

**PREDICTING PILGRIM AND VISITOR SATISFACTION THROUGH USING
SMARTPHONE APPLICATIONS AT HOLY SITES DURING COVID-19**

Abobakr Aljuwaiber and Ahmed K. Elnagar

Abstract. This study aims to investigate the promotion of digital transformation in Umrah and Visitation through the management of smartphone applications (such as Tawakkalna and Nusuk) in light of COVID-19. The research measures the impact of digital transformation on visits during COVID-19, in light of the Kingdom's Vision 2030 statement, in terms of pilgrims' and visitors' satisfaction with the services provided in Madinah. The study relied on the descriptive analytical approach to collect and analyse primary and secondary data as the basis for research findings. An electronic questionnaire was designed and distributed to pilgrims and visitors in Madinah. The study found a positive significant impact of digital transformation on visits during COVID-19 in light of the Kingdom's Vision 2030 statement and pilgrims' and visitors' satisfaction with the services provided to them. The study recommends that decision-makers and employers emphasize the need to use Smartphone applications in Hajj and Umrah visits even after the end of the Corona crisis. Applications were found to be critically important in limiting the spread of the virus. There is a need for continuous improvements in digital transformation in Hajj, Umrah and visits.

Keywords: digital transformation, smartphone applications, Tawakkalna, Umrah, pilgrims and visitors, Madinah, COVID-19

JEL Classification: M15, M38, I18

Authors:

Abobakr Aljuwaiber

Applied College, Taibah University, Madinah, Kingdom of Saudi Arabia

E-mail: abobakrju@gmail.com

<https://orcid.org/0000-0001-8939-5317>

Ahmed K. Elnagar

Applied College, Taibah University, Madinah, Kingdom of Saudi Arabia

E-mail: aelnagar@taibahu.edu.sa

<https://orcid.org/0000-0003-1787-8189>

Citation: Aljuwaiber, A., & Elnagar, A. K. (2022). Predicting Pilgrim and Visitor Satisfaction Through Using Smartphone Applications at Holy Sites During Covid-19. *Virtual Economics*, 5(3), 91-108. [https://doi.org/10.34021/ve.2022.05.03\(5\)](https://doi.org/10.34021/ve.2022.05.03(5))

Received: July 9, 2022. Revised: September 12, 2022. Accepted: October 9, 2022.

© Author(s) 2022. Licensed under the [Creative Commons License - Attribution 4.0 International \(CC BY 4.0\)](https://creativecommons.org/licenses/by/4.0/)

1. Introduction

There has been a boom in electronic and technical fields since the late twentieth century, making the use of modern technologies an inevitability in organizations. The strategic plan for digital transformation is a beacon to lead the economic transformation expressed in the Kingdom's Vision 2030 statement (Saudi Vision 2030, 2022). Digital technology has become the language of the times. It is an essential commodity and no longer a luxury. It presages not only a technical mechanization of current operations, but also a change in work practices that will improve creativity and provide technical empowerment. To achieve these goals, digital transformation will require the deployment of all material and human resources of an organization within a modern and advanced technological and informational framework. Thus, such transformations have become a core responsibility of all senior organizational management and not just of the director of information technology. New technology devices such as smartphones essentially allow individuals to communicate easily. Communication theory argues that people obtain information through different technology devices and applications (Keib et al., 2021). The use of these technologies and associated electronic transactions to serve the guests of Allah are seen in various practices related to the rituals of the Hajj, Umrah, and Visiting.

The importance of technology and availability of the digital infrastructure emerged during the Corona pandemic. In December 2019, the Corona virus (hereafter referred to as COVID-19) first appeared in the seafood market in Wuhan, China. It then spread throughout China and worldwide. The World Health Organization announced the outbreak of the epidemic in March 2020 (Wang et al., 2020) and many countries took precautions to suspend activities in workplaces, schools, restaurants, and shops, and implemented curfews. Under these circumstances, COVID-19 has become a global pandemic due to its worldwide spread. Hence, the Kingdom of Saudi Arabia, like most countries at the beginning of the epidemic, took limited preventive measures, such as thermal examination at all points of entry into the country, the promulgation of travel instructions, and emphasizing basic health prevention measures, such as hand washing and using alcohol-based hand sanitizers and face masks (WHO, 2020).

The Saudi Ministry of Health announced the first case of COVID-19 in March 2020. The case was a Saudi citizen recently returned from Iran. The Ministry revealed through its official account on social media that the patient was immediately quarantined in Qatif Hospital. Since then, COVID-19 cases have begun to spread in the Kingdom. The Government has made every effort to prevent the spread of the virus and prepared twenty-five private hospitals with integrated facilities to support the quarantine process to deal with those infected. At the end of March, the Ministry of Health announced the first death. In view of the rapid spread of the virus and the exponential increase in cases of infection, the country has enacted measures to deal with the global health crisis. For example, schools and universities were closed and distance education activated. Public facilities, such as restaurants, commercial shopping centres and business districts were closed, public curfews announced and movement between cities and regions restricted (Jokhdar et al., 2021).

Because of the virus and associated measures to limit contact, the crisis has contributed to promoting digital transformation through its implementation in businesses and services. It has prompted many organizations to launch smart device applications to enhance digital transformation and support business solutions and customer services. Within the scope of the Ministry of Hajj and Umrah, the use of smart device applications has been instrumental in implementing precautionary and preventive measures to reduce the COVID-19 pandemic effect in the Two Holy Mosques. The Ministry has created its own applications in addition to those developed by the Ministry of Health (SPA, 2020; Basahel et al., 2021).

