

QATAR UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

FACTORS THAT IMPACT USERS' SATISFACTION WHEN USING DIGITAL
CONTACT TRACING APP: THE CASE OF EHTERAZ

BY

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ABSTRACT

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Title: Factors That Impact Users' Satisfaction When Using Digital Contact Tracing App: the Case of Ehteraz

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This research aims to investigate the user satisfaction of Ehteraz in Qatar as a unique case study due to the mandatory requirement to download and present to authorities. Individuals in Qatar are excluded from accessing public spaces, buildings, transport, workplaces, in fact, anywhere where they might come into contact with others unless they can provide evidence of an uninfected state – Green QR Code.

The compulsory requirement is specifically relevant to this research as user satisfaction might be impacted by user health status (chronic illness) and user perceptions of voluntariness (willingness to install). Hence, the study examines the factors that affect user satisfaction and contrasts these with individuals in poor health or resistant volunteers. The main research questions are:

What are the main factors affecting users' satisfaction when using Ehteraz App?

Do voluntariness and the status of users' chronic diseases moderate the relations of the predictors with satisfaction when using Ehteraz App?

What are the recommendations for developers in Qatar to improve Ehteraz App to increase users' satisfaction?

The study of pandemics and specifically the use of DCT apps are a new and exciting field of research, as technology and the pandemic itself come together. This study draws on two existing areas: Those concerning the rationale for DCT apps, such as: measuring to what extent these apps affect public health, limiting to achieve the

public health objectives, and being scientifically justified, and those related to measuring the satisfaction or adoption of technology: The Unified Theory of Acceptance and Use of Technology (UTAUT) and the Information System Success Model (ISSM) are adopted to determine the factors that impact users' satisfaction when using Ehteraz App. The originality of this research is derived from the integration of the two models into a unified user satisfaction model, with nine related variables (7 independent and one dependent) creating associated hypotheses.

The study tested the strength of the dependent variables using a traditional scientific, normative approach. An online convenience sample survey of 550 users using a 34 item questionnaire was conducted and analyzed for reliability (Cronbach Alpha), and each of the seven independent factors was analyzed for correlation. The two moderators (Voluntariness and Chronic Disease) were used to measure their impact on the relationship between the study's variables and public acceptance.

The results indicated that four of the seven variables of user satisfaction are specifically vital in the case of Ehteraz: Performance Expectancy, Effort Expectancy, System Quality & Trust. Information Quality, Technical Experience, and Privacy were not indicators of satisfaction. There is no substantial evidence to indicate a relationship between user satisfaction and either Chronic Disease or Voluntariness. The designer and developers of DCT apps should focus on the reliability and accessibility of the DCT apps to become easier to use and provide more accurate information.

Keywords: *Ehteraz*, users' satisfaction, digital contact tracing (DCT), m-government app, Qatar

DEDICATION

This thesis is dedicated to my parents, Mohamed Mousa and Safaa Ibrahim, who loved me unconditionally and encouraged me to work hard toward things I want to achieve. I am grateful for your presence in my life.

This work is also dedicated to my husband, Moddather Mohamed, who has always been a source of encouragement and consistent support to obtain my master's thesis.

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CHAPTER 1: INTRODUCTION

1.1 Introduction and Background

The year 2020 will always be remembered in history by the worldwide outbreak of Respiratory Syndrome disease (Covid-19) that has caused millions of deaths and affected people's health across the globe. The World Health Organization on 11 March 2020 has declared the Covid-19 as an International Public Health Concern as the virus started to spread across the world (Ahmed et al., 2020). Life after the Covid-19 has been changed a lot. The virus outbreak persuaded many countries to take the necessary step to prevent this epidemic from causing further damage to human life. There was no option left for the governments to reduce the spread of the virus, so they decided to enforce mandatory lockdowns, self-Isolation, and implement work-from-home policies (Kukuk, 2020).

Moreover, the critical condition for saving public life is to trace down and understand infectious chains. Contact Tracing would be helpful for people to know if they were in contact with an infected person so they could self-Isolate themselves to prevent further infections. This issue can be solved by introducing digital contact tracing apps installed on users' smartphones. So, across the globe, the governments have introduced contact tracing apps, users can get to know if there are in danger or not. Citizens are encouraged to install apps that keep track of their proximity to other users. In other words, when two users come nearer to each other, they will receive popup notifications through Bluetooth signals strength. Some famous contacts tracing apps across the world are Trace together, BeAware, NHS, and CovidTracker.

On the 22nd of May, the Qatar Government has also introduced a compulsory contact-tracing app named Ehteraz (Marhaba, 2020). The Ehteraz is a smartphone app aimed to limit the spread of Coronavirus and spread health awareness among people in Qatar through tips and techniques for protection methods, as shown in figure 1

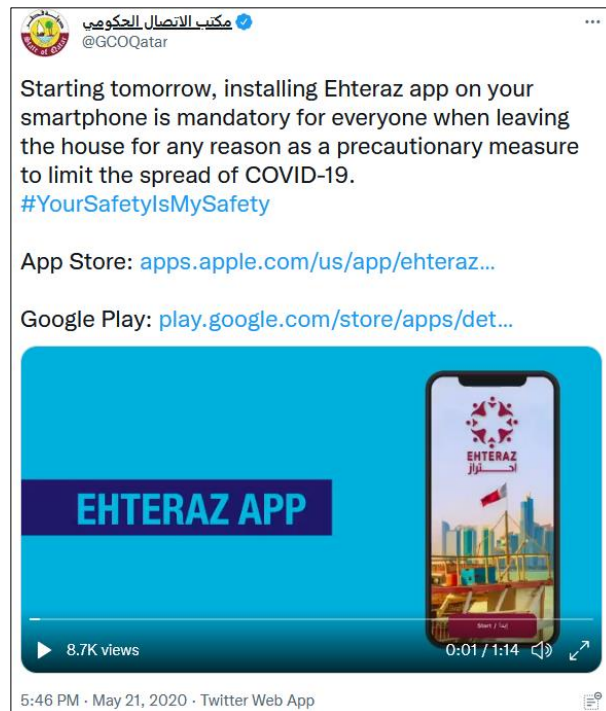


Figure 1. Government Communication Office's Twitter account (Twitter, 2020)

Moreover, Ehteraz shows the latest and official statistics regarding Covid-19, such as the total No. of positive cases of Covid-19, No. of new cases in the last 24 hours, No. of active cases under treatment, and other important information related to Coronavirus (Marhaba, 2020).

The Ehteraz app was launched by the Ministry of Interior (MOI). It uses Bluetooth and GPS features to perform different services. The app access the user's location even if it is not opened. Also, the app has access to personal data such as

photos, media, contact info, storage (Apple, 2020), permission to write to the file system, device Id, and manage phone calls (Qatari Governemnt, 2020). The app is mandatory for all citizens and residents in Qatar to download and use this app (Marhaba, 2020). Any violation of infectious diseases law, the person will be subject to prison for up to three years or a fine up to QR 200.000 \approx US\$55,000 or both (the Peninsula Qatar, 2020). The feature of the Ehteraz app is if it gets turned green, this means there is no danger to users regarding Covid-19. The gray is classified as someone who has symptoms or is contacted with a positive case of Covid-19 but still hasn't got results yet. The yellow shows that someone is approached with a positive case of Coronavirus and should self-isolate themselves for 14 days at home. The red color shows someone the user is tested positive.

Therefore, the Ehteraz app is helpful for a user to make people safe from the ongoing spread of this virus. But with advantages, there are so many disadvantages as well. Likewise, this study aims to understand the factors impacting users' satisfaction using digital contact tracing applications, mainly focused on the Ehteraz app.

This research aims to investigate elements that impact the user's adoption of the Ehteraz app in Qatar. Accordingly, the results and findings will guide Qatar's decision-makers to deeply understand the citizens' and residents' needs of Ehteraz services to implement an effective system. The objective of doing this research is to explore the Ehteraz features in terms of performance expectancy, effort expectancy (Venkatesh, Thong, & Xu, 2012), system quality, information quality, and User satisfaction (Delone & McLean, 2003), adding to them: technical experience, trust, perceived privacy risk, chronic disease, and voluntariness.

In this study, the paper's structure is as follows. The " Literature Reviews" section discusses digital contact tracing overall, introduces the Ehteraz app, and

mentions the adopted technology theories. The study variables; (performance expectancy, effort expectancy, system quality, information quality, technical experience, trust, perceived privacy risk) are presented in the " Constructs of the Study" section. In the " Research Methodology" section, we explain the study's methodology employed in this study. In the " Data Analysis" section, we will run the studys' hypotheses through various tests via SPSS, mentioning the results after each test. Discussion the findings are shown in the " Discussion " section. The recommendations are generated in the " Theoretical and Managerial implication" section. In the " Conclusion" section, we summarize the predictors that are impacting users' willingness. Finally, In the " Limitations and Future research" section, we highlight the key challenges, identifying the potential areas and additional directions for investigation in the future for contact tracing technology.

1.2 Research Problem

The main problem is identifying the main factors that impact users' satisfaction when using the Ehteraz app. Consequently, the findings will provide a deeper insight, highlighting recommendations for developers to improve and enhance the app to increase user satisfaction. The research aims to answer the following questions related to users' acceptance of Ehteraz:

- 1- What are the main factors affecting users' satisfaction when using Ehteraz App?
- 2- Do voluntariness and the status of users' chronic diseases moderate the relations of the predictors with satisfaction when using Ehteraz App?
- 3- What are the recommendations for developers in Qatar to improve Ehteraz App to increase users' satisfaction?

1.3 The Significance of Research

The impact of COVID19 is well known to individuals and entire populations, with people losing jobs, losing income, and losing their lives. The World Health Organization (WHO) (2020) noted: “The economic and social disruption caused by the pandemic is devastating: tens of millions of people are at risk of falling into extreme poverty, while the number of undernourished people, currently estimated at nearly 690 million, could increase by up to 132 million by the end of the year.” They also estimated that 3.3billion workers were at risk of losing their jobs. Understanding how contact tracing apps work is therefore of personal, economic, and social importance.

The current study is an effort to determine different factors affecting users' satisfaction when using the Ehteraz app in Qatar. Although there are studies published about reasons and factors that impact the adoption of DCT apps, there are very limited researches exploring user satisfaction to use a compulsory DCT app. Also, no investigation was done particularly about public acceptance to use the Ehteraz app in Qatar. The study will bridge the gap in the literature by providing scholars and practitioners with some substantial insights into the users' willingness to use DCT apps. This research study will allow stakeholders like the government and technology developers to get more insights into users' satisfaction regarding the Ehteraz app to add more features if a similar pandemic is spread.

1.4 Research Objectives

The objectives of this research include the following:

- To identify the crucial elements that influence users' satisfaction when using digital contact tracing: Ehteraz App.
- To measure the impact of different factors on users' satisfaction.
- To Examine the moderating role of voluntariness and chronic diseases in influencing the relationship between factors that impact users of Ehteraz and their satisfaction.
- To Provide recommendations to the Qatari Government and developers to enhance Ehteraz App.

CHAPTER 2: LITERATURE REVIEW

2.1 COVID-19 Digital Contact Tracing Apps (DCTA)

The World Health Organization has declared the Covid-19 as a global pandemic on March 11, 2020 (Cucinotta & Vanelli, 2020). The risk of being infected increased every day due to delayed or limited precautionary responses against the new virus. It has spread across the globe from person to person (Islam, Islam, Munim, & Islam, 2020). The coronavirus outbreak has affected the lifestyle of everyone throughout the world, forcing some governments to mandate lockdown, initiated working from home policy, recommended self-isolation, instigated strict social distancing criteria, and deploy emergency health responses (Ahmed N. et al., 2020).

