The Use of M-Government and M-Health Applications during the COVID-19 Pandemic in Saudi Arabia

Ahad Abdulqader Allam[1], Amer Nizar Abu Ali[1], Wed H. Ghabban[2], Alaaldin Alrowwad[3], Najmah Adel Fallatah[1], Omair Ameerbakhsh[1], Ibrahim M. Alfadli[1], Fahad M. Ghabban[1]

[1]Information System Department, College of Computer Science and Engineering, Taibah University, Madina, Saudi Arabia
[2]Applied College, University of Tabuk, Tabuk, Saudi Arabia
[3]Department of Business School, University of Jordan-Aqaba Branch, Aqaba, Jorden
Email: fghaban@taibahu.edu.sa

Abstract

The automated proficiencies of the Kingdom of Saudi Arabia, in vision 2030, influence a decade of continual expenditure in contemporary automation and unified government platforms. It affords a reliable base for the COVID-19 response's significant facets, encompassing continued connection to many e-government systems. The worldwide COVID-19 epidemic has reinvigorated the role of e-government. The health crisis has altered SADAIA to lunch Tawakkalna m-government application to execute business continuity strategies, offer important services to people, and assure their fulfilment. The study intends to assess the impact of the COVID-19 pandemic on users' satisfaction with m-government services and Health Care apps in the Al-Madinah region. It analyses the elements that enable people's use of online government services, and m-government services are a solution to handle the crisis. The finding shows that trust in e-government, trust in the internet, ease of use and usefulness are the important factors in using the application during the pandemic.

Keywords

M-Government, M-Health Application, COVID-19 Pandemic, Citizens' Satisfaction

1. Introduction

The worldwide COVID-19 epidemic resuscitated the role of e-government in early 2020. The rapid and distressing spread of the Coronavirus around the world

has increased the importance of remote transactions in all sectors. Widespread quarantine and crew few and stay-at-home behaviors all contribute to an increase in online connection. Saudi Data and Artificial Intelligence Authority (SDAIA) is a government agency.

SDAIA is one of the ambitious initiatives to achieve Vision 2030 and global leadership in data and artificial intelligence. The citizens and residents of KSA have known it during the COVID-19 pandemic through the application of Tawakkalna and Tabaud, and these two applications are produced by (SDAIA). We also got to know it during the G-20 emergency summit of the G-20 when the COVID-19 pandemic spread. To address the crisis and provide e-government services to citizens, residents, and tourists, the national platform and other m-Health applications were created. This research aims to determine the effects of the COVID-19 pandemic on citizens' satisfaction with e-government mobile services and m-Health applications by developing hypotheses based on previous studies measuring citizens' satisfaction with a questionnaire as a numerical data collection tool. A quantitative method was employed to investigate how the government used digital technology during the pandemic to facilitate interactive engagement between citizens and government entities in online service domains.

Throughout the COVID-19 case study of the Al-Madinah Region in Saudi Arabia, this research project questioned the impact of the health pandemic on citizen satisfaction with m-government services. Using the Technological Acceptance Model (TAM) for assessing citizen satisfaction, ease of use, trust, and usefulness, a quantitative research approach was applied with a specimen of 350 Al-Madinah nationals from diverse demographics.

The purpose of this research was to answer the following question: What impact has the COVID-19 pandemic had on residents' satisfaction with e-government mobile services and m-Health applications in the Al-Madinah Region?

Based on the evaluated literature and the study's goal, the researcher developed the following hypotheses.

- H1: Citizens' trust in the e-government positively affects their satisfaction with m-government and m-Health applications during COVID-19.
- H2: Citizens' trust in the internet positively affects their satisfaction with m-government and
- m-Health applications during COVID-19.
- H3: The usefulness of the m-government and m-Health applications positively affects citizens' satisfaction during COVID-19.
- H4: The ease of use of them-government and m-Health applications positively affects citizen satisfaction during COVID-19.