Based on the above unfolding events, this study aims to explore the importance of smartphone applications in promoting digital transformation and to assess the satisfaction of pilgrims and visitors with their use during the pandemic. Taking Madinah as a case study, the research has the following objectives:

- to ascertain the importance of promoting digital transformation in Hajj, Umrah and Visits in light of the Kingdom's 2030 Vision statement.
- to explore the impact of the COVID-19 pandemic on the Hajj, Umrah and Visitation systems.
- to understand participants' attitudes to the use of digital technology, and to measure the impact of smartphone applications management in promoting digital transformation and satisfaction of pilgrims and visitors in Madinah.

In line with these objectives, the contribution of this study lies in the empirical research of how using smartphone applications enhanced digital transformation during the Corona pandemic and shed light on what part it plays in satisfying pilgrims and visitors.

2. Literature Review

2.1. Digital Transformation in the Religious Context

The global community is witnessing a development in the digital and technical field, known as the Fourth Industrial Revolution. It has affected many activities of life, which explains the desire of nations to transform into digital societies and develop their information infrastructure, which accelerates day by day. It has become necessary for individuals and organizations to adapt to this development and transformation in parallel; hence the desire to protect individuals' data and prevent cybercrime (Ahmed & Fattah, 2020). Several studies have addressed the concept of digital transformation. Janssens (2019) sees it as a process in which an organization is transformed into new ways of working and thinking using digital and social technologies. Gurbaxani & Dunkle (2019) defined digital transformation as "the reinvention of the company— its vision and strategy, organizational structure, processes, capabilities, and culture". Based on the foregoing, the current study can procedurally define digital transformation in Hajj, Umrah and Visitation as a comprehensive process of changing the vision and strategy of the Ministry of Hajj and Umrah. Specifically, it will devise

mechanisms for implementing its work and activities in the Ministry to achieve the desired goals through automating traditional businesses by replacing them with digital technology. In considering the objectives of the Kingdom's Vision 2030, which includes improving the capacity of pilgrims, Umrah performers and visitors to use information technology, the Ministry of Hajj and Umrah, as one of the vital pillars in the Kingdom, is taking on the vision's goals. From this standpoint, digital transformation has become a necessity and responsibility placed on the shoulders of the Ministry (Aljohani et al., 2022). For this reason, recent research has focused on studying the impact of using technology to enhance the Hajj, Umrah and Visitation systems. Yasein & Alharthi (2016) point out the importance of using tracking technologies to develop new applications that facilitate services provided to pilgrims and visitors, such as the global positioning system and barcode systems based on satellites, wi-fi, and Bluetooth. Reviewing the benefits of using digital technology, an examination of images suggests that accuracy of localization, scope of coverage, and advantages and disadvantages relate to the suitability for connecting services and applications related to Hajj, Umrah and Visits. Gutub & Ahmed (2018) presented the possibilities of a smart computer system to solve the problem of pilgrims straying from the two holy mosques in Makkah and Madinah during the performance of Hajj, Umrah and Ziyarah. The scholars indicated that the system could be developed in the future to assist the authorities searching for people wanted. Khan & Shambour (2018) conducted an analytical study of smartphone applications related to Hajj and Umrah via Google Play. Their research largely agreed with that of Gutub & Ahmed (2018) about the importance of these applications in improving services provided to pilgrims, Umrah performers and visitors. They called on researchers to shed more light on targeted features and those requested by the beneficiaries. Alshalani et al. (2020) explain, the effective management of crowd density in Hajj is a serious challenge, suggesting the development of the Hajj crowd management application for use by travel agencies to assist pilgrims in managing their camps sites.

In terms of digital transformation in Hajj, Umrah and Visitation, Altahtoo & Al-Fahal's (2020) study proposed a management information system (MIS) to adopt Hajj and Umrah projects within its current and future management infrastructure, linking all activities within a coherent and integrated information template. As a result, the Kingdom's Vision 2030 emphasized the objective of developing communications and information technology sector infrastructure through partnership with service operators. Consequently, the Ministry of Hajj and Umrah launched strategic initiatives to build integrated systems, including the:

- 1) establishment of an electronic control and monitoring centre,
- 2) electronic bangle project,
- 3) electronic track initiative for pilgrims.

Aljohani et al. (2022) suggest that, while the Ministry of Hajj and Umrah is technically and environmentally prepared for the digital transformation process, it still needs to intensify efforts to increase organizational interest in adopting the digital transformation approach. The Ministry has accordingly oriented its strategic plan towards digital transformation in line with the Kingdom's Vision 2030. Nevertheless, even though the Ministry has developed a considerable number of smartphone applications to be used in Hajj, it still faces challenges,

especially those related to the lack of qualified personnel to carry out the work. These two researchers identified the smartphone applications that the Ministry uses in Hajj, including: Fazaa, Makkah Cleanliness, Al-Mutawaf, Hadaj, Mint, Treatment, We Are All Security, Torgoman, Al-Haramain, Messenger, Karim, Navigational Hajj and Umrah Determiner, Destination, Our Rituals, Tarwiyah, Health, Asafni, Smart Washer, “barber” scissors, Watani, Arafat’s sermon.

Based on the foregoing, the efforts are being made to promote the concept of digital transformation in the Hajj, Umrah and Visitation systems is clear. It is also evident that digital technology can contribute to the conduct of organizational business and rapid adaptation to modern technical developments. Further, smart automation can improve the quality of services provided to pilgrims and expand the scope of service through channels and new technical tools.

2.2. An Impact of the Pandemic on Religious Sites

The pandemic had a significant impact globally, especially in health care, economic and social areas. The speed of the infection’s spread is what distinguishes the virus, especially through direct contact with the respiratory droplets of an infected person and their transfer to others. Health laboratories and medical and clinical researchers are striving to find an effective treatment or vaccine to enhance people's immunity, as well as ways to treat the symptoms and to reduce the risk of infection. The directives of international and national health organizations indicate that social distancing and restricting gatherings reduces its spread (WHO, 2020).

