

The Role of Electronic Applications in Transitioning and Developing the Performance of Digital Government Services: Tawakkalna Application for Covid-19 in Saudi Arabia



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Abstract

The Covid-19 pandemic has witnessed the emergence of a new and vital dimension in digital government service – a way of dealing with the outbreak and keeping citizens as safe as possible. However, it is important to know what citizens themselves think about the applications they have to use. This paper explores Saudi citizens' attitudes and experiences with the Saudi government's smart app Tawakkalna, which provides these services, as expressed on the Twitter hashtag # Tawakkalna. A random sample of 766 tweets were analysed during the period 31. 3. 20 to 26.3.21 using a theoretical framework comprising the social constructionist approach, the third electronic wave theory and the Information Systems Success model. The analysis showed that Saudis were largely positive about the services provided and that any negative comments were to do with technical difficulties encountered. The government and other private institutions had a major role in persuading citizens to adopt the app, although influential individuals also had an impact. The study confirmed Twitter as an ideal platform for measuring Saudi public opinion.

Keywords: Twitter; KSA; Tawakkalna app; 3rd electronic wave.

1. Introduction

The Corona pandemic paralyzed many sectors in Saudi Arabia and other countries of the world, as well as harming the global economy. It also negatively affected health facilities and all state institutions. Therefore, Saudi Arabia, like other countries of the world, was quick to convert traditional services into digital services to bypass the obstacles of physical distancing and self-quarantine. Some governments have been able to keep pace with changes faster than others because, before the pandemic, they directed their attention to creating infrastructure and training competencies and hastened to automate business and create digital applications. These strategies focused on building bridges of communication with the citizen by providing direct means of communication and transforming traditional services into integrated smart digital services.

In general, the level of e-government development improved in most world countries in 2020. According to the United Nations e-government survey (2020), the average value of the e-government development index increased from 0.55 in 2018 to 0.60 in 2020, and the number of countries using text messages to send alerts or mobile applications increased by 38% compared to 2018.

The government of the Kingdom of Saudi Arabia is one of the governments that paid attention to putting technology at the service of the citizen and hastened to contain the crisis. The Ministry of Communications and Information Technology (2020) annual report indicates that over 81% of government services have been digitalized. The government has thus been able to adopt information and communication technology and employ it to provide interactive services easily to citizens, residents, visitors and companies.

Despite the absence of official data, the percentage of internet users in Saudi Arabia appears to have reached 95.7% in 2021. Twitter platform statistics indicate an increase in the number of users in Saudi Arabia from 11 million to 14 million from 2014 to 2020. According to the statistics of the Crowd Analyzer company, which specializes in data analysis, Saudi Arabia topped the world in the percentage of active users in relation to the total number of people with internet access. The percentage reached 41%. Based on the previous data, this study aims to examine the level of progress in the path of digital transformation of the Saudi government by analyzing the local discussions in Saudi Arabia about the *Tawakkalna* app, which is a smart app released during the Covid-19 pandemic to provide electronic services that help citizens and residents to engage in their daily work whilst adhering to the precautionary measures recommended by health institutions.

The *Tawakkalna* Application is an electronic application downloadable to mobile phones, launched by the Saudi Data and Artificial Intelligence Authority (SDAIA) in May 2020 to support government efforts to confront the Coronavirus. When it began, the *Tawakkalna* application aimed to manage the process of granting permits electronically to employees of government and private sectors as well as individuals during the curfew period, in cooperation with the Ministry of Health and several government agencies. The application contributed to strengthening precautionary and preventive measures for individuals and employees in the various governmental and private sectors during the stage of returning to normal life by providing many digital services, primarily through clarifying the health status of the application user through colored icons, which contributed to maintaining the safety of citizens and residents during the cautious return to normal life. This helped reduce the spread of the Coronavirus in the Kingdom.

The Corona pandemic created confusion in all state institutions, as activities had to be conducted remotely instead of face-to-face. This meant the state had to resort to digital government and create channels for remote communication, whether between institutions or between institutions and citizens. One of the results of this transformation was the creation of the *Tawakkalna* app. The feedback recorded by Twitter platform users about the *Tawakkalna* application, as one of the leading platforms in integrating government services, posed a new challenge for researchers to know the content of those interactions and communication messages and to monitor the opinions of users of government applications. This research analyzes a sample of tweets to find out the opinions and discussions of the users of the application and their satisfaction with the services provided and related issues

In this study, we shed light on the public's view of the practices applied in the Kingdom of Saudi Arabia, which used digital means to control the Corona pandemic by analyzing the tweets in the hashtag # Tawakkalna, and stopping at the most frequently discussed topics related to the application and identifying the source of those tweets and the direction of public opinion about the application's services. The importance of the study lies in shedding light on the citizens' perspectives on digital services and tracing the path to the achievement of the goals of the Saudi government for digital transformation. These transformations affect the lives of the beneficiaries, as their goal is to facilitate their lives and provide services with the highest possible quality. The study also examines the impact of citizens' perspectives on achieving government goals.

2. Literature Review

A study by [Mat Dawi et al. \(2021b\)](#) aimed to determine the relationship between reliance on information published digitally by the government in Malaysia and the adoption of preventive behavior towards the Coronavirus among sample members residing in Malaysia. This study focused on the importance of social media in encouraging individuals to adopt healthy and preventive behaviors towards the Coronavirus, which contributed to containing the crisis. The researchers obtained 300 responses, and the results affirmed the importance of using communication tools in promoting sound health practices. Using social media as a communication tool enabled the government to control the virus by raising awareness, disseminating information about dealing with the virus and updating this information very quickly according to global changes. The authors recommended that governments adopt digital government and use social media to encourage and enable citizens to follow the recommendations of the World Health Organization during the Corona crisis.