The study focuses on the role and implications of the COVID-19 pandemic on user satisfaction with m-government and the m-Health app in Al-Madinah. To ensure that individuals and residents are satisfied, government sectors strive to improve the quality of their services.

2. Literature Review

The globe is experiencing the most catastrophic health crisis in decades. Ever since the outbreak began, efforts to contain the spread of COVID-19 have negatively affected businesses and governments, putting a strain on economies worldwide [1]. The unified national platform gave numerous services and personal information to citizens via e-government media such as Gov.sa, Absher, and Muqeem [2]. The national platform satisfies the needs of all citizens through a unified digital identity. When the nationwide curfew was implemented, it ensured people had secure access to a variety of government services [3].

This enormous demand for the Communications and Information Technology Commission (CITC) has been met by telecom operators in various ways (e.g., by making data more available, increasing internet speeds, providing services free, and enabling integrated management).

A considerable number of existing studies recognize the critical effect of COVID-19 on the role of digital government in ensuring business continuity in providing electronic services, health consultations, and crisis management in both the public and private sectors. The accessibility of information online helps reduce time-consuming conflicts between service entities and their workers, not to mention heavy crowds or other issues that could arise when visiting the offices of service providers. Discovering citizens' concerns has been part of a business continuity plan articulated to provide adequate services.

2.1. M-Government Applications

Saudi Arabia is a developing country that has an excellent opportunity to shape the future of m-government. M-government refers to a variety of government services that are delivered through mobile devices to their users, as smart devices are an integral part of most people's lives [4]. Although Saudi Arabia has enabled certain m-government services and applications, the adoption of m-government is taking time due to a variety of crucial factors. Those factors include user adoption, the penetration rates of mobile devices and the internet, reliability, stability, privacy, and effectiveness [5]. According to [6], 94.02% of users in the AlMadinah region have mobile devices, and 79.82% have an internet connection. Amidst the cultural transition in modern times, smartphones are quickly becoming multipurpose devices for people. Wider adoption of ICT and engagement with eGovernment services by users would provide several benefits for both the e-Government and the users, such as efficiency, improved services, increased accessibility to public services, sustainable community development, and increased transparency and accountability [7] [8]. ICTs employ smartphone technology in the e-Government sector to benefit people [9] [10].

Tawakkolna and Taba'od are applications used to monitor positive cases of COVID-19, so people are cautious when leaving their homes. This form of application is used to monitor an outbreak without obstructing citizens' mobility or causing economic collapse.

As [11] notes, there is evidence suggesting this type of COVID-19 application can be useful for both government and non-government organizations in order to spot cases of COVID-19. It is necessary for researchers to have a deeper understanding of the apps, their functionality, the consequences, and the alternatives.

For apps that help locate individuals who have COVID-19 and inform others of this information, tracking instruments have been developed to enable patients to self-report data and estimate their COVID-19 levels. The use of telehealth should emphasize accessibility and a high standard of treatment. The author notes that medical confidentiality and emotions must be respected.

The study [12] on COVID-19's effect on social media increased awareness of individuals' ability to access essential services from e-Government. People's expectations about the government-supported strengthening prevention efforts. During outbreaks, the health authorities and government should take more interest in addressing citizens' views because government policies have a significant impact on public attitudes toward quarantine. The study [13] evaluated factors that influenced people's conversion to telehealth: its perceived usefulness and ease of use. Both the patient's privacy and medical information need to be addressed to enhance telehealth. This research is of great value to those making decisions about integrating telehealth services into one application. The results were the first to empirically investigate the effects of COVID-19 on the real world.

2.2. Theoretical Model and Hypotheses

2.2.1. Technological Acceptance Model (TAM)

The technology acceptance model (TAM) describes how users behave to accept and use new technology. As proposed by [14], it suggested that a user accepts information systems according to a variety of factors. Users' positive or negative feelings towards the adoption of a system (*i.e.*, behavioral intention) were predicted. The TAM model has been thoroughly validated in various fields and was greatly elaborated in e-Government and mobile government research.