Since large gatherings contribute to the rapid spread of infections of this type due to social proximity, the large crowds during the performance of the Hajj and Umrah rites are of concern. Here, the number of pilgrims and visitors in normal circumstances throughout the year reaches seven million, while in the Hajj season alone the number reaches more than 2.5 million Muslims. Due to the pandemic, this number decreased to ten thousand in 2020, by applying health restrictions and precautionary measures, including social distancing, not touching the Kaaba (Square Building) or kissing the Black Stone, throwing sterilized pebbles, conducting strict health checks and requiring certificates. Thus, the Saudi Government instituted a number of precautionary measures to control the spread of the virus on a larger scale (Nur ALam et al., 2021; BBC News, 2020). More specifically, the measures included:

1. Temporary suspension of Umrah: Official Umrah activities have been temporarily suspended to prevent the spread of the virus. This ban applies to all local residents since the announcement of the second death in Saudi Arabia. The Saudi Government has stopped issuing visitor visas to foreigners and those seeking to perform Umrah to prevent the spread of the virus from other countries.

2. Closing mosques: The performance of Friday prayers and congregational prayers was suspended in the Kingdom’s mosques to limit the spread of the virus, except for the Grand Mosque and the Prophet’s Mosque. Here, all prayers continued to be held, but were limited to workers in the Two Holy Mosques.

3. Temporary suspension of circumambulation of the Kaaba: The courtyard and the Kaaba are among the sites usually crowded with pilgrims in close proximity. Due to the pandemic and within the framework of measures to tackle the virus, the courtyard around the Kaaba was closed, and barriers were placed around the Kaaba where the cleaning team disinfects the circumambulation. Even though these are health measures, they have had a remarkable psychosocial effect within the Kingdom and among Muslims worldwide.

The Saudi Government took early steps and applied proactive and precautionary measures to impede the rapid transmission of the virus. Further, the fear of exacerbating the health crisis and its dire effects on pilgrims, worshipers, and visitors resulted in the difficult decision to stop issuing Umrah and visit visas. This led to a reduction of the pandemic effects within the Kingdom and was important in supporting international efforts to address the pandemic. Not surprisingly, however, these measures have had a social and economic impact, and also a psychological effect on individuals and private and public stakeholder entities in Hajj and Umrah (Muneeza & Mustapha, 2021).

2.3. Smartphone Applications during the Pandemic

Digital technology has played a critical role during the pandemic in keeping communities working at scale to keep people safe, productive, and connected despite their physical distance. Its importance has emerged in harnessing the potential of communications technology to save lives from the threat of this virus. The International Telecommunication Union has benefited from the diversity of its members to make humanity more connected and safer since the emergence of the virus, and the world has witnessed the acceleration of digitization in many companies and services, including systems for remote work, access to health care, education, basic goods and services, and the creation of health solutions Evidence-Based Digital (ITU NEWS, 2020). Since the beginning of the virus, the Kingdom has paid attention to the safety of more than 600,000 pilgrims present in the Kingdom at the time in Makkah Al-Mukarramah.

Such decisions required the innovation and use of modern technologies to manage the general interests of the people and preserve the health and safety of individuals. The Saudi Data and Artificial Intelligence Authority (SDAIA) developed 'Tawakkalna and Nusuk' Apps, which are applications assist to facilitate the issuance of movement permits electronically during the curfew period to help reducing the spread of the pandemic in the Kingdom, to support government efforts to confront the virus. As of September 5th, 2021, the number of subscribers to the Tawakkalna reached twenty-three million. The Nusuk application also made it easy for pilgrims to plan the Umrah trip or visit and to choose the available date and time. These smart applications were effective in organizing Umrah and Visiting. They assisted with permits issuing procedures for Umrah pilgrims and visiting at the Prophet's Mosque according to the approved capacity of the Two Holy Mosques and the strategic plan to be followed during the pandemic. In addition, the 'Sehhaty' application assisted in organizing the dates of vaccinations, tests for the virus and other health checks, and review health records (Hoang et al., 2020).

On the visit side, smart applications contributed to organizing the appropriate number of health requirements to enter the Prophet's Mosque, and to visit and pray in the honourable kindergarten during the pandemic. Further, the Ministry cooperated with the Saudi Data and Artificial Intelligence Authority to require vaccination as a condition for reservation and issuance of Umrah and visit permits. The application shows the health status of the user, whether they were vaccinated, their immunity, or to be completed 14 days after taking the first dose, or that the infected person has recovered (Ministry of Hajj & Umrah, 2020; Al Sharif, 2021).

With the continuation of the pandemic, the Saudi Government decided to allow the gradual performance of Umrah and visit. This was possible for those who had a permit to visit the holy sites with the aim of implementing the health standards and controls approved by the Ministry of Health and the competent authorities in the Kingdom. Based on the literature review and the context of digital transformation outlined above, the hypotheses of the research were formulated as follows:

H1: There is a statistically significant correlation between the study variables.

H2: There is a statistically significant effect of digital transformation on visits during the pandemic in line with the Kingdom's Vision 2030 regarding the satisfaction of pilgrims and visitors with the services provided during the visit using smartphone applications.