[Bamufleh et al. \(2021\)](#), revealed the factors affecting the use of Saudi government health applications among a sample of resident citizens. This study relied on several models and explanatory theories, including the Information Systems Success model (ISSM). Through an electronic questionnaire with 785 participants, the study found a positive relationship between an individual's behavioral intention and social influence, facilitating conditions, perceived ease of use, perceived usefulness, attitude, information quality and confidence. The presence of these factors encouraged Saudi citizens to adopt Saudi digital government applications. The researchers also suggested that future studies should examine digital government applications, such as the *Tawakkalna* application after they became mandatory for allowing access to public places and workplaces.

Another study in Malaysia conducted an electronic survey with 404 participants to measure the impact of digital government and social media impact on the adoption of preventive practices towards the Coronavirus ([Mat Dawi et al., 2021b](#)). The results indicated that government institutions' social media significantly impacted the dissemination of health information and follow-up updates of news related to the Corona crisis and supported citizens' adoption of correct preventive practices. The researchers noted that individuals relied on social media more than public media to

obtain information related to the Coronavirus. This study recommended studying audience opinions through methods of data collection that did not require participants to answer specific questions but rather used different methods, such as observation.

Hidayat-ur-Rehman *et al.* (2021), evaluated the performance of the Saudi digital government applications (Tawakkalna, Tamman and Taba`d), through an electronic survey with 223 Saudi residents citizens. With regard to the Tawakkalna application, the results of the questionnaire concluded that there were three main indicators of its performance, i.e., the efficiency (mentioned by 91.5% of the sample), ease of use (89.6%) and user satisfaction (91%). In addition, 88.1% of the sample said they were satisfied with issuing of permits through the Tawakkalna application, while only 9% of the sample indicated they were not happy with the speed of response to their requests. In general, this study indicated that on average the respondents agreed on the efficiency of digital government applications according to the main performance indicators, with a percentage of 90% for Tawakkalna, 86.6% for Tamman and 80.5% for Taba`d. The researchers recommended conducting a similar study using other research tools to give different interpretations and insights.

Yasir *et al.* (2020), targeted residents of Wuhan and Anhui provinces in China by conducting an electronic questionnaire in which 683 Chinese citizens from both provinces participated to determine the impact of digital government on the presence of users of social media. The results showed a positive relationship between these two variables, as, during the quarantine, people had more free time, and their desire to use social media increased. This increased their presence on the internet, motivating them to interact with events and participate actively during this period. This study indicates the critical importance of digital government in managing and controlling epidemic outbreaks. Like other studies, this study recommended using a web-mining method to analyze data and information related to this crisis.

Another study aimed to identify the behaviour of individuals when using social media during the quarantine and how the uses of social media changed during this period (Kaya, 2020). An online survey with 668 participants found a difference in individuals' use of social media during the Corona pandemic compared to before the pandemic, as the users shared their feelings, experiences and anxiety about the epidemic and increased their awareness of fake news by following the official authorities' posts to obtain authentic information. The researcher noted a positive effect on decision-makers when they used social media, represented in their response to urgent changes and changing decisions in response to them. The researcher also recommended conducting more research to reveal the relationship between awareness and fake news before and after the Corona pandemic and to search for differences in individuals' use of social media. The study also concluded that future leadership would also occur through digital platforms. Petersen and Gerken (2021), collected data from Twitter by searching for keywords and analyzed 6.9 million tweets using Python (programming language). They then used objective analysis to identify hashtags that revealed topics of interest to Twitter users. The analysis showed that there were 907 thousand hashtags in the sample tweets, of which 1192 thousand were used more than 1000 times. Through the objective analysis of the hashtags, this study identified 13 popular topics. It concluded that the first three most frequently discussed topics related to Corona were: identifying information about Covid-19, information about the methods of combating the epidemic and finally, the cities or countries associated with Covid-19. The researchers concluded that health institutions' accounts were among the most important followed by individuals, even if the number of their daily tweets was limited. The objective analysis indicated the importance of decision-makers choosing appropriate hashtags to disseminate health information and reach the target groups.

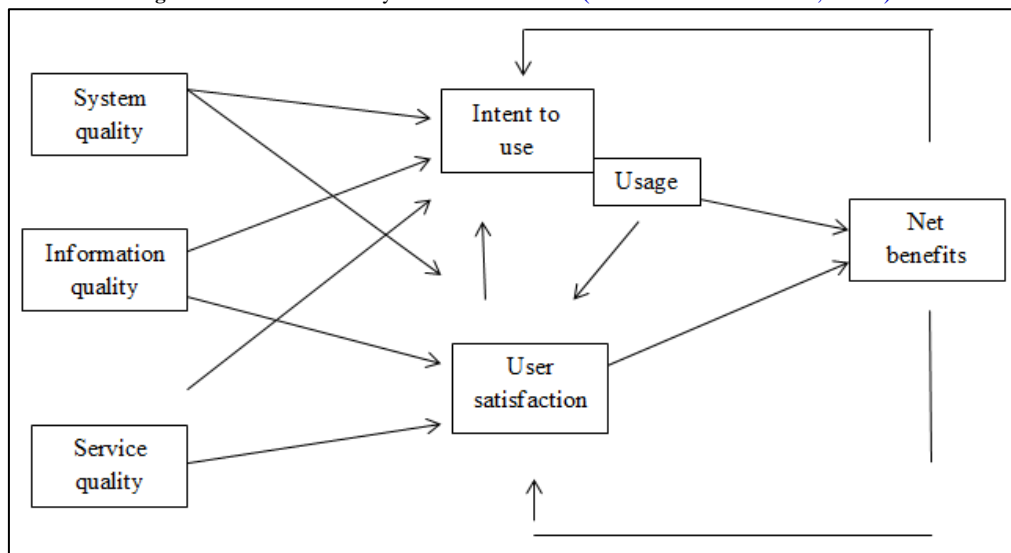
One researcher used observation and content analysis to analyze the Iraqi Ministry of Health's Facebook page to identify the role of public relations through social media and its connection with managing health crises (Alenezi, 2020). The researcher concluded that public relations have an important role in containing the crisis through sending messages to individuals. The researcher noted the diversity of media methods in preparing communicative content aimed at diverse sections of Iraqi society, which relied on high credibility and continuous updating of local and global situations. This strategy helped to build a strong public image of the Iraqi Ministry of Health internally and externally.

