

# **Critical Success Factors Addressing Covid-19 Pandemic: Case of Tawakkalna Application in Saudi Arabia**

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## **Abstract**

This research aims to understand the critical success factors (CSF) of Saudi Arabia (SA) in addressing the COVID-19 pandemic. Moreover, it proposes approaches to decline the bottlenecks of the current process of checking the health status in Tawakkalna application (smartphone app help the authorities to check the vaccines status and infected people). Three hundred eighty-four responses were collected via an electronic survey representing the population with a 5% confidence interval (CI). Data were analyzed to determine participants' agreement and recurrence of the problems identified by observing the checkpoints in malls and their opinion about the suggested solution. The results show promising indicators as the practitioners express agreement on the bottlenecks identified and the proposed solution. In addition, the analysis showed that the participants had an average of 1.62 minutes to pass the checkpoint. Yet, the expected average time after implementing the solution is 0.44 minutes. However, the current study did not study the effect of the solution on the cost. Future work should investigate examining different facilities.

## **Keywords**

COVID-19, Pandemic, Tawakkalna App, and VPN.

## **1. Introduction**

In December 2019, coronavirus was first identified in Wuhan, China. On 11 February 2020, the World Health Organization (WHO) named the disease "COVID-19", which is short for coronavirus disease 2019 (WHO Director-General's Remarks at the Media Briefing on 2019-nCoV on 11 February 2020, n.d.). COVID-19 is a highly infectious disease leading to high mortality rates (WHO 2020, Chowdhury et al. 2020)

The virus is transmitted in different ways, directly or indirectly. It could be transmitted by animals or people carrying the virus. COVID-19 has resulted in a continuing pandemic and a massive effect on the whole world economy and life, causing numerous countries to lockdown imposing a curfew (Challen et al, 2021, Kiros et al. 2020, Sakurai et al, 2020, Aburas et al, 2020, Gersons et al, 2022), As far today, more than 364 million cases, approximate 5.6 million deaths, and 9.8 billion vaccines are given worldwide; as of 27 of January 2022, the spread of the disease still appears challenging to address (Gersons et al. 2020). The virus spreading method makes it dangerous since people are infecting each other without even knowing. The pandemic has caused critical global economic damage, the most significant global economic collapse since the Great Depression. Therefore, authorities have abnormally executed costly interferences to contain the virus, schools and universities were closed, and mosques were also closed (JHU, 2022). Citizens have been requested to social distancing, avoid crowds, and stop unneeded activities. Although different precautionary measures have been taken to narrow and control the entrance of disease, the first significant cases have been reported before the end of February in many countries, including Italy, USA, the UK, and Saudi Arabia (SA).

However, America is one country in which the disease exploded, with over 77.8 million cases and more than 900 thousand deaths reported (Covid 19, 2022)

One of the strategies or approaches used to stop the spread of such disease. Is Contact Tracing (CT). CT is a disease control measure that tries to reveal cases by following chains of infection, seeking to stop the forward spread of the virus. CT has been used to fight infections such as smallpox, SARS, tuberculosis, etc. Another strategy is called Passive Case Finding or voluntary sequestration, which encourages those with a suspected virus to meet or get isolated in units where they can receive primary health care and avoid infecting other people. By quickly isolating suspected cases, this approach aims to keep people with the virus from infecting others. As smartphone communication technologies have become essential in all fields and all aspects of life, the globe has utilized m-Health (mobile computing and communication technologies for healthcare) to be a new way to resolve the global health crisis. M-Health, a subfield of e-Health that helps fulfill the e-Health (emerging information and communication technology) goals utilizing Smartphones. These devices can ultimately improve health care services. Numerous countries use digital tracking means that aim to map, monitor, and decrease pandemics (Eames KTD 2007, Whitty et al. 2014.)

This research will look at different approaches & technology adopted by SA to track the spread of COVID-19. In addition, the study will present a comprehensive review of the critical success factors (CSF) of SA experience, approaches & technologies used, how efficient those technologies are, and utilized for tracking, detecting, and preventing the spread of COVID-19 and improving the current process. It is essential to study this problem because it deals with the impact on the whole life of every human and our daily lives. Since such a pandemic is unique and new to the entire world, it needs unique and innovative solutions to adapt and overcome it.

The study of indicated that with the change patterns of the disease around the globe, governments must reconsider finding more sustainable and resilient mechanisms to absorb shocks such as COVID-19 and fulfill international health obligations.

The study believes that understanding the dynamics of transmission in all countries that are daily affected by COVID-19 and assessing the effectiveness of control policies is critical to the precautionary measures that state governments can take (Shaikh et al, 2020).

There are many factors that helped in addressing and managing the pandemic in SA; there is also a lot of advantages and excellent solutions and decision made by the government of SA. Yet, some areas need examination, observation, and investigation for further improvements. All of these reflect on the strategy of decision-making that works to limit the spread of the virus. Hence, the research addresses the following problem.

1. What is the CSF of SA management to this pandemic?
2. What are the technologies and applications developed by SA to overcome the pandemic?
3. What are the main problems that are facing the current process? How can we improve it and add value?
4. Generating and comparing different alternatives that will improve the current process.

The research aims to:

1. Highlighting the success factors that helped in managing COVID-19 in SA.
2. Identify the SA government's apps to track, monitor, and curb Covid-19 & what is the methodology and technology is used.
3. Identifying and solving the current process problems of checking citizens' health status.
4. Studying SA's best and most effective methods, apps, and factors helped rank SA as the first in the world in response to COVID-19. (Saudi Arabia Ranks First Worldwide in Government and Entrepreneurs Response to COVID-19 Pandemic, GEM Reports The Official Saudi Press Agency, n.d.) .
5. Improving the current process of checking the Tawakkalna app in public places.