3. Methodology

3.1. Sample and Data Collection

A questionnaire-based survey was used to collect data. The questionnaire was developed from a focused literature review, written in Arabic and translated into English. A revised and recompiled version of the questionnaire was sent to two academics, and one citizen working in the field of Umrah and to a resident in the Kingdom to obtain their feedback. The link was subsequently distributed to respondents electronically, and included a group of pilgrims and visitors, citizens, and residents, domestic Umrah companies, residents of hotels and accommodation venues, and university students in Madinah. The total number of responses received and validated for analysis was 440. Krejcie and Morgan (1970) explained that if the study population exceeded 100,000, the study sample must be represented by a minimum of 385 individual responses. Table 1 indicates the distribution of the study sample according to their personal data, including gender, place of residence, destination, identity of the pilgrim or visitor, and age group.

The demographic profile as illustrated in Table 1 shows that most of the study sample was female (64.8%), with fewer males attending (35.2 %). As for the place of residence, most of the study sample (80.7%) resided in Medina, with fewer residing outside Medina (19.3%). As for destination, majority (94.3%) came from within the Kingdom, with few coming from outside the Kingdom (5.7%). As for the identity of the study sample, Saudi citizens ranked first (79.5%), followed by residents in the Kingdom (19.3%), and visitors to the Kingdom (1.2%). As for the average age of the sample, it was dominated by those whose ages ranged between 29-

39 years (27.3%), followed by those aged 50 years and over (26.1%), followed by those aged between 40-49 years (23.1%), and those aged between 18-28 came last (22.7%).

Table 1. Demographic characteristics of respondents

Demographic characteristic		Frequency	Percentage %
Gender	Male	155	35.2
	Female	285	64.8
Place of residence	In Madinah	355	80.7
	Out of Madinah	85	19.3
Destination	From inside the Kingdom	415	94.3
	from outside the Kingdom	25	5.7
Identity of pilgrim or visitor	citizen	350	79.5
	resident	85	19.3
	Visitor (Umrah visa)	5	1.2
Age group	28-18	100	22.7
	39-29	120	27.3
	49-40	105	23.9
	Over 50	115	26.1

Source: Developed by the authors

3.2. Measurement

The questionnaire employed consisted of thirty-three items divided into four parts. All items were rated on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). The first part included the demographic sample characterization, as presented in Table 2. The second part included items related to the digital transformation of the visit during the pandemic. The third part focused on the items related to the procedures followed in the visit during the exacerbation of the pandemic crisis. The fourth part related to items measuring the pilgrims' and visitors' satisfaction with services provided during the visit regarding the use of smartphone applications during the pandemic.

Researchers analysed the collected data by using SPSS V25. The descriptive analysis using mean and standard deviations for the study's variables are illustrated in Table 1, together with the reliability analysis using Cronbach's Alpha correlation coefficient to verify the stability of the scale used in managing smartphone applications in promoting digital transformation and its role in satisfying pilgrims and visitors during the Corona pandemic. Multiple Linear Regression and Correlation Analysis using correlation matrix and F test were applied to study the impact of digital transformation in the visit during the Corona pandemic.

To verify the stability of the constructs used in the questionnaire, Cronbach's Alpha correlation coefficient test was conducted, as shown in Table 2. The results in Table 3 show that the reliability coefficient values ranged between 0.605 and 0.896, indicating that the measure of smartphone application management in boosting digital transformation and the satisfaction of pilgrims and tourists during the Corona epidemic were characterized by a high degree of stability.

Table 2. Results of the reliability and validity test for the research scale

Variable	Items	Cronbach's α	Credibility
The digital transformation of the visit during the Corona pandemic in light of the Kingdom's vision 2030.	9	0.764	0.874
Procedures followed during the visit during the exacerbation of the Corona pandemic crisis.	6	0.896	0.947
Satisfaction of pilgrims and visitors with the services provided to them during the visit in light of using smartphone applications during the Corona pandemic.	13	0.605	0.778
Overall Total Scale		0.828	0.909

Source: Developed by the authors

The dependability coefficient values ranged from 0.778 to 0.947, the value of the total score being 0.828 and the validity value being 0.909. These values indicate that coefficients of stability and homogeneity of the study tool are sufficient for use in its final application, where the Cronbach alpha coefficient exceeded 0.6, the minimum stability threshold (Sekaran and Bougie, 2013). Accordingly, the coefficients of the study data are considered to be reliable.

4. Results and Discussion

This section aims at ascertaining the opinions of the study sample about the digital transformation of the visit during the Corona pandemic, the procedures followed in the visit during the exacerbation of the pandemic crisis, the satisfaction of pilgrims and visitors with the services provided to them during the visit in light of the use of smartphone applications during the pandemic. To verify this, a descriptive analysis test was conducted, as shown in the following Tables 3, 4, and 5.

Table 3 shows that the level of digital technologies use in the visit during the Corona pandemic was high, as the total mean of these practices reached 4.13, with a standard deviation of 1.11. The highest scoring statement, one of the most important technologies used in the digital transformation of the visit is smartphone applications (Tawakkalna and Nusuk), had a mean of 4.44 and a standard deviation of 1.14. The lowest scoring statement, the digital transformation of the visit has helped to gradually increase the number of pilgrims and visitors during the Corona pandemic, had a mean of 3.98 and a standard deviation of 1.09. This statement was preceded by the phrase stating that the digital transformation helped the visit follow all the precautionary measures put in place by the relevant ministries, with a mean of 4.20 and a standard deviation of 1.16. The next statement read, (t)he Kingdom's Vision 2030 included a digital transformation strategy in the Hajj and Umrah sector, which contributed to the appropriate preparation to deal with any crisis and mitigated the severity of the Corona pandemic during the visit, with a mean of 4.13 and a standard deviation 1.17.