3. Theoretical Framework

The primary goal of DeLone and MacLean's paper on the Information Systems Success Model was to synthesize previous research involving information systems success into a more coherent epistemological formula.

Later DeLone and McLean modified this model, (DeLone and McLean, 2003).

Figure-1. The Information Systems Success Model (DeLone and McLean, 2003)



Information systems researchers have used this model extensively to understand and measure the dimensions of information systems' success. Moreover, the variables that describe the success of the information system are consistent with one or more of the six main dimensions of success of this model. The different factors of this model are described as-

- System Quality (SysQ) is concerned with knowing if there are system defects, interface reliability, response rate during interaction with programs, ease of use, authentication, reliability, and software code quality.
- Information Quality (IQ) is 'concerned with an issue as relevance, timeliness, design of information generated by IS as well as accuracy'
- Service Quality (ServQual) is distinct as: 'Quality of the service that users obtain from the information system association and IT support individuals generally or for a particular information system'. Several measurement variables have been suggested (Seddon and Kiew, 1996)
- User Satisfaction (US) concurs with Doll and Torkzadeh (1988) definition of user contentment as 'the professional approach towards a particular PC program.' (p259-274) (Seddon, 1997) depicted user contentment as 'an affective consideration on an attractive continuum of different results. (p 240-253) Variables were developed to assess satisfaction levels with an is exclusive.
- Intention to Use is an attitude, whereas Use is behavior. Besides, the use is an action by the consumer to operate IS. Petter *et al.* (2013), defined Intention to Use as the users' faith about their probability to use the IS. D&M proposed the intention to use it as another assessment to use for some environments. The system uses as a success factor Net Benefits, DeLone and McLean (2002) merged the two dimensions: organization and individual impact, into one and termed it Net Benefit.
- Net Benefits is 'the degree to which IS is involved in the success of organizations, groups, individuals and enterprises as well as countries.'

DeLone and MacLean's new success model includes arrows to demonstrate the suggested associations between the dimensions of success within the context of a process. Still, the model does not show the positive or negative points of those associations in a causal sense. The nature of these causal connections must be assumed in the context of a particular study. For example: if a higher-quality system is associated with more usage, more user satisfaction and positive net benefits, then the suggested associations will be positive. In another circumstance, the use of a poor-quality system may be associated with more dissatisfaction and negative net benefits, then the suggested links are negative (DeLone and McLean, 2003).

4. Study Methodology

This study used the methodological framework of Netnography (Kozinets *et al.*, 2010), which is a comprehensive approach that adapts traditional ethnographic techniques to study social data via the internet (Kozinets, 2015). The approach depends on defining the main topic on which the research focuses, selecting the sample, collecting, analyzing and interpreting data, and then presenting the results (Kozinets *et al.*, 2010). In order to achieve its general objectives, this study focused on analyzing a hashtag (#Tawakkalna), whereby the researcher followed and analyzed what was written about this application.

To apply this approach, the study used artificial intelligence through the meltwater tool to find out the most important issues on Twitter related to the Tawakkalna application, represented by the hashtag #Tawakkalna in the time period from April 1st, 2020, to April 1st, 2021. In addition, the most used hashtags were listed, as this shed light on the nature of followers who interacted with tweets about the application and its posts. Based on this, the team of researchers collected the study sample through a variety of social media monitoring tools, in order to define data traffic and peak dates to discuss the most important events, and the geographical ranges of users interacting the most about the Tawakkalna application. Also, the researchers collected data using many paid social media

monitoring tools, given that the study deals with old data. the previous information for the hashtag Tawakkalna application on Twitter was imported through two sets of tools: tools that help to monitor social media, by pulling out old data, which is usually paid for, and withdrawn completely onto an Excel file. A sample was then selected for the study period .These tools enabled researchers to analyze data and determine how the users interact with hashtags and tweets through a number of keywords developed by the research team (# Tawakkalna - # Tawakkalna App).