## **1.2 Pandemics History**

The spread of pandemics and infectious diseases repeatedly happened over the years. Disease pandemics have had severe and enduring effects on societies throughout history. Pandemics have forcefully shaped the social aspects of human, economic, political, and even industrial with their impact, often persisting for centuries. Major pandemics and epidemics such as flu, Antonine Plague, Black Death, cholera, small box etc. Have already afflicted humanity. At present, the globe is encountering COVID-19 pandemic. For ages, implementing public health measures such as quarantine, isolation, and border control supported and curbed the spread of transmissible diseases and sustained a safe society. While pharmaceutical interventions are not yet available to manage the COVID-19 pandemic, these containment methods are still being used (Ameen et al. 2020, Rehman et al, 2021).

## **1.3 COVID-19 Pandemic in SA**

The first case of COVID-19 was stated in SA on 2 March. Subsequently, cases increased quickly. Hence, as a preventive action, the Saudi government has restricted travelers and visitors from COVID-19 affected countries. The Saudi Ministry of Islamic Affairs announced that the Great Mosque of Mecca and the Prophet's (peace be upon him) Mosque in Medina have been closed for safety purposes and as a preventive action to overcome the spread of COVID-19. In addition, all congregational prayers were suspended, including the five prayers and Friday prayer across all the Kingdom's mosques (Huremović et al, 2019, Mobile Location Data and Covid-19: 2020). On 4 March 2020, the Saudi government announced the suspension of visitors and pilgrims' flights and entry to curb the COVID-19 spread in the country. Consequently, preventive means such as sport-related activities were without any audience attendance. Furthermore, Saudi authorities imposed a temporary ban on citizens and residents from some countries. In addition, schools and universities were closed and transformed to e learning. Citizens have been requested to social distancing, avoid crowds, and stop any unneeded activities. In addition to the cancellation of numerous events in sports and politics. Moreover, as of 23 March, public quarantine was restricted from seven pm to six am for twenty-one days. The disease took about thirty-four days to infect two thousand four hundred individuals by 5 April 2020.

## **1.4 The Critical Success Factors Addressing the COVID-19 Pandemic in SA**

Critical success factors (CSFs) are the factors that have contributed to curbing the number of COVID-19 cases and addressing the virus situation in SA. The CSFs approach has been widely adopted and used in different research fields. The descriptive approach is used in this research to identify, describe, explain, and highlight the relationship between the factors and enablers that helped in the success story of SA in overcoming the pandemic. Many different factors affect controlling the pandemic. Yet, the following factors are based on the literature review made by the researchers and from the experience that they had during the pandemic:

1. The fast response made by the government to the pandemic included:
  - i. Quarantine for arrival people to Saudi Arabia and any suspected cases of COVID-19.
  - ii. Travel suspension.
  - iii. Preventing all sorts of gatherings from mosques, universities, markets, etc.
  - iv. Educating the public on and promoting the importance of hand sanitizer, masks, social distancing, and other habits.
  - v. Curfew.
2. The Saudi government and health sector launched the Apps.
3. The spread of technology and phones among the Saudi society.
4. The availability of free health care to all the residents in the Kingdom, whether of Saudi nationality or foreign.
5. The digital transformation to online in universities, most of the works, services, and almost everything.
6. The availability of all the essential and luxury products from food, medical supplies, and other products that is needed.
7. Holding a daily conference for the Saudi Ministry of Health (MOH) to follow up on cases news to reduce rumors and raise citizens' awareness.

Table 1. Critical success factors addressing the COVID-19 Pandemic in KSA.

No	Paper/CSF	C1					C2	C3	C4	C5	C6	C7
		C <sub>i</sub>	C <sub>ii</sub>	C <sub>iii</sub>	C <sub>iv</sub>	C <sub>v</sub>						
1	(22)							✓		✓		
2	(23)	✓	✓	✓	✓	✓						
3	(24)	✓	✓	✓		✓						
4	(25)								✓	✓		
5	(26)	✓	✓	✓		✓				✓		
6	(27)	✓	✓	✓	✓	✓	✓		✓			
7	(28)				✓	✓	✓	✓				
8	(29)		✓	✓	✓	✓				✓	✓	
9	(30)			✓	✓		✓	✓	✓	✓		
10	(31)			✓	✓	✓	✓	✓		✓		
11	(32)							✓		✓		
12	(33)			✓	✓	✓			✓			
13	(34)						✓	✓	✓	✓		
14	(35)				✓			✓	✓			
15	(36)	✓			✓		✓		✓			
16	(37)			✓	✓	✓	✓	✓		✓		✓
17	(38)						✓					
18	(39)	✓	✓		✓	✓	✓					✓
19	(40)						✓					
20	(41)		✓	✓		✓			✓			
21	(42)		✓	✓		✓						
22	(43)						✓					
23	(44)				✓							
24	(45)									✓		
25	(46)									✓		

The researchers found that most of the publications, with 68% of the papers in the literature review, mentioned C1 as a critical factor (CF) for SA. While the researchers considered C<sub>i</sub>, C<sub>ii</sub>, C<sub>iii</sub>, C<sub>iv</sub>, and C<sub>v</sub> as sub-factors from factor C1. Hence, any paper that is mentioned in any of the sub-factors is considered under C1 also. As shown in Table 1.

While C2 and C3 reached 40% each as shown in Figure 1. However, some factors are harder in measuring their success due to the needed duration to measure its impact and the complicated methods used to measure them. The researchers believe that C2, in correlation with C3, are one of the most important factors since it affects citizens' daily lives because it is now required to check one of the developed apps, Tawakkalna in any public facility such as restaurants, malls, stadiums, etc. Therefore, this area would be more investigated and examined during this research to improve these apps and improve the process of using and checking them.