Table 3. Pilgrims' and visitors' opinions about the digital transformation of the visit during the COVID-19

Item	Mean	Std. dev.	Rank
The objectives of the Kingdom's Vision 2030 were reflected in the development of the Internet, and the Kingdom became one of the first countries in the world to own a 5G Internet, which positively contributed to the development of the service environment for the Hajj, Umrah and Visitor Organization.	4.08	1.05	High
The Kingdom's Vision 2030 included a digital transformation strategy in the Hajj and Umrah sector, which contributed to the appropriate preparation to deal with any crisis and mitigated the severity of the Corona pandemic during the visit.	4.13	1.17	High
One of the most important technologies used in the digital transformation of the visit are the smartphone applications (Tawakkalna and Nusuk).	4.44	1.14	Very High
The digital transformation helped the visit follow all the precautionary measures put in place by the relevant ministries.	4.20	1.16	High
The digital transformation of the visit helped to achieve distancing between pilgrims and visitors, and thus reduced infection from the Corona virus, and preserved their health.	4.10	1.04	High
The digital transformation of the visit contributed to increasing the technological awareness of pilgrims and visitors and reduced the number of violations of the regulations during the Corona pandemic.	4.08	1.13	High
The digital transformation of the visit helped to increase the number of pilgrims and visitors during the Corona pandemic.	3.98	1.09	High
The digital transformation of the visit was reflected in the preservation and sustainability of the places visited.	4.05	1.03	High
Total	4.13	1.11	High

Source: Developed by the authors

The following statement: The digital transformation of the visit helped to achieve distancing between pilgrims and visitors, and thus reduced infection from the Corona virus, and preserved their health, had a mean of 4.10 and a standard deviation 1.04. Next came the statement, the objectives of the Kingdom's Vision 2030 were reflected in the development of the Internet, and the Kingdom became one of the first countries in the world to own a 5G Internet, which positively contributed to the development of the service environment for the Hajj, Umrah and Visitor Organization, with a mean of 4.08 and a standard deviation of 1.05. The item referring to the digital transformation of the visit contributed to increasing the technological awareness of pilgrims and visitors and reduced the number of violations of the regulations followed during the Corona pandemic, had a mean of 4.08 and a standard deviation of 1.13. Finally, the statement, the digital transformation of the visit was reflected in the preservation and sustainability of the places visited had a mean of 4.05 and a standard deviation 1.03.

These findings showed that the applications of Tawakkalna and Nusuk were the most important technologies used in the digital transformation for pilgrims and visitors. This result is consistent with previous research (Khan et al., 2021) that found that the use of the Tawakkalna application is a successful method in fighting the COVID-19 pandemic in Saudi Arabia. In Madinah, the number of active daily cases decreased by 61% after the implementation of technologies, such as Tawakkalna. The positive perception evident in the results of this study indicate the level of collaboration between the users of smart applications and the competent authorities, with the community ready to cooperate in the public interest. Using technologies during this pandemic has offered remarkable protection and support for public health (Khan et al., 2021). Thus, there is a positive moral impact of digital transformation in the visit during the Corona pandemic in light of the Kingdom's Vision 2030 on satisfying pilgrims and visitors with the services provided in light of using smartphone applications during the Corona pandemic.

Table 4 shows that the level of the procedures implantation followed in the visit to the Prophet's Mosque during the exacerbation of the Corona pandemic was seen as high by participants, with the total mean of 4.12 and a standard deviation of 0.83. The statement measuring the highest for the procedures followed in the visit stated that: Banning pilgrims and visitors from entering the Prophet's Mosque, visiting the Prophet, peace be upon him and his two companions, may God be pleased with them, or praying in the honourable kindergarten during the exacerbation of the Corona pandemic, had a mean of 4.32 and a standard deviation of 1.08.

Table 4. The pilgrims' and visitors' opinions about the procedures followed at the visit

Items	Mean	Std. dev.	Rank
Restricting the obligatory prayers, Friday prayers, the month of Ramadan and the Eid prayers to workers only in the Prophet's Mosque during the exacerbation of the Corona pandemic.	4.11	1.22	High
Banning pilgrims and visitors from entering the Prophet's Mosque, visiting the Prophet, peace be upon him and his two companions, may God be pleased with them, or praying in the honourable kindergarten during the exacerbation of the Corona pandemic.	4.32	1.08	Very High
Lifting the Qur'an, carpets and Zamzam water from the Prophet's Mosque during the exacerbation of the Corona pandemic.	3.91	0.87	High
Cancelling the visit of Al-Baqi for pilgrims and visitors during the exacerbation of the Corona pandemic.	4.21	1.23	Very High
Banning serving meals and extending travel during the pandemic inside the Prophet's Mosque during the exacerbation of the Corona pandemic.	4.16	0.76	High
Lessons and Quran memorization sessions stopped in presence inside the Prophet's Mosque during the exacerbation of the Corona pandemic.	3.98	1.17	High
Total	4.12	0.83	High

Source: Developed by the authors

Whilst the lowest scoring statement measuring the procedures followed in the visit stated that lifting the Qur'an, carpets and Zamzam water from the Prophet's Mosque during the exacerbation of the Corona pandemic had a mean of 3.91 and a standard deviation of 0.87. The next statement referred to Cancelling the visit of Al-Baqi for pilgrims and visitors during the exacerbation of the Corona pandemic, with a mean of 4.21 and a standard deviation of 1.23. Next, the statement, Banning serving meals and extending travel during the pandemic inside the Prophet's Mosque during the exacerbation of the Corona pandemic had a mean of 4.16 and a standard deviation of 0.76. The statement that preceded this said, Restricting the obligatory prayers, Friday prayers, the month of Ramadan and the Eid prayers to workers only in the Prophet's Mosque during the exacerbation of the Corona pandemic reported a mean of 4.11 and a standard deviation of 1.22. The last was the statement clarifying that Lessons and Quran memorization sessions stopped in presence inside the Prophet's Mosque during the exacerbation of the Corona pandemic obtained a mean of 3.98 and a standard deviation of 1.17.