Control the spread of the coronavirus; several countries worldwide have shown an interest in digital contract tracing apps since March 2020. The general understanding of contract tracing apps is people download them on their smartphones, and the apps communicate with other mobile devices in proximity through Bluetooth and GPS. When a person has symptoms or tested positive for Covid-19, their health status is updated in the contact tracing app. Then, people who have been within prescribed proximity of the infected person are notified by a text message or notification on their devices and advised to self-isolate (Lucivero et al., 2020).

Furthermore, the framework of digital contact tracing and exposure notification tools should be scaled based on three dimensions; measuring to what extent these apps affect public health, limiting to achieve the public health objectives, and being scientifically justified (Ramjee, Sanderson, & Malek, 2020).

The contact tracing apps can help users take precautionary actions before going out of their houses (Altmann et al., 2020). The contact tracing apps have different usages. For instance, DCT apps can control the spread of ongoing and any epidemic

without damaging society through impacting the social structure and economy. So, DCT apps can help through two interventions; to isolate the individuals who have symptoms, trace the contacts in connection with symptomatic cases, and place them in quarantine. As a result, it will assist in decreasing the number of communications between those who have symptoms and those who may not have symptoms, but it has to be fast, efficient, and occur on a scale (Ferretti et al., 2020).

COVID-19 DCT apps play a fundamental role in many countries. In some countries, citizens have the right to download and use these apps, such as; Austria, Bahrain, Canada, France, Indonesia, Japan, Switzerland, and the UK. While, in other countries, citizens are obligated to download and use DCT apps such as; China, India, Iran, Singapore, Turkey, UAE, Thailand, Algeria, and Qatar (O'Neill, Mosle, & Johnson, 2020). This mandatory decision had supporters and opponents, impacting the rate of their satisfaction. Consequently, this research focuses mainly on users' satisfaction when using Ehteraz App in Qatar.

2.2 About Ehteraz App

A similar kind of digital contact tracing has been developed in Qatar, namely, Ehteraz, meaning precaution (Gulf Times, 2020). Ehteraz is an App for smartphones designed to alert users who contact infected persons (The Peninsula, 2020). It uses Bluetooth (BLE) and GPS technology to perform different services (Marhaba, 2020). There are essential steps that have to be completed by the users to use an active Ehteraz app. The user has to read and agree to the terms and conditions, followed by registering into the app using the user's mobile number, Qatari ID, and the expiry date of QID with a verification code sent to the user's mobile number to complete the registering successfully.

The Ehteraz App is a Covid-19 mobile tracking app developed by the Ministry of Transport and Communication (MoTC) and the Ministry of Public Health (MoPH). The Ehteraz app can be downloaded from the App Store for iOS 13.1 or later (Apple, 2020) and Google Play Store (Google Play, 2020). The application is available in two languages; English and Arabic. The application is designed to alert users when they encounter an infected person through pop-up notifications. The tracking process uses both GPS and Bluetooth technology.

Through location services and Bluetooth sensors, the user's location can be identified by interaction with any user who has tested positive cases of COVID-19, and the user's movement can be tracked (The Peninsula, 2020). The Bluetooth feature allows identifying the distance between users who have the application installed on their smartphones to determine whether or not the contact is safe, in two meters or more. Consequently, these features will assist the authorities in tracking and tracing the individuals in a better way to limit the spread of the virus.

The Ehteraz App shows the health status of the user in several color codes, as shown in figure 2 (The Peninsula, 2020):

- 1- The green code means the user does not have Covid-19.
- 2- The yellow code indicates the user is under quarantine.
- 3- The gray code mentions the user either the result has not shown or has interacted with an infected person.
- 4- The red code indicates the user has been tested and confirmed of Covid-



Figure 2: QR Health Codes in Ehteraz app (The Peninsula, 2020)

The generated data acquired from Ehteraz App is not publicly disclosed as it is used only by the relevant authorities such as the MoPH and government entities. The Ehteraz has four sections within the app: Health Status, Statistics, Hotline, and Notifications. The “Health Status” section informs the user of the risk level of getting Coronavirus. The “Statistics” section contains the updated statistics from the Ministry of Public Health regarding Covid-19 in Qatar. The “Hotline” section provides the user with contact numbers for any technical or health questions and inquiries. The “Notifications” section has messages and news from the Ministry of Public Health (MoPH) informing the number of new confirmed cases, the number of recovery cases in the last 24 hours, and the total number of recovered cases Covid-19.

On the 12th of February, 2021, the MoPH declares new updates include the “Vaccination Status” section and Privacy Policy. The “Vaccination Status “section shows all the information for the individuals, who have taken the full course of Coronavirus Vaccination which consists of two doses, such as Vaccine name, First does, and Second does. As a result, the new health status will be updated in a Golden Frame around the QR code with a vaccinated stamp, as shown in figure 3 (Tribune News Network, 2021).

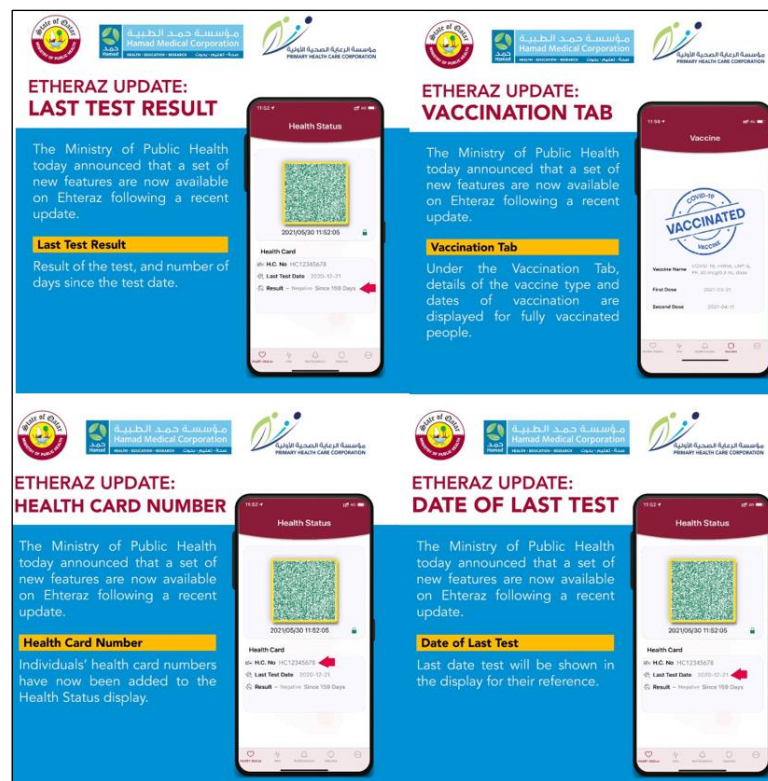


Figure 3: The Ministry of Public Health's Twitter account (Twitter, 2021)

The “Privacy Policy” Section contains all the information related to the user’s privacy, such as Device Permissions, Data Collection and storage, Retention, Security, Usage, Access, and Privacy Support.

2.3 Technology Adoption Theories

Many theoretical models are used to identify the variables that influence user satisfaction with a new system. In this research, the UTAUT 2 and ISSM will be mainly used to extract the research's variables. The researchers, interested in identifying the variables that impact user acceptance, started to integrate the two previous models to eliminate any shortage in any one of them, forming a comprehensive framework (M.Baabdullah, AbdallahAlalwan, Rana, Kizgin, & Patil, 2019).

In this study, two models will be integrated; The Unified Theory of Acceptance and Use of Technology (UTAUT2) and the Information System Success Model (ISSM), to determine the factors that impact users’ satisfaction when using Ehteraz App.

2.3.1 The Unified Theory of Acceptance and Use of Technology (UTAUT2)

The application of the adoption or diffusion of innovation is considered unique in technology terms. The increasing integration of technology into people's lives has created an interest in ‘what makes the technology’ acceptable and adaptable. One of these explanations includes UTAUT, which examines the ultimate adoption of a new technology, specifically related to information systems. That is, it considers how the systems information design results in more significant system usage. (Venkatesh, Thong, & Xu, 2012)

UTAUT is specific to the acceptance of technology. It explicitly examines

factors such as user experience, perceptions of ease, and functionality intentions and behaviors. It has been developed from earlier robust theories and concepts such as the Theory of Reasoned Action (Fishbein & Ajzen, 1975) and the Theory of Planned Behaviour (Ajzen, 1991).

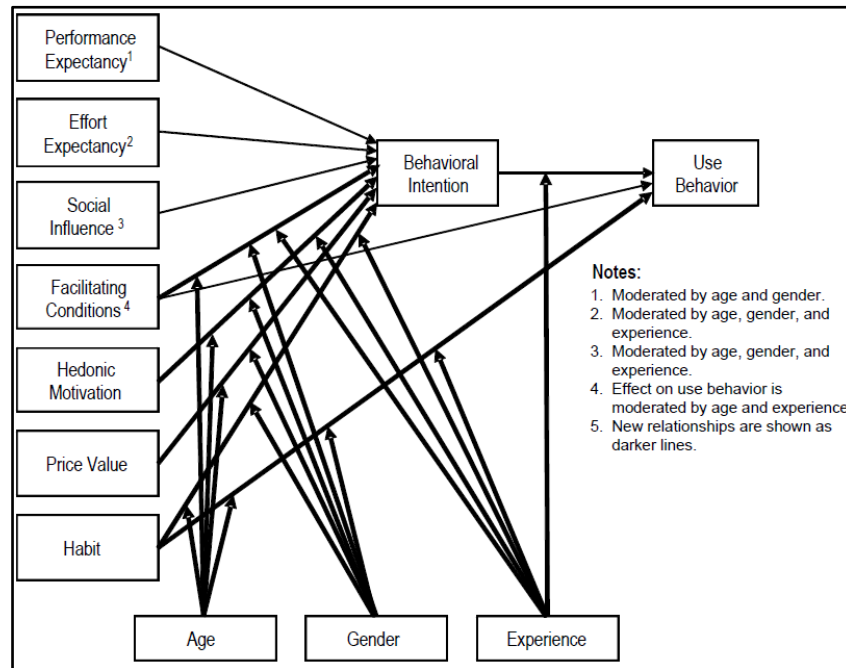


Figure 4: the UTAUT 2 Model (Venkatesh, Thong, Xu, 2012)

2.3.2 Information System Success Model (ISSM)

Although many technology acceptance models examine the perception of the use of technology, such as the Information System Success Model (Delone & McLean, 2003), there are similarities between ISSM and TAM, with aspects of use and satisfaction central to the successful acceptance and adoption of the new system. However, the ISSM is specifically about the quality of the information or system design.

DeLone & McLean's ISSM model identifies and describes the causal connections among six critical elements of IS success: information quality, system quality, system use/user satisfaction, individual impact, and organizational impact. ISSM is recognized as a valuable tool to understand better the factors that influence the acceptance and adoption of new systems, especially those related to mobile apps (Tam & Oliveira, 2017).

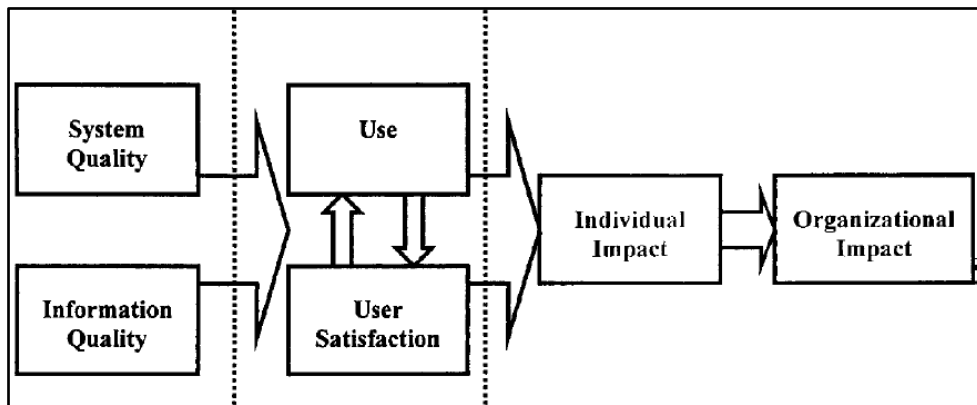


Figure 5: Information System Success Model (ISSM) (Delone & Mclean, 1992)

2.4 Constructs of the Study

This study sheds light on users' satisfaction when the Ehteraz app in Qatar integrates two models UTAUT2 and Information System Success Model (ISSM). These include the performance expectancy and effort expectancy from UTAUT2, information quality, and system quality and user satisfaction from Information System Success Model (ISSM) besides other factors such as technical experience, perceived privacy risk, trust, voluntariness, and chronic diseases.