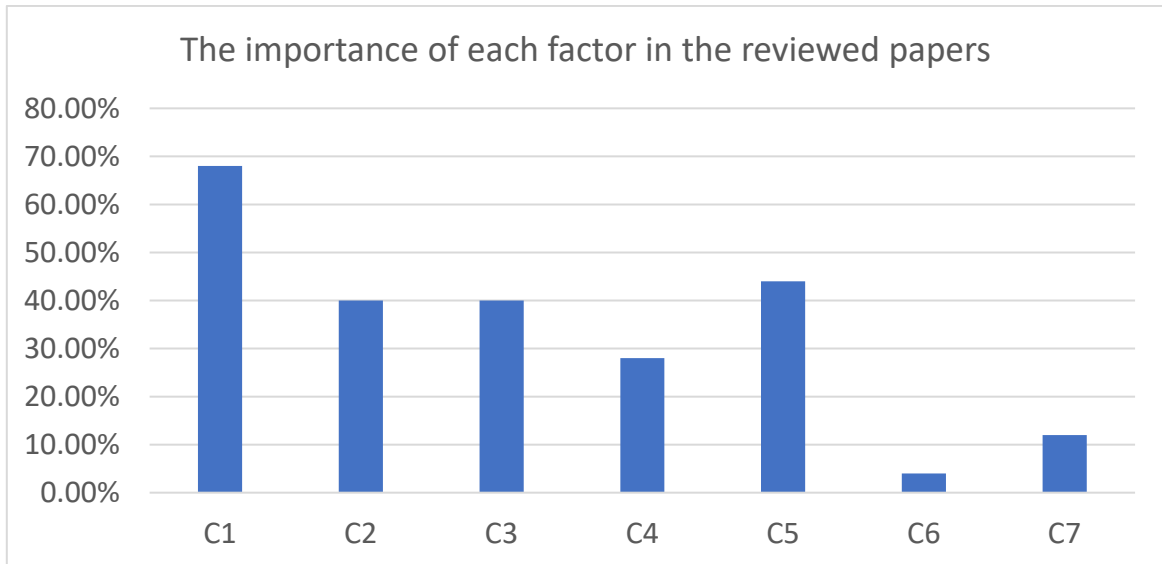


Figure 1. The importance and appearance of each factor in the reviewed papers

In addition, based on the study of Tawakkalna is the most effective app and easy to use among other apps developed by SA. Moreover, Tawakkalna is the official app that is obligated to be checked before entering any public places by the SA government (Abolfotouh et al. 2021, Alsmadi 2021). On the other hand, we can see that only 4% and 8% have focused on C6 and C7, respectively, which indicates that these factors have lower priority. The result was expected since it is considered an obvious factor that are mandatory, especially C6. Figure 1 shows the importance of the rest factors based on the literature review.

### 1.5 Mobile Applications Launched by SA Government to Curb the COVID-19 Pandemic

Mobile applications play a significant role in controlling and monitoring the COVID-19. It is effective in the process of gathering, movement, and transferring data. The Saudi MOH originated applications as part of e-health and m-health to control and monitor the pandemic (Alrasheed et al, 2020, Bamufleh et al. 2021, Abolfotouh et al. 2021, Alsmadi 2021) The applications are available free for download on both Google Play and Apple Store. Descriptions of some of these applications are given below:

#### 1.5.1 Tawakkalna:

The app was developed by the National Information Center (NIC) to prevent the spread of COVID-19. The Saudi MOH approved it. The app provides users with real-time data about how many people in SA are infected with COVID-19 and assists in the early detection of infections once COVID-19 symptoms appear. During the curfew, citizens and residents can request movement permits, follow up on the status of their requests, and receive notifications when they are near infectious or isolated areas. Users of the app can also report suspected COVID-19 cases to receive the care they need.

#### 1.5.2 Sehhaty:

Sehhaty is supervised by MOH. It provides health care services in SA. Users can access health information and medical e-services provided by different health organizations through the app. It enables the users to book COVID-19 test appointments, administer the COVID-19 self-assessment test, track prescribed medicine, retrieve sick leaves, promote a healthy lifestyle, integrate Sehhaty Steps, etc. Some of Sehhaty's services are Telephone-consultation, Searching for medication and their availability in the nearest pharmacies, viewing prescribed prescription, Medical appointment scheduling, Monitoring of vital signs readings, and Results of school screenings (Rehman et al. 2021).

### **1.5.3 Tabaud**

Saudi Arabia's Tabaud app is part of its ongoing fight against and containment of the COVID-19 pandemic. Saudi Arabia's official contact tracing app was developed by the NIC of the Saudi Data and Artificial Intelligence Authority (SDAIA) in close collaboration with MOH. Users of the app could notify other users if they had contact with someone infected with COVID-19 through three primary services. Additionally, the MOH will receive their health forms and provide the necessary medical support based on their status and progress. Furthermore, those infected with COVID-19 will be able to volunteer their test results with people they have interacted with over the past 14 days (Ibrahim 2021, Rehman et al. 2021)

The privacy of Tabaud users is completely protected. Because the app relies on Bluetooth technology to gather and refresh IDs randomly, it does not require information or location sharing. Users who wish to initiate the medical procedure of testing for COVID-19 must provide MOH regulations with their name, National or Residence ID number, and date of birth.