2.2.2. The Proposed Research Model and Hypotheses Development

M-government and m-Health applications are regarded as critical components to combat the global crisis triggered by COVID-19. The factors influencing their adoption have been studied by researchers using the used TAM model. User behavior was replaced by citizen satisfaction as the critical factor in determining the performance of an information system [13] [15] [16] [17] [18]. Users' interaction with the applications was mandatory due to the COVID-19 health crisis. Figure 1 shows the independent and dependent variables:

Independent variable: trust in e-government mobile services and m-Health applications, trust in the internet, ease of use, and usefulness.

Dependent variable: citizens' satisfaction with e-Government mobile services and m-Health applications.

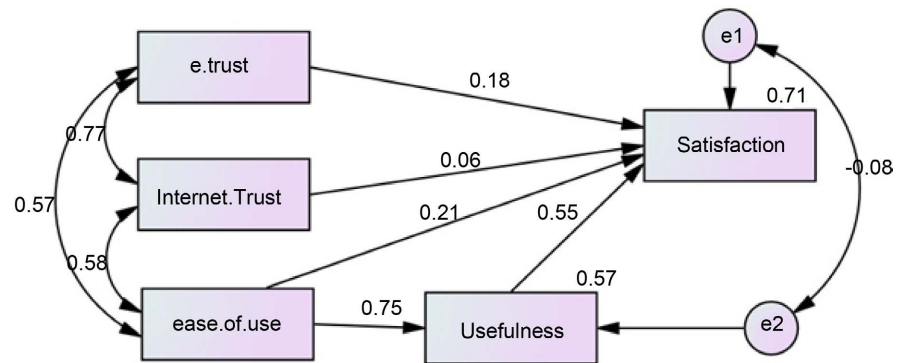1) Citizen Satisfaction with m-Government and m-health application

Figure 1. Proposed model.

Figure 1 demonstrates citizen satisfaction with government services has become a central concern of modern governments. Researchers use a high or low satisfaction index to study how citizens respond and understand service satisfaction. Positive service performance reviews by citizens can support government policy and ensure that government services continue to function well enough to satisfy their constituents [19] [20].

2) Citizens' Satisfaction and Trust in m-Government and m-Health Applications

Trust is the expectation that a commitment, individual, or community is reliable [21]. It can enable people to use facilities intentionally and carefully consider governmental features. Building trust is critical for successful e-Government initiatives [22]. The Saudi government fully operates many government e-services and mHealth applications to mitigate the impact of the health crisis [17] [23]. Therefore, the researcher proposed the first hypothesis as follows:

H1: The citizens' trust in the e-Government positively affects their satisfaction with using m-Government and m-Health applications during COVID-19.

3) Citizens' Satisfaction and Trust in the Internet

Having confidence in e-Government services involves a significant level of trust in the internet. The services require citizens to offer special privileges to access their information. Citizens trust government agencies and their web-based e-services. There are risks associated with making online transactions [24] [25]. Therefore, the researcher proposed the first hypothesis as follows:

H2: The citizens' trust in the internet positively affects their satisfaction with using m-Government and m-Health applications during COVID-19.

4) The Usefulness of the m-Government and m-Health Applications

The m-Government field represents its users' capabilities to access an organization's website to accomplish goals and acquire benefits. User satisfaction is influenced by four factors: system effectiveness, usefulness, system quality, and social impact. Researchers found that perceived usefulness and website design were the most important drivers of user satisfaction [26]. The third hypothesis is as follows:

H3: The usefulness of m-Government and mHealth applications during COVID-

19 positively affects citizen satisfaction.

5) Ease of Use of the m-Government and m-Health Application

The term refers to the amount of work a customer feel would be necessary to utilize a gadget. That is related to how well the item is viewed. As a result of the perceived ease of use (absence of difficulties), behavioral intentions are formed. It has a significant impact on how beneficial it is perceived to be [27] [28]. The researcher proposed the fourth hypothesis:

H4: The ease-of-use of the e-government mobile services and m-health application during Covid-19 positively affects citizen satisfaction.