2.4.1 Performance Expectancy (PE)

Performance Expectancy is a significant factor influencing the users' intention/satisfaction toward digital contact tracing, as indicated in previous studies. The UTAUT2 defined the performance expectancy (PE) as the extent to which the user believes using a particular technology will enhance and ease their performance in certain activities (Venkatesh, Thong, & Xu, 2012; Kharabela & Sahu 2020). Walrave, Waeterloos, & Ponnet (2021) concluded that PE is to what extent the user expects to receive benefits when using technology. Ezzaouia & Gidumal (2021) stated that the degree to use new technology brings more benefits to perform certain activities. Chopdar, Korfiatis, Sivakumar, and Lytras (2018) emphasized that PE reflects the same concept of perceived usefulness (PU) from the Technology Acceptance Model (TAM).

PE is a fundamental factor that contributes to a user's intention to new technology. Ezzaouia and Gidumal (2021) found that PE was the main factor influencing Digital Contact Tracing apps (DCTA). In other words, the more the users expect benefits from using these applications, the more they intend to use and adapt these types of apps (Ezzaouia & Gidumal, 2021). Moreover, Walrave, Waeterloos, and Ponnet (2021) stated that PE was the most significant predictor of using Covid-19 apps. Also, Walrave et al. (2020) found that if the users were persuaded about the effectiveness of DCT apps to increase the users' awareness and the potential risk to the virus, they would intend to use and adopt these applications. Chopdar et al. (2018) emphasized that if the users feel the usefulness of using mobile apps, they will be more satisfied with their use. Also, the authors supported the same findings as the study found that the consumers have a higher intention when they find shopping apps provide them with different and valuable services (Chopdar et al., 2018).

PE is determined through the benefits that users get from downloading digital contact tracing apps. Redmiles (2021) found that different benefits impact the willingness to adopt the digital contact tracing apps:

- 1- It is helpful to know the level of risk through the received notifications that imply whether or not the users have been exposed to infection.
- 2- It is helpful to know the infected hotspots to avoid
- 3- It assists the Ministry of Health (MoH) and the government in gathering the data related to Covid-19

The results are confirmed from previous studies (Li et al., 2020; Trang, Trenz, Weiger, Tarafdar, & Cheung, 2020; Walrave, Waeterloos, & Ponnet, 2021). Consequently, if users find a positive outcome from using mobile apps, they will continue to use them. Thus, we hypothesize the following:

***H1:** Performance Expectancy has a significant positive impact on users' satisfaction when using Ehteraz*

2.4.2 Effort Expectancy (EE)

Effort expectancy is another essential factor that influences the users' satisfaction when they use DCT apps. Venkatesh et al. (2012) defined effort expectancy (EE) as the degree of ease connected with users' technology usage. Walrave et al. (2020) conceptualized the EE as the extent that users use the technology that fulfills their needs with minimum effort. Furthermore, Hamid, AbdulRazak, AbuBakar, and WongAbdullah (2016) redefined the degree of associated ease of use with the self-use and remote of the mobile health system. Chopdar et al. (2018) stated that EE reflects the same concept of Perceived of easy to use (POEU) from the Technology Acceptance Model (TAM).

Effort Expectancy has an essential factor in users' intention to use digital contact-tracing apps. Ezzaouia & Gidumal (2021) found that EE is a crucial factor that impacts behavioral intention to use digital contact tracing. Therefore, mobile apps should be designed to be easy to use by users and enable them to learn and interact. Two studies, Tam et al. (2018) and Rout & Sau (2020) stated that EE positively influences intention to continue using contact-tracing apps.

Although EE was significant for Indian consumers to use mobile shopping apps, it was not among the American users. The justification behind this result is because Indian users have more experience with mobile shopping apps, and they are professional in using complex systems (Chopdar, Korfiatis, Sivakumar, & Lytras, 2018).

Conversely, a study was conducted by Alam, Hu, AbdulKaium, Hoque, & Alam (2020) in Bangladesh, targeting young people prone to technology. The study revealed that EE was an insignificant factor that impacts users' adoption, particularly mobile health apps. In justification of this is that the development of the smartphone interfaces, less effort associated with usage, and the educated young sample of students who have adequate knowledge and are technology-driven. As a result, they don't focus on the ease of mobile health apps usage (Alam et al., 2020). In this research, effort expectancy is seen as a significant predictor that impacts users' satisfaction. Thus the following hypothesis is:

H2: Effort Expectancy positively affects users' satisfaction with Ehteraz usage

2.4.3 Information Quality (IQ)

Information quality is one of the critical determinants that influence the satisfaction of users while using the Covid-19-apps. IQ is the quality of the government produces (Rai, Lang, & Welker, 2002; Stevanovic et al.,2016). Chen & Tsai (2017) stated that IQ measures the reliability, completeness, and accuracy of the generated data from the information system.

Although the accuracy of the information is fundamental to exist in Covid19-tracing apps, these apps are not accurate perfectly. Kaptchuk et al. (2020) found that tracing apps can either have a “false negative” when the apps fail to identify the exposure to coronavirus disease or a “false positive” when the users are notified they have been in contact with an infected person when they have not. Nitesh Saxena, a professor in the Department of Computer Science at the University of Alabama, said, *“what purpose will a contact tracing app serve if it traces incorrectly, creating false alarms and likely missing actual infections?”* (the University of Alabama at Birmingham, 2020).

The accuracy of the information in tracing-apps cannot be accurate perfectly as well as Covid-19 tests. Sun et al. (2021) found that 60% of the users are likely to use the digital contact tracing apps if these apps can detect and notify the users' proximity. On the other hand, in reality, this percentage declines to 31 % and 26% when the Covid-19- apps have a false negative and false positive. Besides, Sun et al. (2021) highlighted that 55% of the tracing app's users are highly concerned about the accuracy of these apps. Previous studies confirmed that accuracy problems, one of the primary users' concerns, have an important impact on users' concern to download Covid-19-tracing apps (Kaptchuk, Goldstein, Hargittai, Hofman, & Redmiles, 2020; Hargittai & Redmiles, 2020; Ezzaouia & Gidumal, 2021; Utz et al., 2021; and

Hajiheydari & Ashkani, 2018). Sun et al. (2021) found that more than 55 % of users were concerned significantly about the accuracy of apps, and 49% were markedly concerned about privacy issues of apps. Thus, the following was hypothesized:

H3: Information Quality positively affects users' satisfaction to use Ehteraz App

2.4.4 System Quality

Another determinant that has an essential effect on users' satisfaction while using the contact-tracing app is system quality. Users' satisfaction is affected by how users perceive the quality of the system. System quality is defined as essential tools and features from a particular application to meet users' expectations (Guimaraes, Armstrong, & O'Neal, 2006; Hassan & Abu Shanab, 2020). Different factors affect system quality properties such as; availability, ease of learning, usability, reliability, response time, and adaptability (Guimaraes et al., 2006).

More than one study emphasized the role of system quality as it positively influences the user's satisfaction (Chen & Tsai, 2019; Wang, Wang, Lin, & Tsai, 2019; Guimaraes al., 2018; Akinbi, Forshaw, & Blinkhorn, 2021). The results concluded that users' willingness would increase if the security concerns of the app were highlighted. Thus, SQ will positively impact customer satisfaction. In addition to that, with improving system quality, the information quality will also influence users' satisfaction. In addition, a study in Iran confirmed the significant impact of the system quality on users' satisfaction (Hajiheydari & Ashkani, 2018). However, a study compared 17 DCT apps owned by the government using the COVID Tracing App Scale (COVIDTAS) to measure and evaluate the apps in terms of data security. The study showed that the Ehteraz app scored Zero in ease of accessibility and security. (Raman, Achuthan, Vinuesa, & Nedungadi, 2021)

System quality is explicit in data misuse, fear of cyber attackers, or sharing the data with third parties (Li et al., 2021; Williams, Armitage, Tampe, & Dienes, 2021; Jonker et al., 2020). System quality positively correlated with perceived usefulness, perceived ease of usefulness, and information quality. As a result, system quality will have a parallel impact on all these variables. (Chen & Tsai, 2019). Indicating that when the users find the operation or system quality is easy to use, produce accurate information and is useful overall, they will be satisfied with system functionality. Therefore, in the research, the following hypothesis is:

H4: System Quality positively affects users' satisfaction to use Ehteraz App

2.4.5 Technical Experience (TE)

A critical factor that affects the acceptance of technology includes the users' own experiences of technology and the cost/benefit analysis of the technology. Definitions of technology experience and acceptance are diverse and overlapping. However, Nadal, Doherty, & Sas (2019) reviewed these saying: “perception of a system before use, while technology acceptance is one’s perception of the system after use” adoption is the consequence of actions. The role of user experience and the rate of adoption has been well researched. Ooi & Tan (2016) noted that the adoption of new email systems could be anticipated based on a knowledge of user experience and perceived benefits as measured through TAM. Chen & Tsai (2019) found that users' expectations of technology's outputs, specifically Information Technology, correlated to higher adoption of new systems. Both these findings indicated that users who can anticipate benefits also experienced better adoption.

Huang, Backman, Backman, McGuire, & Moore (2019) reviewed the literature on Technology Experience and resultant usage and concluded that several complex processes interact to influence and impact experience and willingness to gain a positive outcome. A recent study by Fathema & Akanda (2020) explored the relationship between adopted technology and technology. They noted that the adopted technology was typically expected to be beneficial in advance of the experience. Therefore users already had some understanding of the value before they decided to commit or adopt a new system. A prior study found that users with previous technology experience are more likely to benefit from new technology, including revolutionary such as Virtual Reality shopping assistants (Rani & Chu, 2021). Another study found that young people and users' technology experience were more likely to adopt new wearables technology (Obermeier, Jain, Auinger, & Werth, 2021).

In the digital contact tracing apps context, some tracing apps are mandatory in some countries to use. While the theory of technology experience indicates that factors such as age, previous technology experience, expected benefits support users' motivation, users in those countries don't have a choice that may impact the previous technical expertise and willingness to adopt new technology. For example, Hassan & Abu shanab (2020) researched users' satisfaction with Metrash2, a similar mandatory e-Government initiative, and found that users needed to know the system's benefits to engage fully and that the lack of understanding of the system itself was not of significance. In Qatar, the Business & Human Rights Resource Centre also draws concerns about the lack of choice in implementing the Ehteraz App, which they believe might cause problems or doubts by the populations it's designed to protect (AFP, 2020).