### **1.5.4 Mawid**

Through Mawid, the Saudi MOH enables patients to book and manage their appointments at primary healthcare centers and to cancel or reschedule them online. The system also manages referral appointments. (48)

- **Tetamman:**

The Saudi MOH developed (2)Tetamman, aiming to emphasize the responsibility of all persons designated to quarantine and follow their cases up. Various services are provided through the app. Such as:

1. The results of COVID-19 tests.
2. Requesting help through direct contact with 937.
3. Symptoms daily check-up.
4. Updated data of people who have contacted a positive case.
5. Library that has educational content.
6. Isolation day's countdown.
7. Notifications alerts through automated calls and text messages.

## **2. Methodology and Design**

### **2.1 Overview**

This section is about collecting data about the current method of vaccination check, the smoothness of the process, and how it could be improved with the use of several to enhance the processes and put constraints within the process to reduce cost and time. The steps of this stage is summarized in Figure 2.

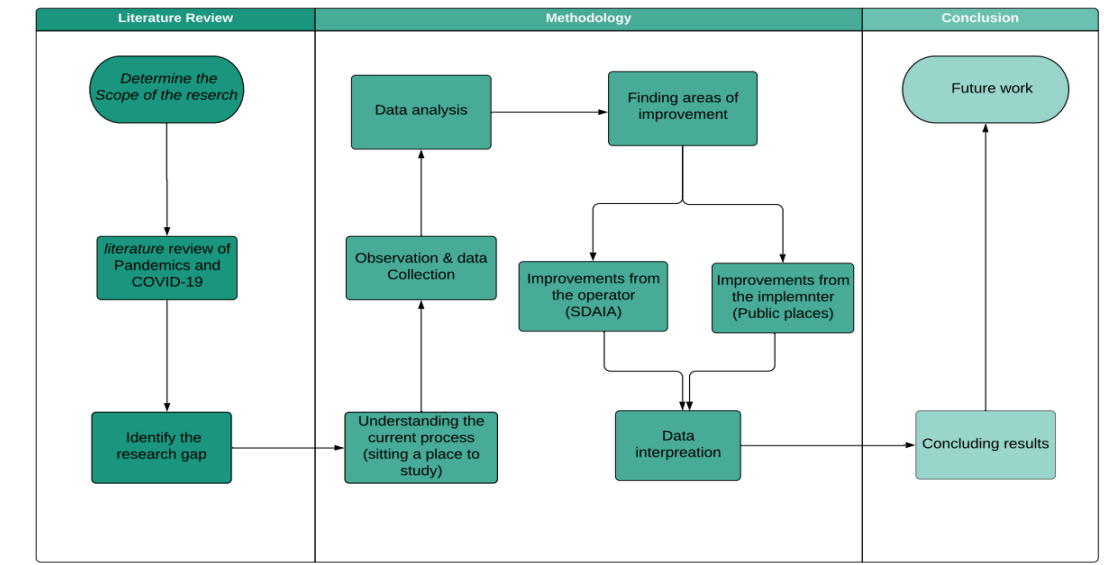


Figure 2. Research methodology

The qualitative analysis contributed to understanding "how" and "why" the factors affect the success of the Kingdom management of the crises.

A combination of approaches for gathering data was applied. It contained a literature review, observations of the process of public places, and the process of the implementer or developer (SDAIA) of the app (Tawakkalna). The literature showed that SA has succeeded in addressing the pandemic and that these factors had contributed toward this success. However, the observation of the current process showed that the process is time-consuming, costly, and disordered. Therefore, there was a demand for further investigation within the existing general place methods used to check Tawakkalna. The idea was to determine the areas that could be improved in order to make the process more efficient (Figure 3).

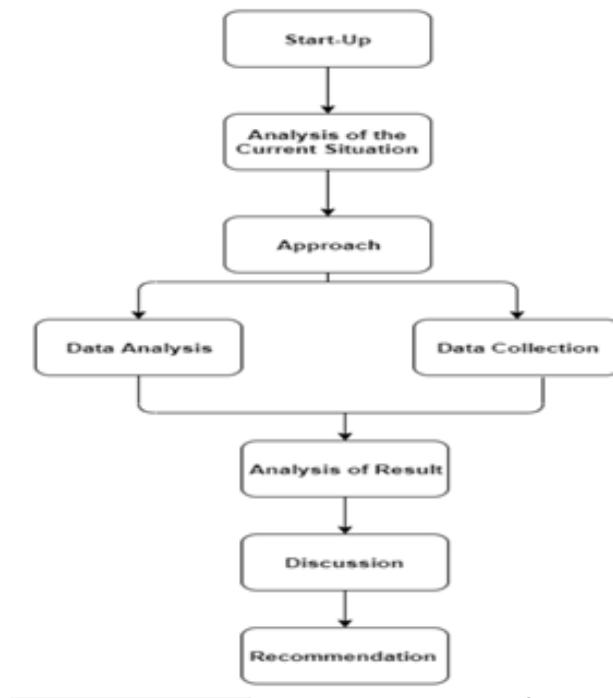


Figure 3. Process steps of the research

Finally, a conclusion with recommended future work is written based on the structured methodology.

## 2.2 Studying Current Situation

After observing the current situation, the researchers found that the current process has two main problems, which had a significant impact on the customer experience in addition to the effects on the providers of the services in public places. The first problem is related to time waste for both stakeholders (the customer and the providers). The second problem is related to cost those impacts the providers only.