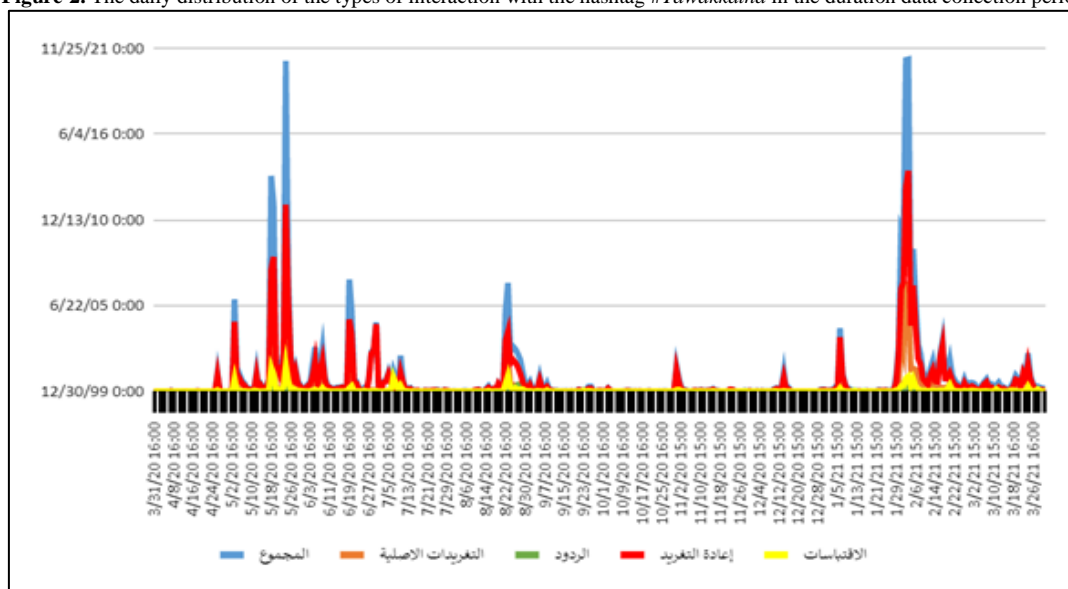
4.1. In the Second Stage

NodeXI was used, as this is a reliable tool for analyzing hashtag content on Twitter and provides statistics on users' interactions with the application's services, and the most discussed issues and topics. The study relied on content analysis, as this is one of the most important methods in the social sciences and humanities, and has become common in social media studies and health sciences, as in the study of epidemiology (Chew and Eysenbach, 2010), politics (Small, 2011) or the study of non-profit organizations (Waters and Jamal, 2011). The researchers explored the contents of the tweets in the hashtag #Tawakkalna on Twitter, which were analyzed during the study's time period, and developed several appropriate analysis categories. The tweets were classified according to the most frequent topics, and a random sample of 1,000 tweets was drawn from the hashtag #Tawakkalna. After excluding 234 tweets unrelated to the hashtag topic, 766 tweets were analyzed, which constituted 76.6% of the study population.

4.2. Total Coverage Size

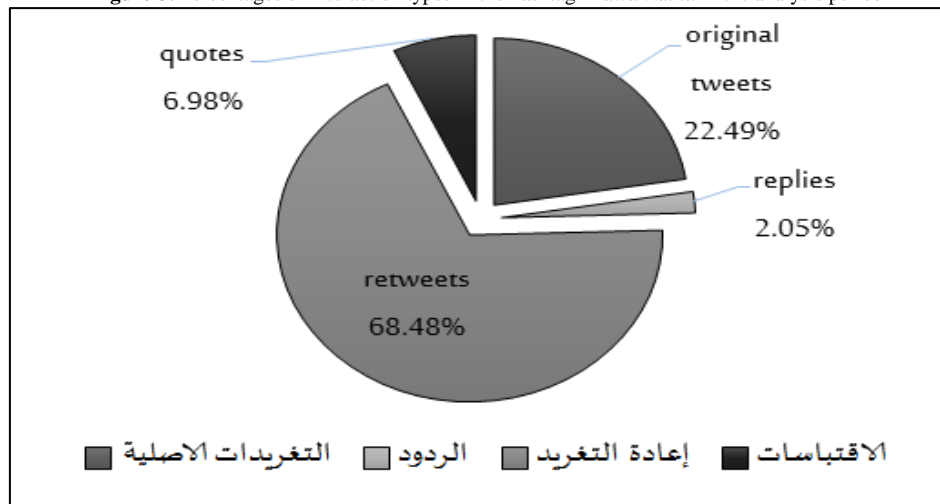
Nearly 52,000 Twitter users interacted with issues related to the Tawakkalna application through the hashtag #Tawakkalna during the analysis period. The total interaction reached 114 thousand interactions, including original tweets, replies, retweets and quoted tweets, with 4.34 billion appearances. The total potential reach of these tweets is 149 million. Figure 2 below shows the details of the types of interaction with #Tawakkalna daily, while Figure 3 shows the percentages for each of them:

Figure-2. The daily distribution of the types of interaction with the hashtag #Tawakkalna in the duration data collection period



It is noted from Figure 2 above that 3/02/2021 was the most interactive day with the hashtag #Tawakkalna, with a total of 7,750 interactions.

Figure-3. Percentages of interaction types in the hashtag #Tawakkalna in the analysis period



4.2.1. The most Influential users Participating in the Hashtag #Tawakkalna

Figure 4 shows the most influential users, based on the number of their followers, who participated in the hashtag #Tawakkalna on Twitter. The Sabq electronic newspaper account tops the list, then the Saudi hashtag account, the Saudi Al-Hilal football Club, former Al Hilal player Sami Al Jaber, psychiatrist Tariq Al-Habib, journalist Khaled Al-Shanif, the Royal News Agency, the News Agency of Suspension of Study and finally, the Al-Riyadh newspaper.

The diversity of the accounts of the influencers participating in publishing on the hashtag gives an overview of the interaction with it, as the diversity of these accounts shows the importance of this application and how much it relates to the elements of the daily life of the individual.

Figure-4. The most influential users were participating in the hashtag #Tawakkalna

Author	Tweets	Followers
1 @sabqorg	84	13M
2 @hashksa	68	10M
3 @alhila_fc	1	9M
4 @samialjaber	1	7M
5 @waleedalfarraj	3	7M
6 @talhabeeb	2	7M
7 @k_alshenaif	1	5M
8 @spagov	1	5M
9 @news_ejazah	5	5M
10 @alriyadh	36	5M

4.2.2. The most interactive cities with the hashtag #Tawakkalna:

According to Table 1, the city of Riyadh was at the top of the list of Saudi cities interacting with the hashtag #Tawakkalna on Twitter during the analysis period.