These empirical results show that respondents were positive about the procedures applied for banning pilgrims and visitors from entering the Prophet's Mosque, visiting the Prophet, peace be upon him and his two companions, or praying in the honourable kindergarten during the exacerbation of the Corona pandemic. This finding supports a similar conclusion drawn by Ahmed and Memish (2020) who indicated that the bans during COVID-19 impeded millions of Muslims fulfilling Hajj rites. However, the procedures followed by Saudi Government in this regard have been widely supported by the Organization of Islamic Cooperation, the World Health Organization and other Muslim governments. These findings indicate that the right to human life was seen above all else as a right that Muslims must preserve for all humanity, irrespective of creed or belief.

Table 5 shows that the level of pilgrims' and visitors' satisfaction with the services provided to them during the visit in light of using smartphone applications during the Corona pandemic was high, with the total mean of 3.85 and a standard deviation of 0.93. The highest scoring statement of the evidence in this set of questions indicating that the wise leadership in the Kingdom seeks the health and safety of the pilgrim and the visitor and provides them with the best services during the Corona pandemic, which made the visit a pioneering and unique experience had a mean of 4.12 and a standard deviation of 1.02. The lowest scoring statement indicating Smartphone applications helped the return of breakfast in the month of Ramadan, and fasting people on Monday and Thursday had a mean of 3.66 and a standard deviation of 0.59.

The findings confirm that the statistically-significant correlation in the study variables in this regard. Respondents perceived that the wise leadership in the Kingdom sought the health and safety of the pilgrim and the visitor and provided them with the best services during the Corona pandemic, which reflected positively on the pioneering and unique experience during their visit to Madinah.

Table 5. The opinions of the pilgrims and visitors about their satisfaction

Item	Mean	Std. dev.	Rank
It is easy for pilgrims and visitors to download smartphone apps, register in them and use all the services included.	4.08	0.72	High
Smartphone apps (Tawakkalna and Nusuk) facilitated the return of worshipers to the Prophet's Mosque.	4.06	0.85	High
Smartphone apps facilitated the organization of the entry and exit of pilgrims and visitors to the Prophet's Mosque, the visit of the Prophet, peace be upon him, and his two companions, may God be pleased with them, and prayer in the honourable Rawda.	4.07	0.75	High
Smartphone apps have helped to feel reassured and safe while visiting the Prophet's Mosque in light of the Corona pandemic.	4.02	0.64	High
Smartphone apps helped trust in returning the carpets, the Qur'an and Zamzam water to the Prophet's Mosque.	3.92	0.70	High
Smartphone apps helped the return of breakfast in the month of Ramadan, and fasting people on Monday and Thursday.	3.66	0.59	High
Smartphone apps helped allow pilgrims and visitors to visit Al-Baqi (The Cemetery).	3.78	0.61	High
Smartphone apps helped bring back the lessons and memorization sessions in presence at the Prophet's Mosque.	3.72	0.87	High
I feel the return of life in the Prophet's Mosque to its previous state occurred as a result of using smartphone apps during the visit.	3.84	0.41	High
It is easy to solve any problem I encounter using smartphone apps during the visit.	3.85	0.68	High
I expect that the use of smartphone apps will continue in the visit even after the end of the Corona pandemic.	3.99	0.33	High
I am fully satisfied with the services provided in the smartphone apps (Tawakkalna and Nusuk) for the visit.	4.05	0.57	High
The wise leadership in the Kingdom seeks the health and safety of the pilgrim and the visitor and provides them with the best services during the Corona pandemic, which made the visit a pioneering and unique experience.	4.12	1.02	High
Total	3.85	0.93	High

Source: Developed by the authors

Indeed, several previous studies emphasized the importance of providing a healthy and safe environment for pilgrims and visitors, particularly by Ministry of Hajj and Umrah, to ensure that well-being of all attendees is taken seriously (Raj & Bozonelos, 2020). It can be concluded that the respondents in this present study have seen smartphone applications, particularly the two applications of Tawakkalna and Nusuk, as being helpful tools to mitigate the risk of corona infection, which reflected positively on their experience during their visit to Madinah.

To test the hypothesis 1, the Pearson Correlation coefficient was used to determine the nature of the relationship among the study variables, as shown in Table 6.

Table 6. Correlation coefficients among study variables

Variable	(1)	(2)	(3)
(1) The digital transformation of the visit during the Corona pandemic in light of the Kingdom's vision 2030	1		
(2) Procedures to be followed during the visit during the exacerbation of the Corona pandemic crisis	0.638	1	
(3) Satisfaction of pilgrims and visitors with the services provided to them during the visit in light of the use of smartphone applications during the Corona pandemic	0.813	0.620	1

Source: Developed by the authors

Table 6 illustrates a medium to strong significant correlation between all study variables, namely: digital transformation in the visit during the Corona pandemic in light of the Kingdom's Vision 2030, the procedures followed in the visit during the exacerbation of the Corona pandemic crisis, and the satisfaction of pilgrims and visitors with the services provided to them during the visit in light of the use of Smartphone applications during the Corona pandemic indicated that the correlation coefficient ranged between 0.620 minimum and 0.813 maximum, with a level of significance of 0.01. Based on the foregoing, the first hypothesis is accepted, which states that "there is a statistically significant correlation between the study variables".

H2: There is a statistically significant effect of digital transformation in the visit during the Corona pandemic in light of the Kingdom's Vision 2030 on the satisfaction of pilgrims and visitors.