## 2.3 Analysis of the Current Situation

Tawakkalna currently has seven colors code, each with a definition that indicates a status, which are Dark Green Color for Immune from COVID-19, indicating that the user either has completed the doses of one of the vaccination types or is immune by the first dose, or immune by recovery. Green Color: Indicating that the user has no record of infection. Orange Color: Indicating that the user has been exposed to a COVID-19 infected person and is not permitted to enter workplaces or enclosed public places. Brown Color: Indicating that the user is confirmed to be infected with COVID-19 under the MOH data. Blue Color: Indicating that the user has arrived from abroad, a category country that is not listed by the MOH, and must complete 7 days of self-quarantine or comply with 3-days of self-quarantine by taking a COVID-19 test within 48 hours of arrival. Violet Color: Indicating that the user has arrived from abroad B category country, a certain country that is listed and defined by the MOH and must complete seven days of self-quarantine by taking a COVID-19 test on the 6th day. Gray Color: Indicating that the user has no internet connection on his device or is using a Virtual Privet Network (VPN).

The current situation is unorganized and seems to have problems since it is not planned well by the public places that check the app. The process of checking itself is time-consuming rather than that it is duplicated and repeated, so once a customer arrives in any public place in our case a mall, for example, the customer needs to show Tawakkalna at the entrance, yet if he goes to the cinema or any closed restaurants or indoor restaurants (that have an inside place to seat in) the customer will be required to show the app once again in each one of them. Moreover, it can spotted that there is a cost that could be avoided which is an opportunity cost. This cost is the cost of the unutilized workers that are checking the customers that were already checked during their entrance to the mall.



Furthermore, the app itself has some areas that could be improved to make the user/customer experience more enriching and practical. One of the users' problems is that the app sometimes logs them out of the account. Hence, when they reach a checking point, they need to re-entire their account and then receive an SMS with a code to reach the QR code and the status in the app. Besides, sometimes when opening the app, the app sometimes needs 30 seconds to operate, update, and download the data. All of this takes and wastes the customer's time and the provider/ checker. As shown in Figure 4.

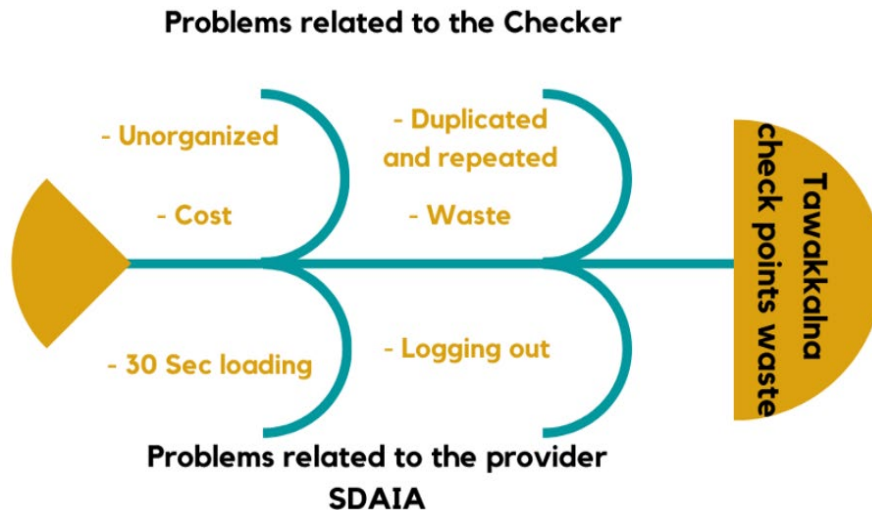


Figure 4. Fishbone diagram showing the problems

## 2.4 Data Collection

A survey was used as a channel for collecting data based on the advantages that this approach has, which made it the most suitable for this study. Some of the benefits of using surveys are that surveys allow for collecting a high amount of data in relatively short periods. Moreover, they assure conclusions that are more reliable since it helps represent the characteristics of a large population (SDAIA 2022)

To determine the sample size needed to achieve a 5% CI, the population number needs to be determined first, the scope of this study is aimed at users of Tawwakalna, and in Saudi Arabia, there are more than 23,000,000 individuals that use Tawwakalna app. Using the Survey System website, it was estimated that the sample size needed for the survey is 384 responses. The confidence level for this research is selected to be 95%. Based on the study of Grant et al. (2015), stated that when determining the sample size needed for a given level of accuracy, it must use the worst-case percentage, which is a 5% margin of error (SDAIA 2022, Jones et al. 2013). Hence, the margin of error for this research equals 5%. Therefore, the sample size is equal to 384.

Results were used to examine the user's perspective and thoughts about the current situation, whether they have faced problems or bottlenecks with the process, and the implementation of the improved situation. The data is collected from a sample of people who use the SA app.

To measure the current situation's satisfaction level, a survey was designed. Next, a pilot study was conducted to check the survey quality. The survey was designed in an electronic format. To measure the survey validation, it was distributed it to five persons that use the app in their daily life, based on their feedback, the survey was modified. In the pilot study, the participants took around a minute and a half to finish filling out the survey.

Additionally, based on the feedback, two new questions were added, the first question was whether the user had been examined multiple times during one visit to a mall. The other question is about the user's opinion and comments. Lastly, the answer to two questions was changed to a linear scale from one to five instead of a yes or no question. After that, the final version of the survey was distributed, and data was collected. The electronic survey was distributed

using different social media channels. 405 responses participants responded. Then, the data were examined, and only 384 responses were accepted and used based on the sample size calculated. Figure 4 shows and summarizes the steps mentioned.

## 2.5 Recommendations to improve the application

The first thing that needs to be done by the implementer of the services (the mall) is to remove the duplicated checks considered a non-value-added activity. Not only that, it is regarded as a waste of time, and resources and increases the cost. It is also because the customers have already been checked and examined while entering the mall. Therefore, this is a non-value-added activity. There is no need for a second and third checkpoint inside the mall except at the entrance gates; the customer will be willing to wait at the first checkpoint since it regards his safety. However, he will not be ready to wait in any further checkpoints other than the first one. Secondly, we suggest three different alternatives for the operator (SDAIA) to develop and utilize to optimize the method of checking the health status of Tawakkalna. The first alternative is using the widget tool available on the diverse phones shown in Figure 5- 7.