Table-1. The top twenty cities participating in the hashtag #Tawakkalna during the analysis period

Percentage	Coverage size	City	Ranking	Percentage	Coverage size	City	Ranking
1.34%	651	Jubail	11	42.72%	20,801	Riyadh	1
1.21%	590	Najran	12	18.05%	8,787	Jeddah	2
1.21%	588	Abha	13	9.62%	4,683	Mecca	3
1.15%	560	Jizan	14	5.89%	2,867	Medina	4
1.06%	516	Kharj	15	5.02%	2,444	Dammam	5
0.72%	350	Dhahran	16	2.57%	1,253	Al Khobar	6
0.66%	323	Buraydah	17	1.94%	946	Taif	7
0.62%	300	Hafar Al-Batin	18	1.85%	903	Tabuk	8
0.57%	279	Al Baha	19	1.83%	889	Hail	9
0.56%	274	Sakaka	20	1.40%	684	Yanbu	10

4.3. The Level of Power for the Accounts Interacting with the Hashtag #Tawakkalna

The AI tool (meltwater) provided a rating of the degree of power for the accounts of users who tweeted using keywords during a specified time range. The power was categorized into three levels: high, medium and low; which was determined using a special algorithm based on the number of followers in addition to the level of participation (frequency and number of tweets). The power level was calculated on a scale of 0-10, where a score of 0-3 means low power, 4-6 medium power and 7-10 high power (see Table 2).

Table-2. The number of views of Twitter accounts participating in the hashtag #Tawakkalna during the study period, with the level of power and ranking.

Percentage	The number of views of the accounts	Power level	Ranking
56.55%	63,197	Medium	1
21.98%	24,566	Low	2
21.46%	23,984	High	3

4.4. Methods of Extracting the most Important Issues Related to the Hashtag #Tawakkalna on Twitter

By using artificial intelligence tools, it was possible to identify the most prominent issues related to the *Tawakkalna* application through the hashtag #Tawakkalna by analyzing the number of retweets, because retweeting is the most frequent type of interaction with important issues in Saudi Arabia. So, it was possible to identify whether the tweets were retweets, as well as the other hashtags mentioned within the hashtag #Tawakkalna in the same tweets, in order to identify the most important issues related to this topic, which Twitter users in Saudi Arabia were interested in during the analysis period.

4.4.1. Most Retweeted Tweets

More than twenty tweets related to specific issues related to the hashtag #Tawakkalna were retweeted during the analysis period, as shown in Appendix 1. Tweets that were not related to a specific topic or issue and intended to increase retweets' value by awarding specific rewards to users were excluded. According to Appendix 1, the most retweeted tweet was one by the Saudi Government urging people to download the *Tawakkalna* application, followed by two tweets from individuals which gave information about how to activate the app. For people who did not have an *Absher* account.

4.4.2. The 'Most Frequent Hashtag' Method

The hashtag is one of the most important tools for tweeters to discuss an issue on Twitter, as they try to put across their negative, positive or neutral opinions by appending them with a hashtag that enables site users to track them. Sometimes tweeters append a single tweet with more than one hashtag. So, by tracking the most frequent hashtags which accompanied the hashtag #Tawakkalna during the analysis period, we could extract the most important issues related to the *Tawakkalna* application on Twitter. Appendix 2 shows the 20 most frequent hashtags associated with #Tawakkalna during the analysis period and the related issues. The most frequently appended hashtag was #Taba'd (11,522) closely followed by #Corona (11,503)

It appears from Appendices 1 and 2 that the most common issues related to the *Tawakkalna* application, where Saudi citizens showed concern by retweeting features of tweets contained in the hashtag #Tawakkalna or by posting accompanying hashtags were:

- Urging people to download the *Tawakkalna* application.
- The requirement to download the *Tawakkalna* application to benefit from the services.
- Praise for the *Tawakkalna* application.
- Permits granted by the *Tawakkalna* application.
- Logging in to the *Madrasaty* platform through the *Tawakkalna* application.
- How to activate the *Tawakkalna* application for those who do not have an account in the *Absher* application.
- Daily update of Coronavirus statistics in Saudi Arabia.
- Adding the service of booking an appointment for the Corona vaccine through the *Tawakkalna* application.
- Launching the *Tawakkalna* app.
- The health passport feature in the *Tawakkalna* app.

5. The most Important Issues Related to the *Tawakkalna* Application during the Analysis Period

After reviewing the methods for extracting the most important issues related to the *Tawakkalna* application, which users on Twitter were interested in, and after showing the results of the two methods used (retweeting and hashtags), these issues can be arranged based on a methodology consisting of three stages:

- Extracting statistics for each issue from indicators (number of interacting users, number of interactions - original tweets, replies, retweets, quoted tweets and frequency of hashtags related to the issue)
- Assigning a relative weight to each item of the statistic that is proportional to the expected weight of the sum of all issues, by dividing the average of each indicator by the sum of the indicators

- Arranging the issues according to the total of the indicators after multiplying the relative weight of each of them by the value of the sub-indicator.

Appendix 3 shows the most important issues identified by this method were encouraging people to download the Tawakkalna application (7,263 indicators) followed by logging into the Madrasty platform through Tawakkalna (4,262 indicators) and permits granted by the Tawakkalna application (4,227 indicators).

6. Tweets Tone Trend Analysis

This analysis aimed to identify and measure the feelings (tone) of a group of tweets on the Twitter site by classifying the views within the written texts of several randomly selected tweets into three types, namely:

- Positive: a state of contentment expressed through written texts (tweets).
- Negative: An impression or situation that has negative connotations that reflects a state of dissatisfaction expressed in the texts (tweets).
- Neutral: expresses the failure to record an attitude (positive) or (negative) within the texts analyzed or unable to form an opinion or an impression after analyzing these texts (tweets).

Table-3. Analysis of content tone.