This study applies Multiple Linear Regression and Correlation Analysis test to check hypothesis 2 on the potential impact of digital transformation in the visit during the Corona pandemic in light of the Kingdom's Vision 2030 on the satisfaction of pilgrims and visitors (Table 7).

Table 7. The impact of digital transformation on the visit during the Corona pandemic on the satisfaction of pilgrims and visitors.

Variables	Dependent variable		
	Satisfaction of pilgrims and visitors with the services provided to them during the visit in light of the use of smartphone applications during the Corona pandemic		
Independent variable	β	T	Sig.
The digital transformation of the visit during the Corona pandemic in light of the Kingdom's vision 2030	0.857	12.94	0.0000
	F= 167.36	R ² =0.66	Sig = 0.000

Source: Developed by the authors

The results in Table 7 demonstrate that there is a positive significant impact of digital transformation in the visit during the Corona pandemic in light of the Kingdom's Vision 2030

in the satisfaction of pilgrims and visitors with the services provided in the visit in light of using smartphone applications during the Corona pandemic, where the value of the regression coefficient ($\beta = 0.857$), and the value of T ($T = 12.94$) is significant if its value is ≤ 2 at the level of significance $P < 0.001$. The value of the coefficient of determination of the R^2 model was 66.1%. This means that the digital transformation of the visit during the Corona pandemic in light of the Kingdom's Vision 2030 as a whole explains 33.9% of the change in the variable of pilgrims' and visitors' satisfaction about the services provided in the visit in light of using smartphone applications during the Corona pandemic. This is consistent with Al-Sharif's (2021) study, which identified the importance of 'my trust' and 'Nusuk' applications in facilitating and organizing Umrah and Visitation in the Two Holy Mosques. The study also recommended the necessity of enabling the elderly to obtain smart devices and use applications.

Based on the foregoing, the hypothesis that states that there is a significant impact of digital transformation in the visit during the Corona pandemic is accepted in light of the Kingdom's Vision 2030 in the satisfaction of pilgrims and visitors with the services provided in the visit with regard to using smartphone applications during the Corona pandemic.

5. Conclusion

This study aimed at identifying the importance of promoting digital transformation in Umrah and visitation through the management of smartphone applications (such as Tawakkalna and Nusuk) in light of the Corona pandemic. It measured the impact of managing smartphone applications as one of the tools for promoting digital transformation and its impact on achieving pilgrims' and visitors' satisfaction during the Corona pandemic, taking Madinah as a case for study. Based on the field work, the empirical results showed that the use of smartphone applications is a successful way to combat the COVID-19 pandemic in the Kingdom.

This study makes theoretical and practical contributions to using digital technologies in times of health crises. Firstly, in terms of theoretical contributions, current research on the importance of promoting digital transformation in Umrah and Visitation remains limited. Thus, this pilot study can enhance the theoretical understanding of promoting digital transformation in Umrah and Visitation under the Kingdom's Vision 2030 and in the Ministry of Hajj and Umrah, that is, within public organizations. Secondly, this study is one of the few that examined views about the impact of smartphone application management in promoting digital transformation and its role in satisfying pilgrims and visitors in Medina. Experimentally, participants demonstrated their awareness of the importance of using smartphone applications during the Corona pandemic, and as an aid to promoting digital transformation, business development, and services provided to pilgrims and visitors. However, this area needs more attention.

Regarding practical recommendations, the results of this study indicated that continuous improvement and adding various services to smartphone applications will positively affect the development of the work of the Hajj, Umrah and Visitation systems. Among the recommendations of this study there are the following: (1) giving attention to solving problems which pilgrims and visitors are facing while using smartphone applications during the visit, (2) paying attention to training employees of the Ministry of Hajj and Umrah, especially those working in the Information Systems Department, on how to solve problems in using smartphone applications, and developing them continuously, (3) emphasizing the necessity of using smartphone applications in Hajj, Umrah and Visitation even after the end of the Corona crisis, because of its proven importance and effective role in limiting the spread of the virus and its positive role in organization, (4) constant interest in innovating modern technologies that enhance digital transformation in Hajj, Umrah and Visitation in light of the Kingdom's 2030 Vision, and (5) supporting scientific research concerned with digital transformation and innovation to uphold it.

Some limitations can be noted in this study. One limitation involves the sample size, which may not have been large enough to confidently obtain general views on the effectiveness of smartphone applications in satisfying pilgrims and visitors during the Corona pandemic, particularly views from outside the Kingdom. Thus, findings of this research encourage undertaking similar studies to obtain significant and more inclusive feedback on the objectives of the study. Another limitation is that the study only investigated the views of pilgrims and visitors in Madinah, where Makkah, another holy city for Muslims that also used these smartphones applications (Tawakkalna and Nusuk) during the corona pandemic, has its own characteristics. Conducting a comparative study in the application of precautionary measures between the Two Holy Mosques would help policy-makers improve services provided in the smartphone applications.