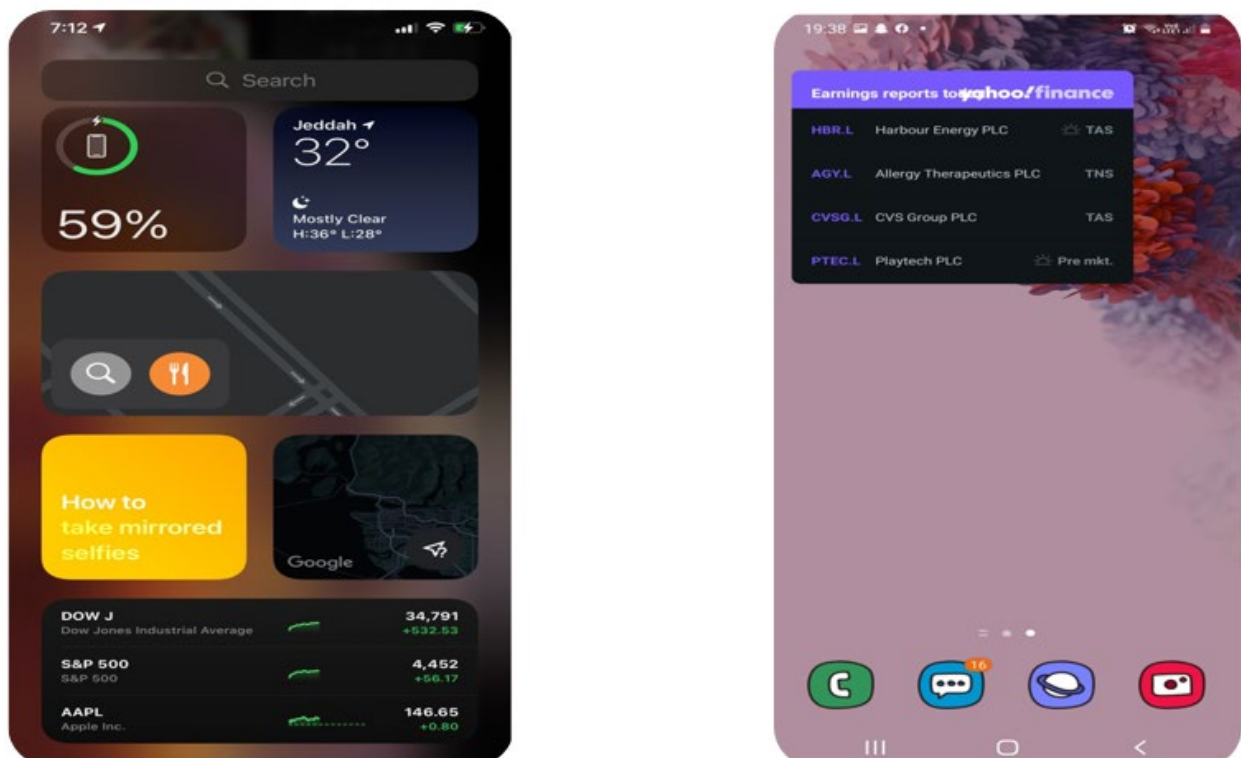


Figure 5. The widget Tools

This idea utilizes the widget tool feature that is available on the different types of phones and adds it to the Tawakkalna app. Therefore, it enables the user to find the QR code with their name, health status, and photo in the widget place even when the phone is closed. Figure 6 shows the recommended way to show these pieces of information.



Figure 6. Suggested ways of utilizing and adding the widget tool to Tawakkalna

This makes the process faster and allows us to overcome one of the main problems that create a queue in the checking point and slow the process. People usually arrive with their phones in their pockets and are not ready for the checkpoint, reflecting on the whole process. On the other hand, if the widget feature were added, it would make us overcome this process and other problems that the user faces while opening the app to reach and show the health status in the checking points.

The second suggestion is to make Tawakkalna, or the user's health status, linked with the Apple wallet. So that it works similarly to Apple pay by either double-clicking or triple clicking, the health status appears. This solution could also be applied and linked to the apple watch, making the process even faster. Figure 7 shows the suggested idea of adding health status to the Apple wallet. Yet, this solution needs to be linked to a similar app in other operators like Samsung and Huawei, which are currently unavailable.