Tone of content				
Type	Frequency	Percentage	Related Topics	Examples of tweets
Positive	528	69%	To commend the ease and comprehensiveness of the application. Pride in the national competencies that developed and operated the application. Other institutions' use of the application to provide their services or as a requirement to benefit from them.	الأحوال والرخصة والاستمارة كلها بتوكلنا، اقسام بالله احترام عظيم لهالتطبيق ولهالنقله النوعية الخر!!!!!!!!!!!!!!!!!!!!!!افيه #توكلنا
Negative	40	5%	App updates. Technical problems.	صراحة سألقة موضوع #توكلنا أصبحت مزعجة للغاية.. ماهوب معقول اطلع جوالي عشرين مرة باليوم عشان اخليهم يشوفون اني محمل التطبيق! يعني بالعقل.. واحد فيه كورونا بيروح لمجمعات تجارية مثلا والامطاعم ومقاهي؟؟
Neutral	201	26%	News of application updates. Steps to benefit from the application services. Services available in the application.	وصل تحديث لتطبيق #توكلنا وتقدر من خلاله تحجز موعد لتطعيم #كورونا أيضا تم تغيير ألوان الشعار <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> الخاص بتطبيق
Total	769	100%		

It was noticed that some sample tweets dealt with other topics unrelated to the sample: advertisements, Quranic verses or inquiries unrelated to the application, and others. The number of those tweets was 234, i.e., 23% of the total sample.

7. Content Analysis According to the Information Systems Success Model

The researchers analyzed the sample of 766 tweets based on the dimensions of the Information Systems Success Model, which depends on the mutual influence and the continuous process in the work of these dimensions, and the influence of each dimension on the others.

Table-4. Content analysis according to the Information Systems Success Model

Percentage	Frequency	The dimension
17%	492	System quality
13%	363	Information quality
13%	354	Intent to use
14%	399	Use satisfaction
20%	567	Individual Impact
23%	656	Organizational Impact
100%	2831	Total

8. Discussion

This study aimed to investigate the interactions of users of the digital government application *Tawakkalna* by analyzing the application-related hashtags on Twitter. The results of the study indicate that there is a fluctuation in daily interaction on Twitter, as on the date of 3/2/2021, there was an increase in interaction with a total of 7,750

interactions. In terms of users, the ten most interacting accounts were 5 news accounts and 4 influencers, while the average power level for the accounts participating in the hashtag was 56.55%.

The city of Riyadh had the highest interactions with the hashtag (42.72%), followed by Jeddah (18%) and Makkah Al-Mukarramah in third place with 9.62%. As for the topics related to the *Tawakkalna* application, the results of the study show the diversity of issues and topics related to the application. According to the importance of the issues, the issue of urging to download the application ranked first, while the issue of logging on to the *Madrasaty* platform¹ through the *Tawakkalna* website ranked second, while third place went to the issue of permits granted by the application.

The results of the tone analysis of tweets indicate that 69% of them were positive, consisting of tweets that praised the application, and 26% of them were neutral and about technical issues, while only 5% of them were negative tweets associated with technical problems.

According to the Information Systems Success Model, the content analysis results showed that the dimension of organizational impact obtained 23%, which was the highest percentage for the dimensions. This indicates that government and private institutions had a major role in influencing the success of the *Tawakkalna* application's arrival in Saudi society. This dimension was reflected in the governmental and private agencies and institutions publishing tweets in the hashtag #*Tawakkalna* indicating citizens' and customers' obligation to use the application. Moreover, the efforts of the application team to carry out periodic updates that facilitated the benefit of many institutions from the services of the *Tawakkalna* application also reflected this dimension. This led to the imposition of laws and guidelines to maintain the safety of individuals. This was shown by the most retweeted tweets in , both of which indicated that the requirement to download the application to benefit from the services was one of the most important issues associated with the *Tawakkalna* hashtag.

The individual impact came next, accounting for 20% of the sample. However, this in turn was affected by the impact of the organisational dimension, given that the authorities' requirements to download the application directly affected individuals and their daily behaviour. System quality came next at 17%, and this referred to tweets focused on publishing app updates. The quality of the information comprised 13%, and referred to the information published about the services of the *Tawakkalna* app.

The results of this study agree with the study by [Mat Dawi et al. \(2021a\)](#) on the impact of the use of social media by governments to adopt preventive behaviours, as the results of their study revealed that 20% of tweets indicated the individual impact dimension in the information success model. Moreover, the study by [Hidayat-ur-Rehman et al. \(2021\)](#) indicated that the *Tawakkalna* app scored 91% in user satisfaction, while this dimension in the information success model ranked third with 14% of the tweets analyzed.

The study results confirm the theoretical hypothesis that society and technology are two sides of the same coin. That is, each of them affects the life of the other, its development, and the way technology is used. The results indicated diversity in the accounts of the participating influencers and the existence of a comprehensive geographical distribution of the participating cities. Also, the majority of participants publishing in the hashtag had a medium power of 57%. These results provide an overview of the interaction with the hashtag, and the diversity of these accounts and updates of the application during the research period shows the importance of this application and its connection with the elements of the individual's daily life.

The results are also consistent with the third electronic wave theory that digital devices affect our relationships with other people who make up public space. These various developments led to the integration of social issues into the study of information and communication technology. This is evident in the emergence of issues related to the *Tawakkalna* application, as they were the most frequently discussed during the research period. The issue of urging the download of the *Tawakkalna* app accounted for 29%. The issues of logging on to the *Madrasaty* platform through the *Tawakkalna* website, and the issue of permits granted by the *Tawakkalna* application, each accounted for 17%; 11% for launching the *Tawakkalna* app; 7% for adding the service of booking an appointment for the Corona vaccine through the application; as did the method of activating the application for those who do not have an account in the *Absher* application; the requirement to download the *Tawakkalna* application to benefit from the services; praising the *Tawakkalna* application; the daily update of Coronavirus statistics in Saudi Arabia; and the health passport feature in the *Tawakkalna* application.