Reference

- Ahmed, Q. A., & Memish, Z. A. (2020). The cancellation of mass gatherings (MGs)? Decision making in the time of COVID-19. *Travel Medicine and Infectious Disease*, 34(1), 10163. <https://doi.org/10.1016/j.tmaid.2020.101631>
- Aljohani, A., Nejaim, S., Khayyat, M., & Aboulola, O. (2022). E-government and logistical health services during Hajj season. *Bulletin of the National Research Centre*, 46(1), 1-8. <https://doi.org/10.1186/s42269-022-00801-4>
- Alshalani, H. J., Alnaghaimshi, N. I., & Eljack, S. M. (2020). ICT System for Crowd Management: Hajj as a Case Study. In *2020 International Conference on Computing and Information Technology*, 1-5. <https://doi.org/10.1109/ICCIT-144147971.2020.9213769>
- AlSharif, H. M. (2021). Studying the degree of use of smart mobile applications and their contribution to facilitating the organization of Umrah and visitation in light of the Corona pandemic. *The Scientific Journal of the Faculty of Education*, 37(7), 356-381. <https://doi.org/10.21608/MFES.2021.187069>

- Altahtoo, U., & Al-Fahal, H. (2020). The importance of the implementation and management of projects and facilities of Hajj and Umrah on sustainable development in Kingdom of Saudi Arabia with concentration on Yanbu province: a prospective study according to the National Transformation Program 2020 and Vision 2030. *Journal of Financial, Accounting and Administrative Studies*, 7(2), 130-149. <https://doi.org/10.35392/1772-007-002-007>
- Basahel, H., Alsabban, A., & Yamin, M. (2021). Hajj and Umrah management during COVID-19. *International Journal of Information Technology*, 13(1), 2491-2495. <https://doi.org/10.1007/s41870-021-00812-w>
- Farahat, A., Chauhan, A., Al Otaibi, M., & Singh, R. (2021). Air quality over major cities of Saudi Arabia during hajj periods of 2019 and 2020. *Earth Systems and Environment*, 5(1), 101-114. <https://doi.org/10.1007/s41748-021-00202-z>
- Gurbaxani, V., & Dunkle, D. (2019). Gearing up for successful digital transformation. *MIS Quarterly Executive*, 18(3), 209-220. <https://doi.org/10.17705/2msqe.00017>
- Gutub, A. A., & Ahmed, S. A. (2018) Trialling a Smart Face-recognition Computer System to Recognize Lost People Visiting the Two Holy Mosques. *Arab Journal of Forensic Sciences and Forensic Medicine*, 8(1), 1120-1132. <https://doi.org/10.26735/16586794.2018.037>
- ITU NEWS, 2020. (2020). Technology and crisis management of COVID-19. Retrieved from https://www.itu.int/en/itu/news/Documents/2020/2020-03/2020_ITUNews03-ar.pdf
- Jokhdar, H., Khan, A., Asiri S., Motair, W., Assiri, A., & Alabdulaali, M. (2021). COVID-19 Mitigation Plans During Hajj 2020: A Success Story of Zero Cases. *Health Security*, 19(2), 133-139. <https://doi.org/10.1089/hs.2020.0144>
- Keib, K., Wojdyski, B. W., Espina, C., Malson, J., Jefferson, B., & Lee, Y. I. (2021). Living at the speed of mobile: How users evaluate social media news posts on smartphones. *Communication Research*, 49(7), 1-17. <https://doi.org/10.1177/00936502211018542>
- Khan, A., Alahmari, A., Almuzaini, Y., Alturki, N., Aburas, A., Alamri, F. A., & Jokhdar, H. A. (2021). The role of digital technology in responding to COVID-19 pandemic: Saudi Arabia's experience. *Risk Management and Healthcare Policy*, 14(1), 3923-3934. <https://doi.org/10.2147/RMHP.S317511>
- Khan, E. A., & Shambour, M. K. Y. (2018). An analytical study of mobile applications for Hajj and Umrah services. *Applied Computing and Informatics*, 14(1), 37-47. <https://doi.org/10.1016/j.aci.2017.05.004>
- Krejcie, R.V. & Morgan, D. (1970). Determining sample size for research activities, *Educational and Psychological Measurement*, 30(3), 607-610. <https://doi.org/10.1177/001316447003000308>
- Ministry of Hajj and Umrah. (2022). Retrieved from <https://www.haj.gov.sa/en>
- Muneeza, A. & Mustapha, A. (2021). COVID-19: it's impact in hajj and Umrah and a future direction. *Journal of Islamic Accounting and Business Research*. 12(5), 661-679. <https://doi.org/10.17762/turcomat.v12i8.2823>
- Nur Alam, G., Obsatar, S., Roespinoedji, D., & Azmi, F. (2021). The impacts of COVID-19 to Saudi Arabia's economic sector and hajj pilgrimage policy of the Kingdom of Saudi Arabia, Turkish. *Journal of Computer and Mathematics Education*, 12(8), 463-472. <https://doi.org/10.17762/turcomat.v12i8.2823>
- Raj, R., & Bozonelos, D. (2020). COVID-19 pandemic: Risks facing Hajj and Umrah. *International Journal of Religious Tourism and Pilgrimage*, 8(7), 93-103.

- Sekaran, U. & Bougie, R. (2013). *Research methods for business: a skill-building approach*. 6th Edition. New York: Wiley.
- Ahmed, H., & Fattah, A. (2020). The impact of digital transformation on organizational restructuring. *Digital Transformation Conference*, Faculty of Commerce, Alexandria University.
- Tawakkalna. Retrieved from <https://ta.sdaia.gov.sa/en/index>
- Saudi Vision 2030. (2022). *Visiosn 2030 Overview*. Retrieved from <https://www.vision2030.gov.sa/>
- Wang, C., Cheng, Z., Yue, X. G., & McAleer, M. (2020). Risk management of COVID-19 by universities in China. *Journal of Risk and Financial Management*, 13(2) 1-6, <https://doi.org/10.3390/jrfm13020036>
- World Health Organization (2020). Novel coronavirus – China. Retrieved from www.who.int/csr/don/12-january-2020-novel-coronavirus-china/en/
- Yasein, M. S., & Alharthi, N. (2016). A Review of Tracking Technologies in Hajj and Umrah. Research17th Scientific Forum for the Research of Hajj, Umrah and Madinah Visit, Scientific Portal for 1438AH.