3. Research Methodology

During COVID-19 in the Al-Madinah region, a researcher used a quantitative technique in the form of a questionnaire to find out users' satisfaction with e-Government mobile services and m-Health applications. The data collection validated theories on sample size, which was then displayed and evaluated using statistics and graphs. [14] TAM variables, PEOU and PU, as well as the trustworthiness constructs, were incorporated into the suggested model. External factors, such as trust and satisfaction, were identified, and other demographic information, such as gender and age, were included. The online surveys collected responses from the study sample by assessing hypotheses based on the literature. The researcher determined the study population to be 384 by referring to the sample table in [29]. According to [6], the Al-Madinah Al-Monawarah area has a population of 2,239,923. A questionnaire was created to fit the study model's parameters. The primary instrument for data collection in this study was a quantitative survey questionnaire.

4. Data Analysis

Internal accuracy and internal reliability were first verified in order to find variables to include in the study hypotheses. Cronbach's (a) and Pearson's correlation coefficients of each of those variables were used to investigate their relationship to each hypothesis. Reliability measurements were used to authenticate the data presented in the research project. The Cronbach's alpha value for the research instrument was between 0.805 and 0.974, showing that the research instrument had an average high level of reliability, as the reliability of research constructs was considered high when the Cronbach's alpha value was greater than 0.7 and extremely high when it was greater than 9.0 [30].

5. Results and Discussion

To test the research hypotheses, the researcher used the Pearson correlation to ascertain the extent of the relationship between the research variables. The result of the statistical analysis shows that citizens' trust level in m-Government and m-health applications was (89.88) trust on the internet was (91.1), the perceived usefulness of the services was (88.52), the ease of use of m-Government applica-

tions was (86.76), and citizens' satisfaction with m-Government services and health applications at large was (88.5). That answers the research question on the effect of the COVID-19 pandemic on citizens' satisfaction with m-Government and m-Health applications in the Al-Madinah region. Participants' responses aligned with most of the items tested in the hypotheses.

Hypotheses Testing

The research presents four hypotheses, which are evaluated using statistical tests. The researcher used Pearson correlation to determine the magnitude of the relationship between the research variables in order to evaluate the research hypotheses.

According to the research's first hypothesis, H1: The citizens' trust in the e-Government positively affects their satisfaction with using m-Government and m-Health applications during COVID-19. Identifying and quantifying the relationship between Satisfaction and Trust in e-Government, the Pearson coefficient value demonstrates the presence of a significant positive relationship between Satisfaction and Trust in e-Government, indicating that the hypothesis is accepted. Table 1 illustrates the Pear coefficient value between Satisfaction and Trust in e-Government.

As shown in Table 1, there is a strong correlation between Satisfaction and Trust in e-government in the sample analysis, with a correlation coefficient of 0.01, suggesting that the null hypothesis (that there is no relationship between Satisfaction and Trust in e-Government) is incorrect.

According to the research's second hypothesis, H2: The citizens' trust in the internet positively affects their satisfaction with using m-Government and m-Health applications during COVID-19. Identifying and quantifying the relationship between Satisfaction and Trust on the Internet, the Pearson coefficient value shows a strong positive relationship between Satisfaction and Trust on the Internet, indicating that the hypothesis is accepted. Table 2 illustrates the Pearson coefficient value between Satisfaction and Trust on the Internet.

Table 1. The correlation between satisfaction and trust in e-Government (N = 350).

Variables	Satisfaction
Trust in e-government	0.649**

**Correlation is significant at the 0.01 level, r table: at 0.05 level = 0.174, at 0.01 level = 0.208.

Table 2. The correlation between satisfaction and trust in the internet (N = 350).