Contact tracing apps have mobile costs that impact the users' mobiles, especially those that rely on Bluetooth because they frequently require using Bluetooth, which negatively impacts the battery life of cell phones (Saltzman, 2021). Trang et al. (2020) found that 66 % of participants noticed DCT apps drain the battery, and 64% of users noticed how these apps impact the performance, mobile data, and data storage of their mobiles. Consequently, these negative impacts deter the users from downloading contact tracing apps. Furthermore, contact tracing apps are not compatible with some devices. Some users may not have the advantage of using these apps because their mobiles do not support or are incompatible. Technical experience is considered an essential factor in predicting users' acceptance (Redmiles, 2020; Li et al., 2020; Trang et al., 2020; Garousi, Cutting, & Felderer, 2021). Thus we hypothesize the following:

H5: Technical Experience positively affects users' satisfaction to use Ehteraz App

2.4.6 Perceived Privacy Risk (PPR)

Privacy is an essential factor influencing the satisfaction of users. Merhi, Hone, and Tarhinib (2019) defined privacy as an individual's right to manage the collection of personal, non-digital, and digital information. Moreover, it is defined as an individual's right to prevent any unapproved acknowledgment of personal data or share any personal information that causes any privacy risk (Merhi, Hone, & Tarhini, 2019). From a Digital contact tracing perspective, it has been defined as the user's awareness to control the collection of personal information in terms of health status, social interactions, location, age, name, gender, health history (Hobson et al., 2020). In the mobile app context, Balapour, Nikkhah, & Sabherwal (2020) defined PR as the individual's ability to manage and control how, to what extent, and when their personal

information is involved and used in mobile apps. Ezzaouia & Gidumal (2021) stated that perceived privacy positively correlates with users' acceptance of contact tracing apps. Balapour, Nikkhah, & Sabherwal (2020) indicated that despite the broad usage of applications for different purposes, data privacy threatens adoption and continuous intention to use apps. Also, the study revealed a significant impact with a negative correlation on perceived security (Balapour, Nikkhah, & Sabherwal, 2020).

Data privacy is fundamental in perceived risks. If the privacy has not been explained adequately, it decreases the intention to adopt m-health apps (Rout & Sahu, 2020). A recent study conducted by Rout and Sahu (2020) about Aarogya Setu (Singapore Apps for Covid-19) showed a significant and negative influence on users' intention to contact tracing apps. In other words, if privacy risks are weighted more than the benefits of the Aarogya app, the users will not intend to use the app. In addition, Klaver, Van de Klundert, Van de Klundert, and Askari (2021) indicated that perceived privacy risk has a significant and negative correlation with users' intention to use m-health apps. A more recent study by Walrave, Waeterloos, and Ponnet (2021) stated that applications related to privacy concerns impacted significantly but negatively on the users' intention. Also, Kostka and Habich-Sobiegalla (2020) found that DCT apps that preserve users' privacy concerns, such as no location via GPS or Bluetooth, and decentralized data storage can positively impact users' willingness to adopt these apps. Conversely, DCT apps that are based on centralized architecture will decrease to use of the application. (Li et al., 2021).

Recent studies evaluated Ehteraz App, particularly in the context of privacy compared to other contact tracing apps. Raman, Achuthan, Vinuesa, and Nedungadi (2021) scored the Ehteraz app as Zero in privacy and data management based on the COVIDTAS parameter. Another research reviewed 61 published studies about contact tracing apps done by Akinbi, Forshaw, and Blinkhorn (2021), highlighting the different challenges of these apps. The study indicated that almost half, 45 % from primary studies, were concerned about the users' privacy. Another study published by Sun et al. (2021) categorized the privacy exposure level of Ehteraz's users at a high-risk level due to the app sending privacy information of the user such as the user's Qatari ID, name, contact number during the registration to the central server.

Krehling and Essex (2021) stated that the Ehteraz app ranked the app's privacy as low compared to 55 contact tracing apps. Contrary to recent research, Fox, Clohessy, Van Der Werff, Rosati, and Lynn, 2021 stated that privacy concerns have a weak impact on users' acceptance to use DCT apps. In this study, PPR is a significant factor in predicting public acceptance. Hence, the following hypothesis assumption:

H6: Perceived Privacy Risk positively affects users' satisfaction to use Ehteraz App

2.4.7 Trust (TR)

While the term trust is widely used, its meaning is complex and nebulous, making it both difficult to define and more difficult to measure. However, in the case of trust applied to technology, e.g., eGovernment and m-Government, Almarashdeh (2018) and, El-Kiki and Lawrence (2007) suggest most literature follows the institutional view of trust. McKnight and Chervany (1996) tried to capture the complexity and structure of thinking about trust in management. Hence the

development of meaning had neither coagulated nor dissipated over that period of 20 years.

Ejdys (2018) showed that while IT systems could be introduced to government institutions, concerns about trust by the managers and users need to be considered in implementing new systems using technology. As the world moves into the later pandemic stages, Pratona (2021) argues that the economy and businesses need a new attitude to trust so that risk can become part of strategic planning and help create innovative behaviors, rather than just reasons, to reduce actions.

Damnjanovic's work suggests lack of trust might mean citizens act to circumvent the technology, such as taking screenshots to mask COVID health status. In very recent work, Akinbi, Forshaw, and Blinkhorn (2021) reviewed the global literature on contact-tracing apps and noted that while many countries have an active and willing endorsement of tracking apps, others didn't report. It implies that where some populations willingly adopt the apps, others are more reluctant. France is an interesting case as it not only resists Government interference France also has one of the lowest vaccination rates in Europe – of any vaccine, not just COVID.

A study in Poland showed that users who trust the government and official authorities intend to accept digital surveillance technologies more than those in individualistic cultures (Wnuk, Oleksy, & Maison, 2020; Bradshaw et al., 2021). Therefore, it can be noticed that the collectivist societies such as China trust highly in the government, and supporting contact tracing apps is the highest. On the other hand, the fear of government surveillance is more evident in societies such as the US and Europe despite the app designs in these countries concerned more about the privacy-protective (Kostka & Habich-Sobiegalla, 2020; Guillon & Kergall, 2020; Jonker et al., 2020; Hobson et al., 2020). Another study in Australia indicated that one of the

main reasons behind not accepting to adopt the contact tracing apps is distrust in the government (Thomas, Michaleff, Greenwood, Abukmail, & Glasziou, 2020). Also, a study in Switzerland explored that users who trust the government and health care system are more likely to download DCT apps (Von Wyl et al., 2021). Moreover, studies regarding m-health apps showed that there is a positive correlation between trust and users' adoption (Oldeweme et al., 2020; Klaver et al., 2021; Deng, Hong, Ren, Zhang, & Xiang, 2018; Guo, Zhang, & Sun, 2016; Deng, Liu, & Hinz, 2015). Accordingly, the following hypothesis:

H7: Trust positively affects users' satisfaction when they use Ehteraz App

2.4.8 Users' Satisfaction (US)

User satisfaction is central to the theme of all willing consumer choices. A consumer will not usually choose a product or service that they expect might NOT meet or exceed their needs. When they experience a product or service, they will not be satisfied if they perceive that the experience was less than their expectations. This concept of satisfaction is well established as the difference between expectations and perceptions (Parasuraman, Zeithaml, & Berry, 1985). However, the concept can now be revised for the unique context in which technology and complexity mean users don't usually know what to expect. Secondly, users don't have a choice to use technology willingly.

In the context of Digital contact tracing apps, some mandatory apps to download and use during the pandemic are a case in point. There is a large body of knowledge about technology and user satisfaction in the health field. It is helpful as users benefit from the technology even if they are unwilling, which informs our understanding of the possible lessons for mandatory apps. Ho, Ho, and Chung (2019) illustrated that

patients' user experience resulted in greater engagement and enjoyment. Wanti, Insan, and Prasetya (2020) noted that integrated systems that linked users and their remote technology to centralized systems delivered benefits that users perceived.

Technology has problems of expectation among new users for such things as food delivery apps (Choi, 2020); fitness apps (Busch, Utesch, & Strauss, 2020); COVID-focused contact tracing apps (Raman, Achuthan, Vinuesa, & Nedungadi, 2021). Raman et al. (2021) suggested that the satisfaction of the technology may be more influenced by the culture and expectation of the society rather than the technology itself. Therefore, research measuring user satisfaction against the technological performance of track-and-trace apps demonstrated that this connection was complex. India scored user satisfaction with Apps highly compared to the international results from countries with technically superior apps.

2.4.9 Moderation Effects

There are two moderators effects; chronic diseases and voluntariness. Chronic diseases are complex and typically difficult to define. For example, Souril et al. (2017) referred to no accepted definition, but terms such as long-lasting, underlying, or complex combinations of conditions are aspects of chronic. Barnett et al. (2012) lancet article listed over 40 diseases that can be categorized as chronic. This diversity of definition is important to understand. In some cases, long-term illness, defined as chronic, may not have a direct physical consequence and instead have a much more powerful psychological impact on concurrent responses to additional infections.

In the case of susceptibility to COVID, it is already known that chronically ill patients are more vulnerable to infection, and the morbidity and mortality of chronically ill patients are less favorable. Haybar, Kazemnia, and Rahim (2020) noted

that in the context of COVID, the investigations of COVID-19 infection found that people with an underlying illness are more possibly to die by virus infection.

According to Tapp, Dulin, and Plescia (2018), patients with chronic issues utilize over 85% of healthcare resources. Balancing the cost of resourcing healthcare system provide vs. self-management, shared decision-making, and peer support improves medical treatment and quality of life. Thus, in a pandemic, it is unlikely that central/national healthcare resources could reasonably be expected to deliver quality healthcare to chronically ill people properly.

The implications of COVID on the chronically ill will include an intention to make self-determined health-related judgments about individual needs. For instance, how safe people feel in public, how important safety and security people feel, how concerned they care about others, how important isolation is (self-isolation), what reasonable precautions can be made, and how reliable are they?. Based on recent studies, users who feel that their health is in danger were more likely to accept and intend to adopt DCT apps. While, the users who don't care about their health or to be infected with COVID-19 have a lower motivation to download and use these apps (Kostka & Habich-Sobiegalla, 2020; Munzert, Selb, Gohdes, Stoetzer, & Lowe, 2021). However, other studies in Germany and Netherlands showed that the health conditions have a very weak correlation and insignificant predictor to adopt DCT apps (Kaspar, 2020; Munzert, Selb, Gohdes, Stoetzer, & Lowe, 2021).

The second moderator of public health is voluntariness. A likely consideration of the adoption or acceptance of new technology will relate to the willingness of the user to use the technology given a choice they have, and this is called voluntary action (Schultze-Kraft, Parés Pujolràs, Matic, Haggard, & Dylan Haynes, 2020). In a democratic state, the population may choose not to accept technology, including

technology designed to protect themselves, such as vaccines for COVID or Technology designed to protect society. Even when the technology is a legal requirement, it is likely to be some resistance to its acceptance and adoption. Bonnevie, Gallegos-Jeffrey, Goldbarg, Byrd, and Smyser (2021) cited recent research illustrating the impact of social influencers on vaccine opposition. Also, Altmann et al. (2020) confirmed that voluntariness is an essential predictor of adopting DCT apps. It is reconfirming the result with a recent study (Lucivero et al., 2020). The resistance to the adoption of contact tracing apps is also documented by Jacob and Lawarée (2021), and Abuhammad, Khabour, and Alzoubi (2020) demonstrated that not all users would voluntarily use technology even to protect themselves. Thus, the following hypothesis is:

H8: Chronic disease status will significantly moderate the relation between the predictors and the satisfaction.

H8a: Chronic disease will significantly moderate the relation between Performance Expectancy and Satisfaction.

H8b: Chronic disease will significantly moderate the relation between Effort Expectancy and Satisfaction.

H8c: Chronic disease will significantly moderate the relation between Information Quality and Satisfaction.

H9: Voluntariness will significantly moderate the relation between the predictors and the satisfaction

H9a: Voluntariness will significantly moderate the relation between System Quality and Satisfaction.

H9b: Voluntariness will significantly moderate the relation between Technical Experience and Satisfaction.

H9c: Voluntariness will significantly moderate the relation between Perceived Privacy Risk and Satisfaction.

H9d: Voluntariness will significantly moderate the relation between Trust and Satisfaction.