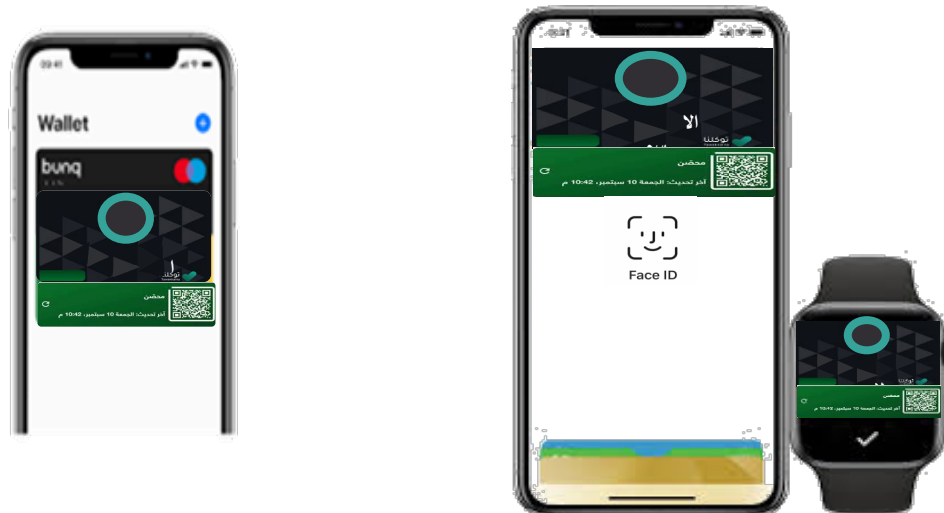


Figure 7. Suggested method of adding health status to Apple wallet

The third and final alternative is using a new type of technology called Bluetooth Low Energy (BLE), which is available in most new phones; it is similar and built on the same concept of standard Bluetooth, which makes it easy to set up and as reliable as Bluetooth. Yet, there are some significant differences between the two technologies. BLE's goal is to connect devices and enable smart devices to communicate over a relatively short range (Gomez et al, 2012). It will enable the required data such as health status, photo, name, ID, etc. To be immediately shared through it with the security responsible for the checking point when arriving at the checkpoint.

### **3. Analysis of Results and Findings**

The researchers classified the results into two main sections. The first set of questions; concentrates on examining the bottlenecks that were identified in the current process analysis as a problem. While also showing how frequently it is happening to the app's users. The second section is regarding providing information about the average time of the current process (current situation). Moreover, what is the expected average time of the suggested process (future situation) after implementing the widget tool to the app?

#### **3.1 Examining the bottlenecks**

The researchers found that most participants face the problem of logging out of their accounts frequently. Since the percentage of participants that answered with three or more to the question on a scale of 1 to 5 was 74%. Figure 8 shows the rest of the data.

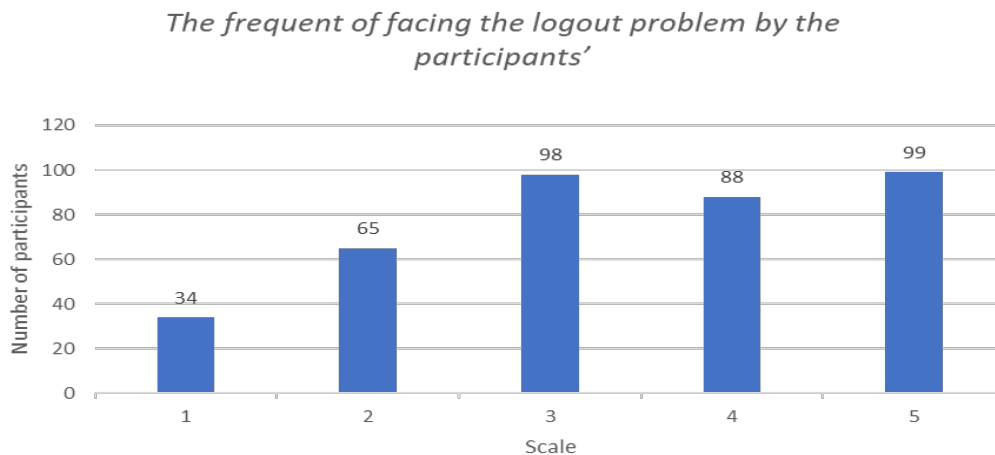


Figure 8. Participants' facing the problem of logging out of their Tawakkalna account

As for the problem of 30 seconds loading that is faced when opening the app, the researchers found that most participants are also facing the problem frequently. With a 75% that answered with 3 or more to the question. Figure 9 shows the rest of the data.

The frequent of facing the 30 second loading problem by the participants'

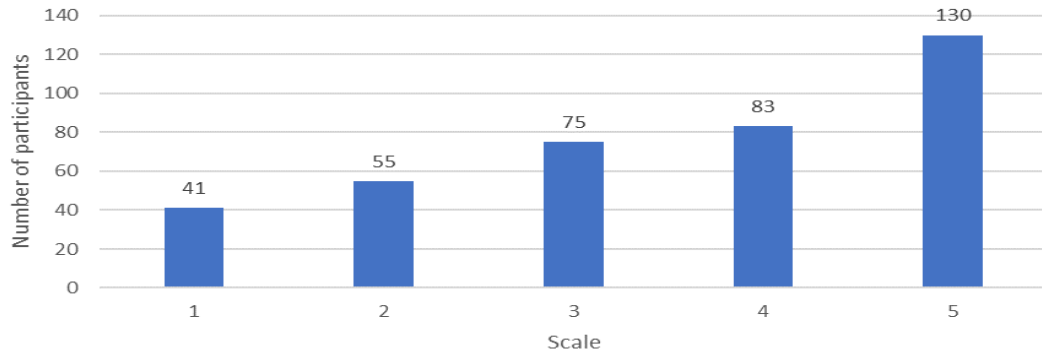


Figure 7. Participants' that face the 30 second loading problem

As for the duplicated checks, 63% of participants have been double-checked during their visit to the mall, as shown in Figure 10.

Have you been Eximend twice during one visit to a mall?

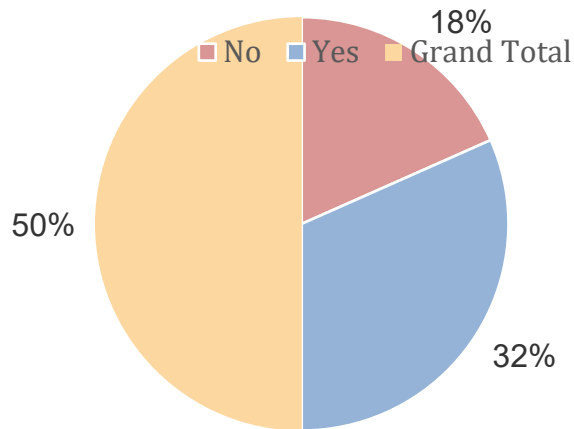


Figure 8. Participants' that face duplicated checks during their visit to mall

As for participants' opinion about adding the widget tool feature, the majority, with 89% of participants, believe that adding such a feature will make the process faster, as shown in Figure 11.