Recommendations

- The Twitter platform is ideal for measuring Saudi public opinion on the most important, interesting topics, as it is among the most popular social media platforms in the Kingdom. The nature of Twitter allows users to tweet, retweet, reply and interact about the topics trending on various hashtags. Therefore, we recommend that attention be paid to following the discussions and dialogues on the Twitter platform, as it is an active place for conveying the various trends of public opinion on topics related to Saudi affairs. Also, the government could investigate Twitter hashtags and correct false posts immediately. Monitoring Twitter is an excellent way to take the current pulse of the street.
- A large number of users (28 million) and interactions (219 million) during the study period reflects a large number of opinions and general trends in Saudi society regarding the topics of interest. Accordingly, we

¹ It is an e-learning management platform provided by the Ministry of Education completely free of charge. It includes many electronic educational tools that support teaching and learning processes and contribute to achieving the educational goals of the curricula. Madrasati supports the achievement of skills, values and knowledge for students to be in line with the digital requirements that the Ministry is working to develop continuously.

recommend that research and study centres and those interested in scientific research in Saudi higher education institutions pay attention to the new media, with a special focus on Twitter, because of its clear popularity among Saudis.

- Studying the reasons for the emergence of certain topics in social media at specific times and studying the mechanisms of how those topics rise to the top of public interest and the decline of other topics for investigating this would allow researchers to gauge changing trends in public opinion.
- Studying the interests of specific sectors of Saudi society (such as the elite, journalists or religious scholars) in social media and their influence on the most controversial topics on Twitter.
- Monitoring how to address specific topics at specific times through social media, to know the trends of Saudi public opinion and modern methods of communication through new media.

9. Conclusion

This paper has shown how using AI tools to investigate big data sets, such as tweets occurring in a particular hashtag (#*Tawakkalna*) over a set period of time, can yield useful information. We took the opportunity to analyse interactions on Twitter to reveal trends in government efforts regarding *Tawakkalna*, the Saudi government's application to inform the public and to regulate Covid-19 as well as Saudi citizens' reactions to the application. The dataset was subjected to a range of analyses to reveal that certain topics, such as encouragement for citizens to download and use the application, were foremost in importance. Although the study only covered a limited range of aspects it has shown how theories such as the ISSM can usefully contribute to analysis of such datasets and a number of recommendations have been made for how future studies could expand the field. It is of great importance to understand how social media can be used to provide vital information to the public, especially about issues that profoundly affect their health and well-being, such as pandemics like Covid-19 and to know how the public uses and reacts to the information and regulations.

References

- Alenezi, N. (2020). The impact of covid-19 on construction projects in kuwait, international. *Journal of Engineering Research and General Science*, 8: 4.
- Bamufleh, D., Almalki, M. A., Almohammadi, R. and Alharbi, E. (2021). User acceptance of enterprise resource planning (erp) systems in higher education institutions: A conceptual model. *International Journal of Enterprise Information Systems (IJEIS)*, 17(1): 144-63.
- Chew, C. and Eysenbach, G. (2010). Pandemics in the age of Twitter: content analysis of Tweets during the 2009 H1N1 outbreak. *PloS One*, 5(11): e14118.
- DeLone, W. H. and McLean, E. R., 2002. "Information systems success revisited." In *Paper presented at the Proceedings of the 35th Annual Hawaii International Conference on System Sciences*.
- DeLone, W. H. and McLean, E. R. (2003). The DeLone and McLean model of information systems success: a ten-year update. *Journal of Management Information Systems*, 19(4): 9-30.
- Doll, W. J. and Torkzadeh, G. (1988). *The measurement of end-user computing satisfaction*. MIS Quarterly. 259-74.
- Hidayat-ur-Rehman, I., Ahmad, A., Ahmed, M. and Alam, A. (2021). Mobile applications to fight against COVID-19 pandemic: The Case of Saudi Arabia. *TEM J. Technol. Educ. Manag. Inform*, 10: 69-77.
- Kaya, T. (2020). The changes in the effects of social media use of Cypriots due to COVID-19 pandemic. *Technology in Society*, 63: 101380.
- Kozinets, R. V. (2015). *Netnography Redefined*. Sage.
- Kozinets, R. V., De Valck, K., Wojnicki, A. C. and Wilner, S. J. (2010). Networked narratives: Understanding word-of-mouth marketing in online communities. *Journal of Marketing*, 74(2): 71-89.
- Mat Dawi, N., Namazi, H. and Maresova, P. (2021a). *Predictors of COVID-19 preventive behavior adoption intention in Malaysia*. *Frontiers in Psychology*. 1476.
- Mat Dawi, N., Namazi, H., Hwang, H. J., Ismail, S., Maresova, P. and Krejcar, O. (2021b). Attitude toward protective behavior engagement during COVID-19 pandemic in Malaysia: The role of e-government and social media. *Frontiers in Public Health*, 9: 609716.
- Petersen, K. and Gerken, J. M. (2021). # covid-19: An exploratory investigation of hashtag usage on twitter. *Health Policy*, 125(4): 541-47.
- Petter, S., DeLone, W. and McLean, E. R. (2013). Information systems success: The quest for the independent variables. *Journal of Management Information Systems*, 29(4): 7-62.
- Seddon (1997). A respecification and extension of the DeLone and McLean model of IS success. *Information Systems Research*, 8(3): 240-53.
- Seddon and Kiew, M. Y. (1996). A partial test and development of DeLone and McLean's model of IS success. *Australasian Journal of Information Systems*, 4: 1.
- Small, T. A. (2011). What the hashtag? A content analysis of Canadian politics on Twitter. *Information, Communication and Society*, 14(6): 872-95.
- Waters, R. D. and Jamal, J. Y. (2011). Tweet, tweet, tweet: A content analysis of nonprofit organizations' Twitter update. *Public Relations Review*, 37(3): 321-24.
- Yasir, A., Hu, X., Ahmad, M., Rauf, A., Shi, J. and Ali, N. S. (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(8): 2954.