2.5 Proposed Theoretical Framework

Figure 9 shows the conceptual framework that illustrates the different relations between the other variables based on the above research hypotheses and previous research problems. Notably, the research contains one dependent variable, two moderating variables, and seven independent variables. Figure 9 highlights these variables. The conceptual framework seeks to understand these essential independent factors and users' satisfaction with Ehteraz App. Furthermore, the chronic disease variable is proposed as a moderator that impacts the relationship between performance expectancy, effort expectancy, and information quality with users' acceptance. Moreover, the voluntariness variable is structured as a moderator influence the relation between system quality, technical experience, perceived privacy risk, and trust with users' satisfaction when using Ehteraz app.

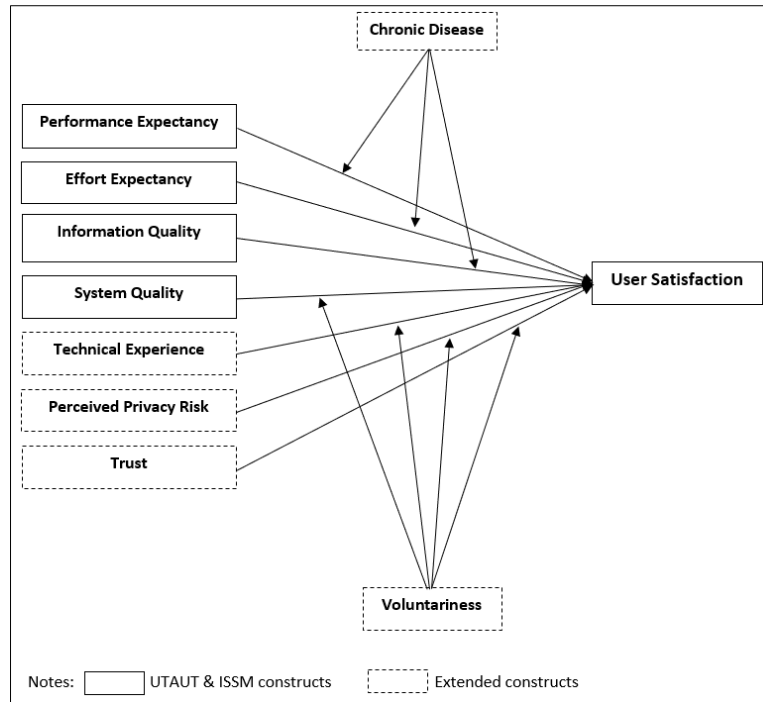


Figure 6: Proposed Research Model

CHAPTER 3: RESEARCH METHODOLOGY

In this chapter, the details of the methodology employed will be discussed to evaluate the main key drivers that influence the users' acceptance when using the Ehteraz app and identify the associations' impact on the relationship between independent constructs and dependant constructs. Therefore, this chapter discusses research design, the proposed research model with research hypotheses, the instrument, the data collection and sampling technique, and the statistical techniques employed.

3.1 Research Design

This research conducted a descriptive correlational method to measure the relationship between the independent variables (PE, EE, IQ, SQ, TE, PPR, TR) with the dependant variable US. Furthermore, to describe the influence of the moderators on the relationship between the independent and dependant variables. Consequently, it will assist in shedding light on the factors that have a positive and significant impact on user satisfaction and will provide a hint to the Qatari government to better insight to increase the adoption of Ehteraz. As a result, the hypotheses will be tested and proven, or rejected.

3.2 Research Model and hypotheses

Figure 10 shows essential predictors of users' acceptance when using the Ehteraz app, as highlighted in chapter 2, and were not involved in the previous integrated models such as (TE, TR, PPR) as independent variables and CD and V as moderators factors. Other constructs were applied and used from the integrated models, and some predictors were eliminated from UTAUT. For instance, social influence, facilitating condition, motivation, and price are removed because they don't meet the characteristics of the Ehteraz app in terms of it being a governmental app,

and it is mandatory to download and use by all the citizens and residents. Furthermore, some variables were adopted from the integrated models as they showed their significant relationships with the research's scope.

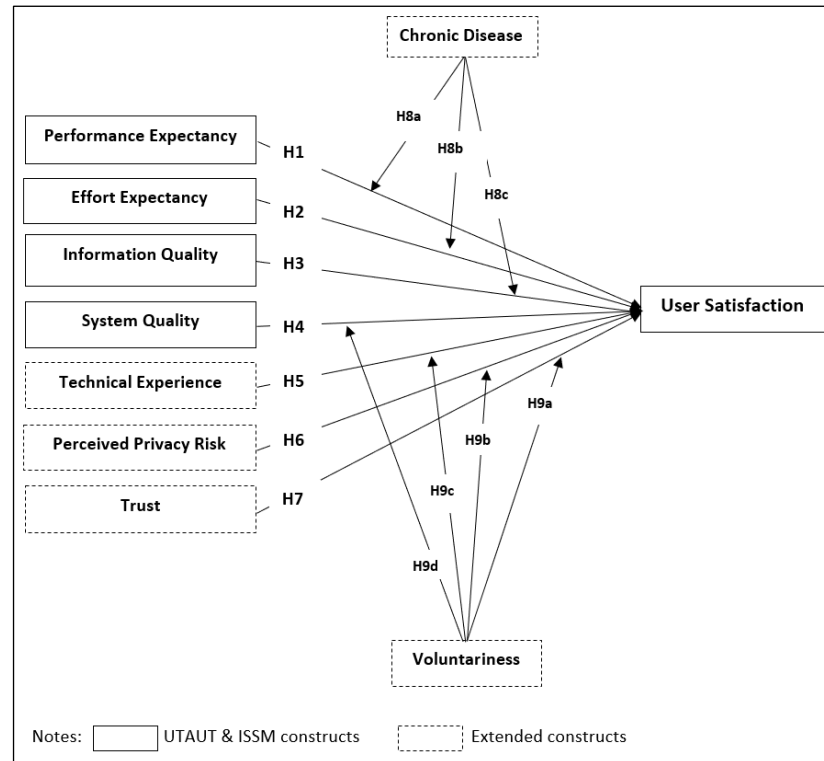


Figure 7: Proposed Research Model with the hypotheses

3.3 Instrument

In this study, a quantitative survey was used to measure the rate of users' acceptance toward the Ehteraz app by gathering primary data about their inputs. A structured questionnaire was used in the study. The questionnaire was formulated in English and translated to Arabic to avoid language restrictions. The survey's link was generated via Google Drive and shared through different communication channels like WhatsApp, Instagram, and Facebook. The questionnaire included a consent form explaining the objectives and purpose of the study and mentioning that the participation was anonymous and voluntary. The questions were adapted from previous studies, and their conceptual and operational definitions are presented in

Appendix A. A sample of the survey in English and Arabic are shown in Appendix B & Appendix C

The survey has three main parts:

1. **Eligibility to use Ehteraz App:** this section includes check-box questions, either Yes or NO, where the respondents indicate whether or not they have a smartphone. This question will exclude the participant who lives in Qatar and is above 18 years old but does not have a smartphone.
2. **Variables influence the users' satisfaction when using Ehteraz App:** the core of the research and the essential section. The questions were developed based on a Likert scale, where the participants ranked each statement from 1 (Strongly disagree) to 5 (strongly agree). This part consists of Independent variables, Moderating variables, and Dependent variables as the following:
 - Independent variables: variables impact the users' satisfaction when they use Ehteraz App. These variables were performance expectancy (PE), Effort Expectancy (EE), Information Quality (IQ), System Quality (SQ), Technical Experience (TE), Perceived privacy Risks (PPR), Trust (TR)
 - Moderating variables: check-boxes either Yes or No about the Voluntariness and Chronic Disease
 - Dependent Variable: users' satisfaction
3. **Demographic Information:** questions were asked about age, gender, educational level, occupation, status, and nationality.

Qatar University Institutional Review Board Committee (QUIRB) reviewed and approved the survey under QU-IRB 1503-E/21. It is presented in Appendix D. The purpose of this approval is to validate the study as it follows ethical practices.

3.4 Data Collection & Sampling Technique

The study was conducted through an online survey distributed in Qatar. The population included all citizens and residents who live in Qatar from 18 and above years old, particularly users eligible to use Ehteraz. A convenience sampling technique was used in this study to ensure that all the nationalities, gender, and groups were appropriately covered. Participation in this study was voluntary, and the participants received all required information about the study. The consent form was provided to proceed with the participation in the survey with explained objectives in the questionnaire's introduction. Hair, Hult, Ringle, & Sarstedt (2014) recommended that the minimum sample size was estimated based on 10- times rule. Therefore, this study calculated the minimum sample size to be (ten times) 10×34 (the number of survey questions)=340 participants had to be surveyed as a minimum, and the sample size was 605 respondents.

The data was collected from the 17th of March 2021 to the 17th of October 2021, which resulted in 550 valid. The data was extracted in an Excel sheet to be prepared and moved into SPSS for analysis.

3.5 Statistical Techniques

In this study, different statistical techniques were used to analyze the data. First, the respondents' demographic profile was used to compare the frequencies among their age, gender, education, occupation, status, and nationality. Second, the reliability test mentioning to Cronbach's Alpha and. Third, the correlation between variables to know to what extent they are linearly related to each other. Fourth, the descriptive statistics to know the mean and standard deviation for all the independent and dependent variables. Last, regression analysis without moderators effect to investigate the influence of the independent variables on the dependent variable, and regression analysis with the moderator effects to know to the moderators' role of (V and CD) on the relation between the independent variables dependent variable.

CHAPTER 4: DATA ANALYSIS

4.1 Profile of Respondents

Table 1 described the sample distribution based on different categories such as age, gender, education, occupation, status, and nationality. It showed that 53 (10%) of the users were between 18 to 25 years old. The majority of participants (n=377; 68 %) were between 26 to 40 years old, and 120 (22 %) of the interviewees belonged to 41 and above years old. In terms of gender, the percentage of males was more remarkable than females (309; 56 %, 241; 44%) respectively. Regarding education, 73 (13%) of responses obtained a high school and diploma. Most of the participants (385; 70%) got a bachelor's degree, 80 (15 %) with a master's degree, and 12 (2 %) had a Ph.D. Relating to occupation level, 6 % of users still were students. More than half, 68 % of users were employed, 12 % were self-employed and followed by 14 % of interviewees chose other occupations. Concerning the status of users, 142 (26 %) were single, while the vast majority, 408 (74 %), were married. In terms of nationality, most of the respondents, 86 %, were non-Qatari, while 14 % only were Qatari. Regarding installing the Ehteraz app, if it is voluntary, the majority of respondents, 61 %, would intend to install the app, while 39% wouldn't. Lastly, 89 % of the users don't suffer from any chronic diseases, and only 11% for those who have a chronic illness.

Table 1. Demographic Profile of the Respondents (N = 550)

Demographic	Description	Frequency	(%)
Age	18 to 25	53	10
	26 to 40	377	68
	41 and above	120	22
Gender	Male	309	56
	Female	241	44
Occupation	Student	35	6
	Employee	373	68
	Self-employed	67	12
	Other	75	14
Status	Single	142	26
	Married	408	74
Nationality	Qatari	76	14
	Non-Qatari	474	86
Would you install Ehteraz if voluntary	Yes	336	61
	No	214	39
Suffering from chronic diseases	Yes	60	11
	No	490	89

4.2 Reliability and Convergent Validity Analysis

Reliability analysis was conducted in this study to measure the internal consistency of the predictors' items. Also, to assist us whether or not our Likert- scale questions are reliable using the Cronbach's alpha. Many sources recommended the acceptable value for Cronbach's alpha starting from 0.7 and above. As shown in table 2, most of the variables were above 0.7 except one variable technical experience (TE). However, as per the acceptance reliability of 0.7 or 0.6 (Griethuijsen et al., 2015), TE can be accepted. It means that there is internal consistency among the items of each variable, and all the research variables are reliable.