Variables	Satisfaction
Trust in the Internet	0.649**

**Correlation is significant at the 0.01 level. r table: at 0.05 level = 0.174, at 0.01 level = 0.208.

As shown in Table 2 there is a strong correlation between Satisfaction and Trust on the Internet in the research sample, with the correlation relationship being significant at the level of significance 0.01. As shown in Table 4.18 at the level of significance 0.01 indicates that the null hypothesis (that there is no relationship between Satisfaction and Trust on the Internet) is incorrect.

According to the research's third hypothesis, H3: The usefulness of m-Government and m-Health application during COVID-19 positively affects citizen satisfaction. By identifying and quantifying the relationship between Satisfaction and Usefulness, the Pearson coefficient value shows a strong positive relationship between Satisfaction and Usefulness, indicating that the hypothesis is accepted. Table 3 illustrates the Pearson coefficient value between Satisfaction and Usefulness.

As shown in Table 3, there is a strong correlation between Satisfaction and Usefulness in the research sample, where the value of the correlation relationship is significant at the level of significance 0.01, meaning that the null hypothesis (that there is no relationship between Satisfaction and Usefulness) is excluded and the alternate hypothesis (that there is a correlation between Satisfaction and Usefulness) is approved.

According to the research's fourth hypothesis, H4: The ease-of-use of the m-Government mobile services and mHealth application during COVID-19 positively affects citizen satisfaction. Identifying and quantifying the relationship between Satisfaction and Usefulness, the value of the correlation shows that there is a strong positive relationship between Satisfaction and Ease of use, indicating that the hypothesis is accepted. Table 4 illustrates the correlation between Satisfaction and Ease of use.

As shown in Table 4, there is a strong correlation between Satisfaction and Ease of use in the research sample, with the correlation being relevant at the level of significance 0.01. As shown in Table 4 at the level of significance of 0.01, that implies that the null hypothesis (that there is no relationship between Satisfaction and Ease of use) is excluded, and the alternative hypothesis (that there is a

Table 3. The correlation between satisfaction and usefulness (N = 350).

Variables	Satisfaction
Usefulness	0.808**

**Correlation is significant at the 0.01 level. r table: at 0.05 level = 0.174, at 0.01 level = 0.208.

Table 4. The correlation between satisfaction and ease of use (N = 350).

Variables	Satisfaction
Ease of use	0.746**

**Correlation is significant at the 0.01 level. r table: at 0.05 level = 0.174, at 0.01 level = 0.208.

correlation between Satisfaction and Ease of use) is approved.

6. Conclusions

New healthcare technologies have been critical in recent years amidst the growth of information and communication technology, especially as mobile phones enable connectivity anywhere and at any time. This study aimed to establish a correlation between citizen satisfaction and the technology acceptance model (TAM) form-Government and m-Health applications that rationally simplify daily life for Saudi citizens and residents. The researcher is using TAM to ascertain users' overall satisfaction with m-Government and m-Health applications during COVID-19, as well as their perceptions of their usefulness and ease of use.

The findings indicate that citizens' trust in the e-Government significantly influences citizens' satisfaction and intention to connect with m-Government and m-Health services in everyday life. In other words, people who trust the m-Government are more likely to report high levels of satisfaction and are more willing to trust the Internet to perform an online transaction with the e-government, as in H2 (Citizens' trust in the Internet positively affects their satisfaction with m-Government and m-Health applications during COVID-19).

Trust (Trust in e-Government and Trust in the Internet) is the most influential extended predictor of citizens' decisions, preceded only by COVID-19. In both cases, the greater the levels of trust, the more satisfied users are with the m-Government and m-Health applications.

With H3 (the usefulness of m-Government and m-Health applications positively affects citizens' satisfaction during COVID-19), the study showed that the majority of participants confirmed their satisfaction with their e-Government system experience. Work endorses this result, as it claims that perceived usefulness has a strong positive correlation with citizen satisfaction.

Finally, the results of H4 (the ease of use of m-Government and m-Health application positively affects citizen satisfaction during COVID-19): the findings of the analysis indicate that there is a clear positive correlation between ease of use and citizens' satisfaction with m-Government and m-Health applications. That implies that perceived ease of use has a positive and significant effect on citizens' attitudes toward using m-Government and m-Health applications.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] WHO (2020) Global Collaboration to Accelerate New COVID-19 Health Technologies.

