3.039	1.372				18.203	-0.83	1.89
SOL3									
Facilitating conditions (CDT)	0.890	3.239	1.039	0.914	0.964	0.643	9.304	-1.23	1.09
CDT1	0.913	2.347	1.328				16.302	-1.48	1.67
CDT2	0.893	2.883	1.037				3.290	-1.93	1.34
CD3									
Perceived risk (RSK0	0.930	3.202	1.290	0.934	0.973	0.674	11.290	-1.29	1.029
RSK1	0.923	2.192	1.029	0.923	0.963	0.608	23.890	-1.28	1.116
RSK2	0.871	2.893	1.67				32.912	-1.02	1.028
RSK3	0.893	3.203	1.209				8.340	-1.20	1.09
Religiosity (REL)	0.903	2.129	1.283				11.290	-1.78	1.11
REL1	0.798	2.378	1.672				21.298	-1.25	1.07
REL2	0.938	3.280	1.254				32.190	-1.08	1.23
REL3	0.884	3.289	1.092				7.398	-1.23	1.26
REL4	0.812	3.120	1.267				14.309	-1.08	1.06
REL5									
REL6									

Table 2. Discriminant validity of the correlations between constructs

Construct	Correlations and square roots of AVE									
	INT	ATT	AWR	SFF	EXP	EFF	SOL	CDT	RSK	REL
INT	0.761a									
ATT	0.439b	0.794								
AWR	0.490	0.348	0.837							
SFF	0.549	0.537	0.434	0.770						
EXP	0.309	0.435	0.430	0.445	0.714					
EFF	0.345	0.323	0.378	0.487	0.345	0.727				
SOL	0.423	0.302	0.434	0.430	0.504	0.354	0.798			
CDT	0.378	0.439	0.339	0.474	0.474	0.389	0.438	0.802		
RSK	0.670	0.328	0.309	0.509	0.458	0.530	0.540	0.453	0.821	
REL	0.239	0.432	0.274	0.327	0.403	0.329	0.493	0.583	0.238	0.779

a Composite reliabilities are along the diagonal, b Correlation

Figure 2. Structural model results
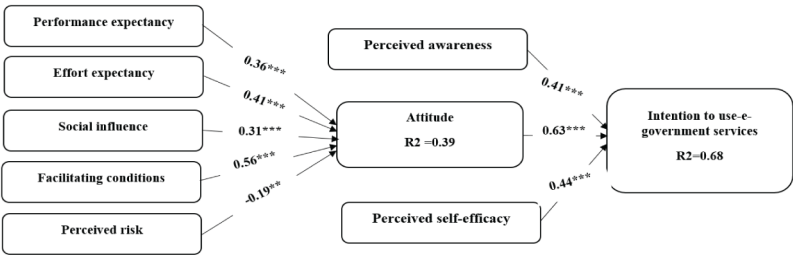
and Toleman, 2021; Revyakin and da Rocha, 2021). This demonstrates that when people consider e-government services to be risky, they are less likely to embrace them.

Finally, the analysis results indicated that religiosity moderates the relationship among perceived awareness, attitudes, perceived self-efficacy, and intentions. These findings show that the level of effect of perceived awareness, attitudes, perceived self-efficacy on behavioural intentions is stronger for those of high religiosity. Thus, we suggest that users who have high level of religiosity demonstrated a stronger attitude– behavioural intentions link. Such users are more likely to behave according to their attitude than users that scored low on religiosity.

5.2. Theoretical Implications

Over the years, research has proven the need of testing technology adoption models in a variety of nations to determine their applicability and to identify important variables that may help extend them (Chacón et al., 2021; Goyayi and Subramanium, 2021). Qaid, Samikon, and Al Fahmi, (2021) recently designed and verified UMEGA in the Indian setting within the framework of e-government research. UMEGA was created using nine well-known theoretical models and was validated to outperform all other models. However, UMEGA has not been verified in other settings to our knowledge. As a result, this research provided a second confirmation of UMEGA in a new setting. In Saudi Arabia, UMEGA (R^2 of 68.3 percent) outperformed other models, such as the combination of UTAUT2

and GAM by Tamilmani et al. (2021) in Mauritius, in predicting behavioural intention (R2 of 38 percent). However, the universality of UMEGA's suggested connections was questioned in the Saudi Arabia setting. This was because effort expectations did not accurately predict attitudes. Additionally, Lallmahomed et al. (2017) shown in their model that effort expectation failed to predict behavioural intention in Mauritius's e-government adoption. Nonetheless, this research demonstrated that effort expectation had an indirect impact on attitudes through performance expectancy's mediating function. This indicates a need for further refinement of the connections within various technology acceptance models in order to get a better understanding of their applicability in diverse contexts.

Additionally, this research extended the model by including variables such as computer self-efficacy and trust, which have been proven to be beneficial for e-government adoption in Saudi Arabia but are not included in UMEGA. Extending the model to include these two variables enhanced the explanatory power of attitudes by 5.3 percent and that of behavioural intention by 7.1 percent. For academics, this study demonstrates that, despite the fact that UMEGA is well-founded and outperforms comparable models, it may still benefit from further theoretical refinement while being compact and easy to implement. Moreover, our research also make contributions to the theory of religious by investigating the moderating role of religiosity in the link between attitude, perceived awareness, self-efficacy and intentions.

5.3. Managerial Implications

For government decision makers, the findings may be critical in terms of reaching more people. To persuade more individuals to utilise e-government, prospective users must be educated about the potential advantages of e-government, particularly in their professional lives. Additionally, the government should develop and raise knowledge of the resources available to users of e-government whenever they need assistance. Finally, it has been shown that people are more likely to utilise e-government services when their social context encourages them to do so, which means that getting one more user may imply obtaining many. If the basic needs of people are properly addressed, the adoption of e-government services in Saudi Arabia is expected to grow significantly.

Numerous conclusions may be drawn from our findings, many of which are beneficial to the Saudi Arabia government. For instance, if governments want to improve the adoption of their services, they need establish effective marketing and communication channels. Simply having the required infrastructure will not result in widespread adoption of e-Government services. If people are unaware of accessible e-Government services, they will be unable to assess the value of such a service. As a result, they are more inclined to reject e-Government services. Lack of knowledge is cited as one of the issues impeding the adoption of e-Government services (Fakhoury and Chebaro, 2021). A systematic campaign of e-Government awareness should be launched to promote and encourage the use of e-Government services. Individuals aged 18 to 39 should be addressed initially, since they constitute the bulk of Saudi Arabia's Internet users.

6. LIMITATIONS AND FUTURE RESEARCH

As is the case with any study, the results of this one should be interpreted in light of the following limitations. To begin, this study was performed in Saudi Arabia, where e-Government services are still in a static state with no interaction. As a result, the study results may not apply to underdeveloped nations or countries with fully interactive e-Government services. Generalization of those results should be done with caution, since this study used a purposive sample in a cross sectional design. Additionally, since the majority of our respondents are highly educated, our findings may be limited to that subset of e-Government users. Finally, since our data were gathered at a particular moment in time, they may represent people' opinions at the time.

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