Appendix-2. the most frequent hashtags associated with #Tawakkalna during the analysis period and the related issues

Associated issue	Frequency	Hashtag	Ranking
<ul style="list-style-type: none"> • Urge to download the <i>Tawakkalna</i> application. • Requirement to download the <i>Tawakkalna</i> application to benefit from the services. 	11,522	<i>Taba'd</i>	1
<ul style="list-style-type: none"> • Urge to download the <i>Tawakkalna</i> application. • Praise for the <i>Tawakkalna</i> application. • Adding the service of booking an appointment for the Corona vaccine through the <i>Tawakkalna</i> application. • Requirement to download the <i>Tawakkalna</i> application to benefit from the services. 	11,503	<i>Corona</i>	2
<ul style="list-style-type: none"> • Permits granted by the <i>Tawakkalna</i> application. • Praise for the <i>Tawakkalna</i> application. • The requirement to download the <i>Tawakkalna</i> application to benefit from the services. 	5,832	<i>Saudia</i>	3
<ul style="list-style-type: none"> • Log in to the <i>Madrasaty</i> platform through the <i>Tawakkalna</i> application. 	3,918	<i>Manasat madrasaty</i>	4
<ul style="list-style-type: none"> • Log in to the <i>Madrasaty</i> platform through the <i>Tawakkalna</i> application. 	3,872	<i>Madrasaty</i>	5
<ul style="list-style-type: none"> • Urge to download the <i>Tawakkalna</i> application. • Praise for the <i>Tawakkalna</i> application. • Requirement to download the <i>Tawakkalna</i> application to benefit from the services. 	3,568	<i>Na'od behazar</i>	6
<ul style="list-style-type: none"> • General social and religious phrases. 	3,285	<i>lailat_27</i>	7
<ul style="list-style-type: none"> • Launching the <i>Tawakkalna</i> app. • Permits granted by the <i>Tawakkalna</i> application. 	3,025	<i>Mane'e al tajawol</i>	8
<ul style="list-style-type: none"> • Urge to download the <i>Tawakkalna</i> application. 	2,818	<i>Al tahdes al jaded</i>	9
<ul style="list-style-type: none"> • Log in to the <i>Madrasaty</i> platform through the <i>Tawakkalna</i> application. 	2,624	<i>Wezarat al ta'lem</i>	10
<ul style="list-style-type: none"> • Permits granted by the <i>Tawakkalna</i> application. • Urge to download the <i>Tawakkalna</i> application. • The requirement to download the <i>Tawakkalna</i> application to benefit from the services. 	2,555	<i>Was_aam</i>	11
<ul style="list-style-type: none"> • Praise for the <i>Tawakkalna</i> application. • Permits granted by the <i>Tawakkalna</i> application. 	2,456	<i>Tatbeq Tawakkalna</i>	12
<ul style="list-style-type: none"> • The requirement to download the <i>Tawakkalna</i> application to benefit from the services. 	2,393	<i>Riyadh</i>	13
<ul style="list-style-type: none"> • How to activate the <i>Tawakkalna</i> application for those who do not have an account in the <i>Absher</i> application. 	2,331	<i>Absher</i>	14
<ul style="list-style-type: none"> • General social and religious phrases 	2,331	<i>Al hazer al kolle</i>	15
<ul style="list-style-type: none"> • Daily update of Corona virus statistics in Saudi Arabia. • Urge to download the <i>Tawakkalna</i> application. 	1,972	<i>Al sehha</i>	16
<ul style="list-style-type: none"> • Launching the <i>Tawakkalna</i> app. 	1,963	<i>Agel</i>	17

<ul style="list-style-type: none"> The health passport feature in the <i>Tawakkalna</i> app. 	1,857	<i>Al jawas al sehhe</i>	18
<ul style="list-style-type: none"> How to activate the <i>Tawakkalna</i> application for those who do not have an account in the <i>Absher</i> application. 	1,802	<i>Absher</i>	19
<ul style="list-style-type: none"> Launching the <i>Tawakkalna</i> App. 	1,770	<i>Kolana maso'ol</i>	20

Appendix-3. Arrangement of the issues according to importance

Total indicators	Hashtags	Quotes	Re-tweet	Replies	Original tweets	The number of reactants	The issue	Rank
7,263	3,505	6	1,930	0	38	1,783	Urge to download the <i>Tawakkalna</i> application.	1
4,262	2,421	19	876	6	50	890	Log in to the <i>Madrasaty</i> platform through the <i>Tawakkalna</i> application.	2
4,227	1,056	21	1,630	2	75	1,444	Permits granted by the <i>Tawakkalna</i> application.	3
2,847	1,155	11	871	1	34	776	Launching the <i>Tawakkalna</i> App.	4
1,882	961	3	537	0	8	374	Adding the service of booking an appointment for the Corona vaccine through the <i>Tawakkalna</i> application.	5
1,740	1,199	2	214	1	66	258	How to activate the <i>Tawakkalna</i> application for those who do not have an account in the <i>Absher</i> application.	6
1,287	534	4	356	0	12	380	Requirement to download the <i>Tawakkalna</i> application to benefit from the services.	7

702	294	1	195	0	5	206	Praise for the <i>Tawakkalna</i> application.	8
539	108	2	203	1	18	208	Daily update of Corona virus statistics in Saudi Arabia.	9
509	245	0	147	0	3	114	The health passport feature in the <i>Tawakkalna</i> app.	10