[2] Abolfotouh, M.A. (2020) Perception and Attitude of Healthcare Workers in Saudi

Arabia with Regard to Covid-19 Pandemic and Potential Associated Predictors. *BMC Infectious Diseases*, **20**, Article No. 719. https://doi.org/10.1186/s12879-020-05443-3

[3] WBG (The World Bank Group) (2020) Unlocking the Digital Era during the Lock Down, Covid-19 Digital Response and Future of Digital Government in KSA.

[4] Alotaibi, R., Houghton, L. and Sandhu, K. (2017) Factors Influencing Users' Intentions to Use Mobile Government Applications in Saudi Arabia: TAM Applicability. *International Journal of Advanced Computer Science and Applications*, **8**, 200-211. https://doi.org/10.14569/IJACSA.2017.080727

[5] Alonazi, M.B. (2018) MGAUM—Towards a Mobile Government Adoption and Utilization Model: The Case of Saudi Arabia. *International Journal of Humanities and Social Sciences*, **12**, 459-466. https://core.ac.uk/download/pdf/223211161.pdf

[6] General Authority for Statistics (2019) The Percentage of Individuals 15 Years and over and the Language Used to Browse the Internet (during the Last 3 Months) by Gender and Nationality, out of the Total Internet Users Kingdom-Wide. https://www.stats.gov.sa/sites/default/files/nshr_msh_nfdh_wstkhdm_tqny_lmlwmt_wltslt_llsr_wlfrd_2019m_0.pdf

[7] Alrowili, T.F., Alotaibi, M.B. and Alharbi, M.S. (2015) Predicting Citizens' Acceptance of M-Government Services in Saudi Arabia: An Empirical Investigation. 2015 *Annual IEEE Systems Conference* (*SysCon*) *Proceedings*, 627-633.

[8] Almrezeq, N., Alhamdan, R., Mahyub, M. and Alfayad, M. (2019) An Exploratory Study to Investigate Citizens' Experience with E-Government Mobile Services in Saudi Arabia. 2019 5*th International Conference on Information Management* (*ICIM*), Cambridge, 24-27 March 2019, 188-196. https://doi.org/10.1109/INFOMAN.2019.8714719

[9] Muzafar, S. and Jhanjhi, N.Z. (2020) Success Stories of ICT Implementation in Saudi Arabia. In: Ponnusamy, V., *et al*., Eds., *Employing Recent Technologies for Improved Digital Governance*, IGI Global, Hershey, 151-163. https://doi.org/10.4018/978-1-7998-1851-9.ch008

[10] Alsyouf, A. (2020) Mobile Health for Covid-19 Pandemic Surveillance in Developing Countries: The Case of Saudi Arabia. *Solid State Technology*, **63**, 2474-2485.

[11] O'Leary, D.E. (2020) Evolving Information Systems and Technology Research Issues for COVID-19 and Other Pandemics. *Journal of Organizational Computing and Electronic Commerce*, **30**, 1-8. https://doi.org/10.1080/10919392.2020.1755790

[12] Yasir, A., *et al*. (2020) Modeling Impact of Word of Mouth and E-Government on Online Social Presence during COVID-19 Outbreak: A Multi-Mediation Approach. *International Journal of Environmental Research and Public Health*, **17**, Article No. 2954.