Table 2. Reliability Analysis

Variables	Cronbach's α	N of items
Performance Expectancy (PE)	0.831	5
Effort Expectancy (EE)	0.770	4
Information Quality (IQ)	0.898	4
System Quality (SQ)	0.869	5
Technical Experience (TE)	0.646	5
Perceived Privacy Risk (PPR)	0.846	4
Trust (TR)	0.924	4
User satisfaction (US)	0.906	3

The results in table 3, convergent validity was demonstrated to verify intercorrelations among the items for each construct. This verification can be measured through Factor Loading, Composite Reliability (CR), and Average Variance Extracted (AVE). As per the findings below, the convergent validity is confirmed as the FC value of most items exceeded the minimum criterion of 0.5 (Hair, Anderson, Tatham, & Black, 1995). The CR values are more significant than the acceptance criterion of 0.6, and the AVE of all the variables is close to the minimum criterion of 0.4 (Fornell & Larcker, 1981). Thus, all the items are reliable and valid.

Table 3. Convergent Validity and Reliability of the Measurement Model

Variables	Indicator	Loading	Composite Reliability (CR)	Cronbach's α	Average variance Extracted (AVE)
Performance Expectancy (PE)	PE1	0.626	0.802	0.831	0.450
	PE2	0.592			
	PE3	0.751			
	PE4	0.717			
	PE5	0.652			
Effort Expectancy (EE)	EE1	0.677	0.767	0.770	0.452
	EE2	0.633			
	EE3	0.701			
	EE4	0.676			
Information Quality (IQ)	IQ1	0.824	0.862	0.898	0.612
	IQ2	0.830			
	IQ3	0.810			
	IQ4	0.651			
System Quality (SQ)	SQ1	0.642	0.807	0.869	0.455
	SQ2	0.663			
	SQ3	0.695			
	SQ4	0.715			
	SQ5	0.655			
Technical Experience (TE)	TE1	0.567	0.769	0.646	0.410
	TE2	0.842			
	TE3	0.703			
	TE4	0.569			
	TE5	0.450			
Perceived Privacy Risk (PPR)	PPR1	0.779	0.832	0.846	0.555
	PPR2	0.795			
	PPR3	0.617			
	PPR4	0.776			
Trust (TR)	TR1	0.796	0.860	0.924	0.607
	TR2	0.802			
	TR3	0.846			
	TR4	0.660			
User Satisfaction (US)	US1	0.743	0.780	0.906	0.541
	US2	0.739			
	US3	0.725			

4.3 Testing Research Hypotheses

Pearson correlations were conducted, highlighting the mean and standard deviation to measure the inter-construct correlations among the factors influencing the users' satisfaction and to check the multicollinearity for all the variables based on a sample size of 550.

4.3.1. Correlation Analysis for Hypothesis

Table 4. Descriptive Statistics and Intercorrelations (N = 550)

Descriptive statistics			Correlations								
Variable	Mean	SD	PE	EE	IQ	SQ	TE	PPR	TR	US	
PE	3.6116	0.97697	Pearson Correlation	1	.653**	.625**	.582**	-0.017	-.162**	.547**	.657**
			Sig. (2-tailed)		0.000	0.000	0.000	0.694	0.000	0.000	0.000
			N	550	550	550	550	550	550	550	550
EE	4.0473	0.80302	Pearson Correlation	.653**	1	.640**	.718**	-0.037	-.157**	.497**	.601**
			Sig. (2-tailed)	0.000		0.000	0.000	0.392	0.000	0.000	0.000
			N	550	550	550	550	550	550	550	550

Descriptive statistics			Correlations								
Variable	Mean	SD		PE	EE	IQ	SQ	TE	PPR	TR	US
IQ	3.7986	0.96502	Pearson Correlation	.625**	.640**	1	.665**	0.016	-.143**	.594**	.596**
			Sig. (2-tailed)	0.000	0.000		0.000	0.703	0.001	0.000	0.000
			N	550	550	550	550	550	550	550	550
SQ	3.8644	0.92848	Pearson Correlation	.582**	.718**	.665**	1	-0.041	-.178**	.616**	.674**
			Sig. (2-tailed)	0.000	0.000	0.000		0.335	0.000	0.000	0.000
			N	550	550	550	550	550	550	550	550
TE	3.7062	0.84642	Pearson Correlation	-0.017	-0.037	0.016	-0.041	1	.319**	-0.079	-0.073
			Sig. (2-tailed)	0.694	0.392	0.703	0.335		0.000	0.066	0.089
			N	550	550	550	550	550	550	550	550

Descriptive statistics			Correlations								
Variable	Mean	SD		PE	EE	IQ	SQ	TE	PPR	TR	US
PPR	3.1250	1.15112	Pearson Correlation	-.162**	-.157**	-.143**	-.178**	.319**	1	-.379**	-.254**
			Sig. (2-tailed)	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
			N	550	550	550	550	550	550	550	550
TR	3.4382	1.07782	Pearson Correlation	.547**	.497**	.594**	.616**	-0.079	-.379**	1	.769**
			Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.066	0.000	0.000	0.000
			N	550	550	550	550	550	550	550	550
US	3.4212	1.05647	Pearson Correlation	.657**	.601**	.596**	.674**	-0.073	-.254**	.769**	1
			Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.089	0.000	0.000	0.000
			N	550	550	550	550	550	550	550	550

** . Correlation is significant at the 0.01 level (2-tailed).

- **Performance Expectancy (PE):** had a mean of 3.6116 with SD= 0.97697. It means users were likely to agree that the Ehteraz app is valuable and improve their knowledge about the possibility of being infected by Covid-19. There was a moderate positive correlation of 0.657 between PE and US.
- **Effort Expectancy (EE):** PE had a mean of 4.0473 with SD= 0.80302. most users agreed that the Ehteraz app is easy to learn and use. There was a moderate positive correlation of .601 between the EE and US.
- **Information quality (IQ):** IQ had a mean of 3.7986 with SD=0.96502. The average was close to 4, indicating users' agreement with IQ statements about the Ehteraz app. There was a moderate positive association of .596 between IQ and US.
- **System Quality (SQ):** SQ had a mean of 3.8644 with SD=0.92848. Hence, the respondents tend to accept that the Ehteraz app is secure. There was a moderate positive correlation of .674 between SQ and the US.
- **Technical Experience (TE):** TE had a mean of 3.7062 with SD= 0.84642. there was a negligible correlation of -0.073 between TE and US.
- **Perceived Privacy Risk (PPR):** PPR had a mean of 3.1250 with SD= 1.15112. It implies that the public was slightly concerned about their data in Ehteraz app. There was a negligible association of -.254 between PPR and US.
- **Trust (TR):** had a mean of 3.4382 with SD=1.07782. The participants considered to some extent that Ehteraz is trustworthy. There was a high positive correlation of .769 between TR and the US.
- **User Satisfaction (US):** has a mean of 3.4212 with SD=1.05647. It means users are likely to accept the Ehteraz app.

To conclude the results, there is no multi-collinearity as all the associations are below 0.8. Furthermore, there are different levels of correlation between independent variables with the dependent variable.

- most the variables had a moderate positive correlation between the dependent variables US and independent predictors such as PE ($r = .657$), EE ($r = .601$), IQ ($r = .596$), SQ ($r = .674$). these relationships are statistically significant ($p < .001$)
- There was a high positive correlation between the US and TR ($r = .769$), and statistically significant ($p < .001$)
- The associations between TE and US & PPR and US were negligible correlation with ($r = -0.073$) and ($r = -.254$) respectively. The relationship between the PPR and US is statistically significant ($p < .001$). However, the relationship between TE and US is not significant as the p-value exceeded the confidence level ($p > .05$).

4.4 Regression Analysis

In regression analysis, the coefficients and P-values are fundamental indicators to describe the mathematical and robust relationship between independent and dependent variables. This study conducted multiple regression without the moderators' effects and the moderators' role to test the hypotheses and answer the research questions.

4.4.1 Regression Analysis for the Independent Variables

As shown in table 5, the results indicated 70 % ($R^2 = 0.70$) of the data fit the proposed research model. It means that the adjusted R^2 of 0.70 of the variances of users' satisfaction that explained by all independent variables (PE, EE, IQ, SQ, TE, PPR, and TR)

Table 5. ANOVA of the Dependent Variable and Independent Variables

ANOVA						
Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	428.886	7	61.269	180.609	<.001 ^b
	Residual	183.867	542	0.339		
	Total	612.753	549			

a. Dependent Variable: US
b. Predictors: (Constant), EE, TE, PPR, TR, PE, IQ, SQ

Table 6. Model Summary for All Variables

Regression statistics	
Multiple R	.84
R^2	.70
Adjusted R^2	.70
Standard error	0.58
Observations (<i>N</i>)	550

Table 7 revealed that four out of seven factors significantly contributed to users' satisfaction when using the Ehteraz app, whereas three elements didn't. PE, EE, SQ, and TR are statistically significant with the users' acceptance to use the Ehteraz app at confidence levels between $p < .001$ and $p < .05$. Conversely, TE, PPR, IQ as their p values above the significant level $p > .05$. There is no evidence that TE, PPR, IQ contribute to users' acceptance of the Ehteraz app. As a result, the changes in (TE, PPR, IQ) are not associated with the difference in users' satisfaction.

Tables 7 and 8 indicated that the four independent variables (PE, EE, SQ, TR) are significant predictors and have a high statistically significant impact on users' acceptance of the Ehteraz App. The strongest predictor was TR ($\beta_1 = 0.489, p < .001$), followed by PE ($\beta_2 = 0.225, p < .001$). then, SQ ($\beta_3 = 0.176, p < .001$), and EE ($\beta_4 = 0.093, p = .01$). The analysis revealed that (PE, EE, SQ, TR) contributed to users' satisfaction. Furthermore, they can be predicted by the linear combination of these variables. Consequently, the overall multiple regression equation is:

$$US = -0.293 + (0.243 PE) + (0.106 * EE) + (0.201 * SQ) + (0.480 * TR)$$

Table 7. Coefficients of the Dependent Variable and Independent Variables

Coefficients						
Model	Unstandardized		Standardized Coefficients		t	Sig.
	Coefficients		Beta			
	B	Std. Error				
(Constant)	-0.312	0.186			-1.674	0.095
1 PE	0.259	0.037	0.24		7.03	0.000
IQ	-0.028	0.039	-0.026		-0.712	0.477
SQ	0.212	0.044	0.187		4.819	0.000
TE	-0.033	0.031	-0.027		-1.069	0.286
PPR	0.025	0.025	0.028		1.025	0.306
TR	0.497	0.034	0.507		14.758	0.000
EE	0.103	0.05	0.078		2.068	0.012

a. Dependent Variable: US

Table 8. Coefficients of significant variables

	Coefficients	Standard Error	t Stat	P-value	Lower 95.0%	Upper 95.0%
Intercept	-0.293	0.117	-2.499	0.013	-0.523	-0.063
PE	0.243	0.036	6.753	0.000	0.173	0.314
EE	0.106	0.042	2.516	0.012	0.023	0.188
SQ	0.201	0.042	4.832	0.000	0.119	0.282
TR	0.480	0.031	15.701	0.000	0.420	0.540

Table 9. Summary of Hypotheses Testing

Hypotheses	β	P-value	Results
H1: Performance Expectancy has a significant positive impact on users' satisfaction when using Ehteraz	0.240	0.000	Supported, accepted
H2: Effort Expectancy has a significant positive impact on users' satisfaction when using Ehteraz	0.078	0.039	Supported, accepted
H3: Information Quality has a significant positive impact on users' satisfaction when using Ehteraz.	-0.026	0.477	Not supported, rejected
H4: System Quality has a significant positive impact on users' satisfaction when using Ehteraz.	0.187	0.000	Supported, accepted
H5: Technical Experience has a significant positive impact on users' satisfaction when using Ehteraz.	-0.027	0.286	Not supported, rejected
H6: Trust has a significant positive impact on users' satisfaction when using Ehteraz.	0.507	0.000	Supported, accepted
H7: Privacy has a significant positive impact on users' satisfaction when using Ehteraz	0.028	0.306	Not supported, rejected

4.4.2 Multiple Regression with the Moderator effects

To test the influence of the moderating factors on the relation between the related predictors to users' acceptance and users' satisfaction when using the Ehteraz app, the regression analysis run, particularly multiple regression coefficients to measure the role of the moderators between the predictors and dependent variable.