### Do you believe that adding the widget tool will make the process faster?

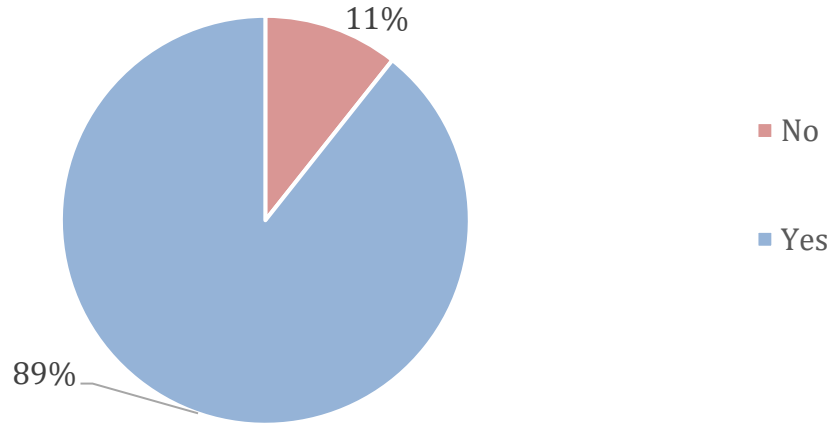


Figure 9. Participants' opinion on whether the widget will make the process faster or not

### 3.2 Time-Related

The result shows that the participants' average duration to past the checking point equals 97.29 seconds, equivalent to 1.62 minutes. On the other hand, the participants believe that if the widget tool were applied, the average time would be 26.64 seconds, equal to 0.44 minutes.

### 4. Discussions and Recommendations

The result found from the survey agrees and confirms what was found through observation. Figure 10 shows that 74% of the participants answered with three or more to the first problem that was found in observation. This indicates that this is a bottleneck that is causing the process to have a high time. In addition, this problem consumes a high amount of time. It also has a high-frequency level that is the problem is repeatedly happening to the app's users. Figure 11 shows that the data obtained through observation and the survey data are also matched since most participants with 75%, answered with three or more to the second problem, which indicates waste and bottleneck as mentioned in the current situation analysis section.

When looking at the percentage difference, we will find that the average time of the new process is faster by 365%. Moreover, we need to consider that this reduction in time (was only due to the widget tools feature without looking in the time wasted in the multiple check points problem) assuming that the time average time spent in the second check since it is not one after the other; the additional percentage of reduction in time would be 229.9% considering that 63% of the participants have been examined more than once during one visit to the mall. A comparison between all the alternative solutions is shown in Table 2.

Table 2. A comparison between all the alternatives

ALTERNATIVE	ADVANTAGES	DISADVANTAGES
WIDGET	<ul style="list-style-type: none"> <li>- No additional cost</li> <li>- Fast</li> <li>- Familiarity with the tool</li> <li>- Do not require intricating with different entities</li> </ul>	-

APPLE WALLET	- Fast - Familiarity with the tool	- Only applicable to Apple products - Require intricating with different entities
BLE	- Fast (automatic) - Low battery consumption - Do not require intricating with different entities	- N/A for some Old devices

The researchers recommend removing the duplicated checks, which will reduce the processing time and waiting line. In addition to reducing the cost, we either have fewer employees due to eliminating the multiple checks or utilizing our staff to deliver better service to the customers. Secondly, we recommend applying and developing the widget tool to Tawakkalna since it seems to positively affect the process, which helps have better flow and better overall customer experience.

## 5. Conclusion and Future Research

All the factors mentioned in this paper are considered essential factors that should be considered in any future pandemics or similar circumstances. We believe that the factors mentioned, found, examined, and reviewed in this research helped in minimizing the effect of COVID-19 pandemic and contributed to the success story of addressing the virus in SA. The importance of the factors could also be seen and reflected through the made literature review, as shown in table 1. However, some other factors were not mentioned and could have an effect, and the mentioned factors are considered the most important ones based on the researcher's literature review.

The C2 factor was examined since the researcher believes it is one of the most critical factors. Yet it needs a longer time to show the effect while it is a new approach. Hence, not many papers mentioned this factor. Based on the study of (47) Tawakkalna is the most effective app and easy to use among other apps developed by the SA government. Therefore, this paper examined many problems and areas of improvement in the app that affect people's daily lives. After observing and investigating the current process of examining malls visitors' health status on Tawakkalna, the process was found to have two main problems and activities that were considered non-value-added and bottlenecks processes. While a survey was used to confirm the data obtained by observing the process, the results showed a verification and a clear indicator that the problems were frequently happening and wasting and increasing the processing time. Furthermore, the survey results highlighted that the recommendation of applying a widget tool to the app is helpful and will make the process faster, less costly, and more efficient.

An in-depth analysis of the effect of applying the solution on the cost should be made in future. In addition, future work should consider examining facilities other than malls since the same approach can be used to other facilities to have a better flow and a better process while reducing the waste of time and cost.

All the mentioned suggestions could be utilized for different purposes other than Tawakkalna. The first alternative can be used to improve any process or event that is crowded; for example, it could be used for checking the tickets for football games, events, etc. As for the second alternative could also be utilized for different purposes such as linking the driving license with it, linking the national ID, etc.

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