[13] An, M.H., *et al*. (2021) Using an Extended Technology Acceptance Model to Understand the Factors Influencing Telehealth Utilization After Flattening the COVID-19 Curve in South Korea: Cross-sectional Survey Study. *JMIR Medical Informatics*, **9**, e25435. https://doi.org/10.2196/25435

[14] Davis, F. (1989) Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, **13**, 319-340. https://doi.org/10.2307/249008

[15] Alkraiji, A.I. (2020) An Examination of Citizen Satisfaction with Mandatory e-Government Services: Comparison of Two Information Systems Success Models. *Transforming Government: People, Process and Policy*, **15**, 36-58. https://doi.org/10.1108/TG-01-2020-0015

[16] Kamal, S.A., Shafiq, M. and Priyanka, K. (2020) Investigating Acceptance of Tele-medicine Services through an Extended Technology Acceptance Model (TAM). *Technology in Society*, **60**, Article ID: 101212. https://doi.org/10.1016/j.techsoc.2019.101212

[17] Velicia-Martin, F., *et al*. (2021) Researching COVID-19 Tracing App Acceptance: Incorporating Theory from the Technological Acceptance Model. *PeerJ Computer Science*, **7**, e316. https://doi.org/10.7717/peerj-cs.316

[18] Rout, K. and Sonalimayee, S. (2020) Exploring Factors Influencing the Users' Intention to Use Aarogya Setu Contact Tracing Mobile Health Application during COVID-19 Pandemic. *Journal of Humanities and Social Sciences Research*, **2**, 29-36. https://doi.org/10.37534/bp.jhssr.2020.v2.nS.id1068.p29

[19] Van de Walle, S. (2017) Explaining Citizen Satisfaction and Dissatisfaction with Public Services. In: Ongaro, E. and Van Thiel, S., Eds., *The Palgrave Handbook of Public Administration and Management in Europe*, Springer, Berlin, 227-241. https://doi.org/10.1057/978-1-137-55269-3_11

[20] Hjortskov, M. (2017) Priming and Context Effects in Citizen Satisfaction Surveys. *Public Administration*, **95**, 912-926. https://doi.org/10.1111/padm.12346

[21] Al-Amawi, A.M.I. (2020) The Critical Success Factors That Affect the Adoption of Smartphone-Based Governmental Services by Jordanian Citizens. *Journal of Critical Review*, **7**, 2930-2938.

[22] Chatzoglou, P.D., *et al*. (2015) Factors Affecting the Intention to Use e-Government Services. 2015 *Federated Conference on Computer Science and Information Systems* (*FedCSIS*), Lodz, 13-16 September 2015, 1489-1498. https://doi.org/10.15439/2015F171

[23] Hussain, A.H. (2020) Factors Affecting the Adoption of E-Government in Saudi Arabia. *International Journal of Business Marketing and Management* (*IJBMM*), **5**, 26-41.

[24] Beldad, A., *et al*. (2012) A Cue or Two and I'll Trust You: Determinants of Trust in Government Organizations in Terms of Their Processing and Usage of Citizens' Personal Information Disclosed Online. *Government Information Quarterly*, **29**, 41-49. https://doi.org/10.1016/j.giq.2011.05.003

[25] Tufail, M.S., *et al*. (2017) An Analysis of Citizens' Trust in E-Government Services and User Satisfaction and Their Impact on E-Services Adoption in Pakistan. *Future of Marketing and Management*, **11**, 492-522.

[26] Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003) User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, **27**, 425-478. https://doi.org/10.2307/30036540

[27] Chen, L. and Aklikokou, A.K. (2019) Determinants of E-Government Adoption: Testing the Mediating Effects of Perceived Usefulness and Perceived Ease of Use. *International Journal of Public Administration*, **43**, 850-865. https://doi.org/10.1080/01900692.2019.1660989

[28] Gajendra, S., Subarna, S. and Purushottam, K. (2014) Technology Acceptance Perspectives on User Satisfaction and Trust of E-Government Adoption. *Journal of Applied Sciences*, **14**, 860-872. https://doi.org/10.3923/jas.2014.860.872

[29] Johnson, B. and Christensen, L. (2014) Educational Research: Quantitative, Qualitative, and Mixed Approaches. 5th Edition, SAGE Publications, London.

[30] Biasutti, M. and Frate, S. (2017) A Validity and Reliability Study of the Attitudes toward Sustainable Development Scale. *Environmental Education Research*, **23**, 214-230. https://doi.org/10.1080/13504622.2016.1146660