New variables were created for all variables to multiply the moderators' values. So, CD multiplied by the independent variables it moderated, which is (PE and EE). Also, V multiplied by the independent variables moderated (SQ and TR). As shown in table 10, the results indicated that both chronic diseases and voluntariness have no

impact on the relationship between the predictors toward the users' acceptance to use Ehteraz app as their p-values were above the confidence level of 0.05.

Table 10. Multiple Regression with the Moderator effects

Constructs	Coefficients ^a						Collinearity Statistics	
	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.	Tolerance	VIF	
	B	Std. Error						
PE	0.523	0.047	0.484	11.241	0.000	0.508	1.968	
EE	0.381	0.057	0.290	6.703	0.000	0.504	1.983	
SQ	0.330	0.049	0.290	6.698	0.000	0.315	3.173	
TR	0.451	0.048	0.460	9.351	0.000	0.243	4.108	
PExCD	-0.263	0.143	-0.313	-1.848	0.065	0.033	30.538	
EExCD	0.177	0.167	0.222	1.061	0.289	0.022	46.458	
SQxV	-0.022	0.072	-0.043	-0.299	0.765	0.028	35.480	
TRxV	0.089	0.064	0.170	1.391	0.165	0.040	25.207	

a. Dependent Variable: US

Table 11. Summary of Hypotheses Testing

Hypotheses	β	P-value	Results
H8a: Chronic disease will significantly moderate the relationship between Performance Expectancy and Satisfaction	-0.313	0.065	Not supported, rejected
H8b: Chronic disease will significantly moderate the relationship between Effort Expectancy and Satisfaction	0.222	0.289	Not supported, rejected
H8c: Chronic disease will significantly moderate the relationship between Information Quality and Satisfaction	-	-	Not tested
H9a: Voluntariness will significantly moderate the relationship between System Quality and Satisfaction	-0.043	0.765	Not supported, rejected
H9b: Voluntariness will significantly moderate the relationship between trust and Satisfaction	0.170	0.165	Not supported, rejected
H9c: Voluntariness will significantly moderate the relationship between Technical Experience and Satisfaction	-	-	Not tested

Table 11. Summary of Hypotheses Testing (continued)

Hypotheses	β	P-value	Results
H9d: Voluntariness will significantly moderate the relationship between perceived privacy risk and Satisfaction	-	-	Not tested

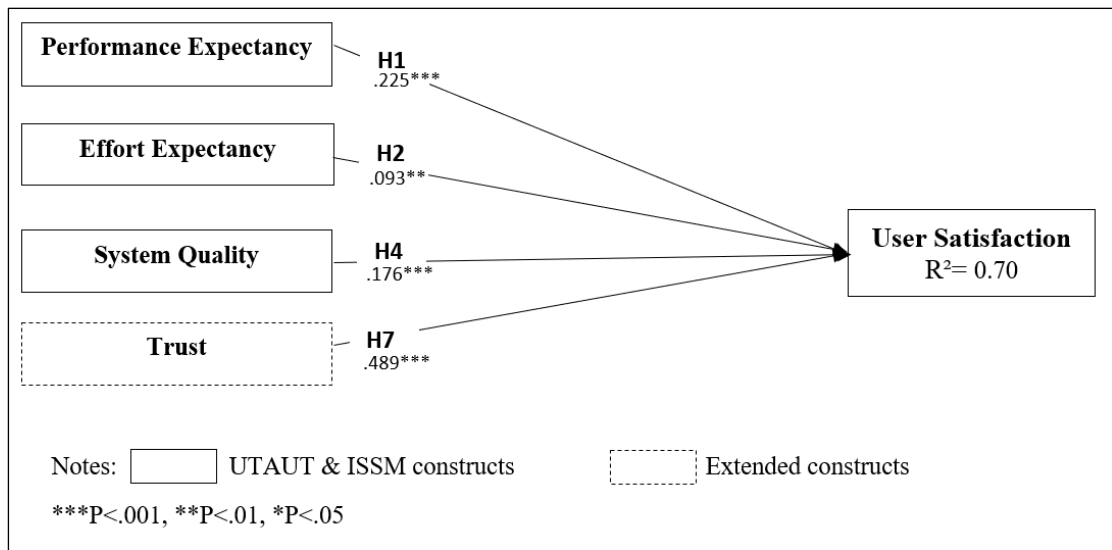


Figure 8: Research Model

CHAPTER 5: DISCUSSION AND CONCLUSION

5.1 Discussion

Understanding the users' intention to adopt and use digital contact tracing apps is crucial and fundamental to understand and consider. So, understanding the predictors that can evoke the users' willingness to use these apps is an excellent strategy to be formulated. Of course, the predictors may vary among different cultural contexts. In this reach, we explore the predictors that impact the users' willingness to use the Ehteraz app by reviewing the literature reviews and developing and integrated frameworks that explain the factors of users' satisfaction when using the Ehteraz app. We rely on UTAUT and ISSM to build our version of the integrated models for the Ehteraz app.

This study focused on three main pillars. Firstly, different predictors influence the users' acceptance to use the Ehteraz app. Secondly, the role of chronic diseases would impact the relationship between PE, EE, IQ, and US. The third one is that voluntariness would evoke the relation of SQ, TE, TR, PPR toward the US. Based on our investigation, the results indicated that PE, EE, SQ, TR associated positively and highly significantly with the users' satisfaction when using the Ehteraz app. On the other hand, IQ, TE, and PPR were not associated or impacted users' acceptance.

The first two factors adopted from UTAUT, namely performance expectancy and effort expectancy, participated in our framework to examine the users' perception to adopt the Ehteraz app. The results presented in this study showed that PE and EE are significant predictors for the users' acceptance when using the app, as hypothesized H1 and H2 in this research. These findings were consistent with what Ezzaouia and Gidumal (2021), Waeterloos, and Ponnet (2021), Redmiles (2021), Rout & Sau (2020), Chopdar et al. (2018), and Tam et al. (2018) found. However, our

finding contradicted Alam et al. (2020) as he discovered that EE is an insignificant predictor of mobile health apps, especially among young people. A possible illustration is that the research received very few responses from young people (10%) while the majority, 69%, were from middle-aged adults (30 to 40 years old). Another related explanation can be that people in Qatar are obligated to show their “green” health status on the Ehteraz app as a prerequisite to enter any public place. Thus, it is significant for people to access the app very quickly and easily without facing any difficulties.

Another two predictors adopted from ISSM, namely information quality and system quality, to understand the factors contributing to the users' acceptance of the Ehteraz app. Our findings found that IQ failed to predict the users' satisfaction as hypothesis H3. Our result contravenes with the recent researchers (Kaptchuk, Goldstein, Hargittai, Hofman, & Redmiles, 2020; Hargittai & Redmiles, 2020; Sun et al., 2021; Ezzaouia & Gidumal, 2021; Utz et al., 2021; and Hajiheydari & Ashkani, 2018). We argue the insignificant result because android users don't receive the notifications of exposure that alert them about infected people's proximity. Android devices are out of updates for two years or more (Akinbi, Forshaw, & Blinkhorn, 2021). As a result, it will lead to proximity accuracy problems. In Qatar, android users are more than the ios users as per the Qatari market size for a smartphone. So, grand view research statistics showed that the majority of the smartphone users in Qatar are Android users (Grand View Research, 2019).

The second predictor is the system quality of the Ehteraz app. In our study, SQ is a significant predictive factor in users' acceptance of the Ehteraz app as hypothesis H4. The study outcome is consistent with previous studies (Chen & Tsai, 2019; Wang, Wang, Lin, & Tsai, 2019; Guimaraes al., 2018; Hajiheydari & Ashkani, 2018; Akinbi,

Forshaw, & Blinkhorn, 2021). However, a recent study stated that the Ehteraz app scored Zero in security and data management (Raman, Achuthan, Vinuesa, & Nedungadi, 2021). We argue this failure because people in Qatar might feel their safety was at risk, especially after the Amnesty Security Lab investigation that announced critical weakness in the configuration of the Ehteraz app. This vulnerability authorized the cyber attackers to access users' personal information regarding their national IDs, names, location data, and health status for one million Ehteraz users (Amnesty International, 2020). Another justification for the significant result is that the users cannot enter any place in Qatar unless they show their green health status through the app (Qatar, 2020). As a result, if they have any technical issues with the app, such as crashing, registration, installing, and not operating correctly, these issues will restrict people's movements as users review the app through App Store and Google Play (Apple, 2020; Google Play, 2020).

Contrary to our hypothesis that perceived privacy risk could significantly predict the users' intention to use the Ehteraz app, the data analysis showed that PPR is not a significant predictor to satisfy Ehteraz's users. This result is consistent with a recent study by Fox et al., 2021. Our investigation result differs from the majority of recent researches that showed that PPR is one of the significant predictors with a negative correlation on users' adoption of DCT apps (Rout & Sahu, 2020; Klaver, Van de Klundert, and Askari, 2021; Walrave, Waeterloos, and Ponnet, 2021; Akinbi, Forshaw & Blinkhorn, 2021; Ezzaouia & Gidumal, 2021; Li et al., 2021; Kostka & Habich-Sobiegalla 2020; Sun et al., 202; Krehling & Essex 2021). The insignificant output can be justified because the Qatari government emphasized that the Ehteraz app is safe and confidential. Only health professionals, when needed, can access users' data that will be eliminated after two months (Aljazeera, 2020). Thus, PPR is

considered an insignificant factor to Ehteraz users in Qatar. Another justification for PPR failure is that people argued that other apps such as social media already have access to people's phones in terms of their location, Bluetooth, and other services (ElKabbash, 2020).

Technical Experience is another construct of the Ehteraz app. Our investigation showed that TE failed to contribute to users' willingness to use the Ehteraz app. The study result differs from hypothesis H5, contradicting most recent studies (Saltzman, 2021; Trang et al., 2020; Redmiles, 2020; Li et al., 2020). The analysis outcome can be explained that the telecom companies in Qatar, Ooredoo and Vodafone, encourage users to download and use the app for free. (Ooredoo Qatar, 2020; Vodafone Qatar, 2020).

Interestingly, another factor of the Ehteraz app is trust. The study revealed that TR is one of the most significant variables and the largest correlation coefficient factor that predicts the users' Ehteraz app satisfaction as hypothesized in H7. The results are broadly consistent with prior findings that indicated TR is a fundamental determinant to impact the users' acceptance to use DCT apps (Oldeweme et al., 2020; Wnuk, Oleksy, & Maison, 2020; Bradshaw et al., 2021, Kostka & Habich-Sobiegalla, 2020; Guillon & Kergall, 2020; Jonker et al., 2020; Hobson et al.,2020; Thomas, Michaleff, Greenwood, Abukmail, & Glasziou, 2020; Klaver et al., 2021; Deng, Hong, Ren, Zhang, & Xiang, 2018; Guo, Zhang, & Sun, 2016; Deng, Liu, & Hinz, 2015).

The impact of the moderators on the independent variables (IQ, TE, PPR) have been excluded as they failed in the regression coefficient. The findings in this study showed the effect of chronic disease on the relationship between (performance expectancy and effort expectancy) and the users' willingness has no significant impact. The result reconfirmed the finding with (Haybar, Kazemnia & Rahim, 2020;

Tapp, Dulin, & Plescia, 2018; Kostka & Habich-Sobiegalla, 2020). On the other hand, the research outcome is not in accordance with the finding from antecedent studies (Kaspar, 2020; Munzert et al., 2021). We suggest the reason behind this failure is due to the participants' sample size, as 89 % of participants don't suffer from any chronic disease, while only 11 % suffer. Hence, in future research, we may focus more on users who suffer from chronic illness to evaluate the role of chronic diseases properly.

Lastly, the role of voluntariness has not strengthened the relationship between variables of the study (SQ and TR) with users' satisfaction, confirmed with recent research done by Jacob and Lawarée (2021) and Abuhammad, Khabour, and Alzoubi (2020). On the contrary, the finding does not align with previous researchers who found that voluntariness is a vital predictor that impacts the users' intention to use DCT apps (Bonnieve, Gallegos-Jeffrey, Goldbarg, Byrd, & Smyser, 2021; Altmann et al., 2020; Lucivero et al., 2020). A probable explanation for this failure is that people in Qatar don't have enough awareness about Ehteraz. The Qatari government did not provide users with tutorials within the Ehteraz app or external access to third parties to enhance the users' attention to the pandemic that may lead to proper use of the app (Raman et al., 2021).

5.2 Theoretical and managerial implications

The study outcomes in the research will develop the integrated UTAUT and ISSM theories to guide the interested researchers, the Qatari government or technology developers to understand better factors that impact users' perception when using the Ehteraz app in Qatar during the pandemic. The theoretical relevance of understating the users' satisfaction is fundamental from different perspectives. First, establish knowledge about the nature of contact tracing apps and health apps for public acceptance in the context of concerns and benefits. Second, this paper can contribute to preventative techniques which may require mass satisfaction when coordinated efforts are necessary for situations that pose hazards to society. As a result, the study will spread awareness among the individuals of the Ehteraz app. Also, the app's features and functions can be improved for efficient use. Furthermore, the users' personal information stored in the central server must be securely protected and maintained. Consequently, this will balance the users' conveniences and the protection of others to increase the individuals' satisfaction when using the Ehteraz app.

In this study, we provide recommendations for the Qatari government, decision-makers, health authorities, or developers to remedy the app's issues and improve the acceptability of the Ehteraz app.

- TR is the most critical determinant of the US. Hence, the government can connect the users' trust in the Ehteraz app by emphasizing that these apps work within laws and systems, securing the users' data. Thus, the public's trust in DCT apps will be enhanced. Privacy concerns and data management: rather than sending personal information to the central server, the Qatari government can follow a decentralized protocol. Also, decision-makers need to provide explicit consent to users, mentioning that all the data will be erased when the

pandemic is over, removing the modification terms without further notice because it will make users uncomfortable with the app. Furthermore, developers need to show the users adequate transparency of how the data will be collected and used.

- Pre-installed Alternatives: offering electronic tracker wristbands such as "the geofencing" tracker in Hong Kong to reduce the privacy risk of users' data.
- Raising users' awareness: through educational tutorials, reading materials within the app or external access to third parties, and advertisements on a large scale to enhance the knowledge on using the app properly. Thus, spreading the awareness will increase the benefits of the technology and encourage users to believe in the advantages of the Ehteraz app
- Increase the accuracy: to avoid long-distance reception, signals will be delivered at lower transmission power. Thus, it will reduce sending false notifications to users
- Enhance Ehteraz's efficiency: this can be done through training the customer service team to respond fast and efficiently to public queries when needed. Also, developers can enable the " Give Feedback" option to allow the users to give their reviews and comments as per the issues they face to enhance the service in a better way.

These approaches may contribute to citizens' and residents' acceptance of the Ehteraz app. Thus, the recommendations above need to be implemented to evaluate their effectiveness and verify whether they impact users' satisfaction.

5.3 Conclusion

This research aims to study the predictive factors that impact users' satisfaction when using the Ehteraz app. The study explored eight variables in this study: (1) *Performance expectancy*; (2) *Effort expectancy*; (3) *Information quality*; (4) *System quality*; (5) *Technical experience*; (6) *Perceive privacy risk*; (7) *Trust*; (8) *Users' satisfaction*. This thematic examination can be a starting point to develop integrated theories in the future.

We conclude that performance expectancy, effort expectancy, system quality, and trust are positively significant determinants to predict the users' satisfaction of Ehteraz app in Qatar, where trust was the strongest predictor, followed by PE, SQ, and EE, respectively as significant predictors. However, IQ, TE, PPR have no impact on public willingness to use Ehteraz app. Furthermore, no effect was observed of the moderators' role, chronic diseases, and voluntariness on the relationship between the study variables and users' acceptance of the Ehteraz app.

5.4 Limitations and future research

Some limitations are considered in this research. First, The study was conducted during the pandemic, and the app was launched by the Qatari government, which complicated the data collection. Although users had many concerns about privacy, technical, and security, they could reflect these concerns freely in the web-based questionnaire. Second, the majority of the participants don't suffer from any chronic disease. Thus, it was difficult to measure the effectiveness of the moderator role on the study variables. Hence, further study can focus on this group to obtain deeper insights. These limitations will bias the results and may reveal not accurate results. Therefore, to generate more precise and reliable results, a more comprehensive population range should be considered to represent and generalize the sample.

The proposed research model can extend to other compulsory apps in Qatar to comprehensively understand the factors influencing mass acceptance. Future potential research can focus on the effect of privacy awareness on the relationship between the perceived privacy risk and users' satisfaction. Also, further analysis can study the users' acceptance of the application's provided services, such as customer service. The study will assist from different perspectives. First, the Qatari government to increase the adoption of such apps. Second, policymakers and technology developers to enhance the apps ethically and conveniently. Third, the health authorities to manage such a pandemic

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APPENDIX

Appendix A: The Measurement of Items

Variable	Conceptual Definition	Operational Definition
<p>Performance Expectancy (PE) Independent variable</p>	<p>the performance expectancy (PE) is the extent to which the user believes that using a specific technology will enhance and ease their performance in certain activities (Venkatesh et al., 2012; Rout & Sahu, 2020).</p> <p>The study aimed to measure to what extent the user perceived the usefulness when they used the Ehteraz app</p>	<p>PE1: Using Ehteraz will improve the knowledge about the hazard of being infected by COVID-19. (Walrave et al.,2020)</p> <p>PE2: Ehteraz sends alerts to be cautious from visiting dangerous spots. (Suh & Mengjun,2021; SHARMA et al,2020)</p> <p>PE3: Ehteraz is useful to control the infection of COVID-19. (Suh & Mengjun,2021; SHARMA et al,2020)</p> <p>PE4: I would find Ehteraz useful. (O’Callaghan et al.,2020, Saxena, 2017; Chen & Tsai, 2017).</p> <p>PE5: Finding information from the Ehteraz is faster than the media. (Suh & Mengjun,2021; SHARMA et al,2020)</p>
<p>Effort Expectancy (EE) Independent variable</p>	<p>Venkatesh et al. (2012) defined the effort expectancy (EE) as the degree of ease that connected with users’ usage of technology</p> <p>The study aimed to measure to what extent the user perceived the usage of the Ehteraz app is easy</p>	<p>EE1: It is easy to use Ehteraz app. (Saxena, 2017; Chen & Tsai, 2017).</p> <p>EE2: I can learn how to operate Ehteraz App. (Chen & Tsai, 2017; Abu Shanab, 2017).</p> <p>EE3: I get what I need from Ehteraz app. (Chen & Tsai, 2017; Abu Shanab, 2017)</p> <p>EE4: Using Ehteraz, I can access information on health status quickly. (Suh & Mengjun,2021)</p>

Appendix A: The Measurement of Items (Continued)

Variable	Conceptual Definition	Operational Definition
Information Quality (IQ) Independent variable	<p>Information quality is a measure of the reliability, completeness, and accuracy of the generated data from an information system (Chen & Tsai, 2017)</p> <p>The study aimed to measure to what extent users of Ehteraz find the app is reliable, complete, and accurate</p>	<p>IQ1: I think the Ehteraz system provides accurate information. (Stevanovic et al., 2016; Chen & Tsai, 2017)</p> <p>IQ2: I think the Ehteraz system provides reliable Information. (Stevanovic et al., 2016; Chen & Tsai, 2017)</p> <p>IQ3: I think the Ehteraz app provides complete information. (Stevanovic et al., 2016; Chen & Tsai, 2017).</p> <p>IQ4: Ehteraz provides updated information regarding confirmed cases. (Suh & Mengjun,2021)</p>
System Quality (SQ) Independent variable	<p>Hassan & Abu-shanab (2020) defined system quality as the essential tools and features from a particular application to meet users' expectation</p> <p>The study aimed to measure the security of the Ehteraz app to meet the users' satisfaction</p>	<p>SQ1: I think Ehteraz system is very secure. (Stevanovic et al., 2016; Zolotov, et.al., 2017)</p> <p>SQ2: I could use the Ehteraz system at any time. (Stevanovic et al., 2016; Zolotov, et.al., 2017)</p> <p>SQ3: I find the Ehteraz system is flexible to interact with it. (Aldholay, et. al., 2018; Stevanovic et al., 2016)</p> <p>SQ4: Ehteraz system provides convenient access. (Zolotov, et.al., 2017)</p> <p>SQ5: The use of the Ehteraz system provides the desired services. (Stevanovic et al., 2016; Zolotov, et.al., 2017)</p>

Appendix A: The Measurement of Items (Continued)

Variable	Conceptual Definition	Operational Definition
<p>Technical Experience (TE) Independent variable</p>	<p>Nadal, Doherty & Sas (2019) defined as different stages of the process as it starts with deciding to select or buy to use, then continuous use</p> <p>The study aimed to measure to what extent users' technical experience impact their satisfaction when using the Ehteraz app</p>	<p>TE1: Keeping Ehteraz active drains my battery TE2: With Ehteraz, I have to enable the location all the time TE3: With Ehteraz, I receive annoying notifications to turn off my Bluetooth TE4: With Ehteraz, I cannot access warnings, notifications in the "notification" option of the App TE5: Ehteraz app is not compatible with some smartphones (proposed by the researcher)</p>
<p>Perceived Privacy Risks (PPR) Independent variable</p>	<p>it is defined as an individual's right to prevent any unapproved acknowledgment of personal information or share any personal information that causes any privacy risk (Merhi, Hone, & Tarhini, 2019)</p> <p>the study aimed to measure to what extent the Ehteraz app protects users' privacy</p>	<p>PPR1: My personal information on Ehteraz can be misused by the developers. (O'Callaghan et al.,2020) PPR2: I worry that my info on Ehteraz would be at risk. (O'Callaghan et al.,2020) PPR3: I don't remember signing privacy's statement on the Ehteraz app. Adopted from (Balapour et al.,2020) PPR4: It would be risky to give access to my personal information to Ehteraz. (Balapour et al.,2020)</p>
<p>Trust (TR) Independent variable</p>	<p>Almarashdeh (2018) define trust as user's perception regarding the reliability, honesty, and ability of the developer to provide the service</p> <p>The study aims to measure to what extent the users of Ehteraz trust in governmental services</p>	<p>TR1: Ehteraz app is trustworthy. (Ukpabi et al.,2021) TR2: I believe Ehteraz is transparent. (Bonner et al.,2020) TR3: I trust in a high degree Ehteraz App. (Abu-Shanab,2014) TR4: Developers of the Ehteraz app keep users' interests in mind. (Balapour et al., 2020)</p>

Appendix A: The Measurement of Items (Continued)

Variable	Conceptual Definition	Operational Definition
Voluntariness (V) Moderate variable	<p>the willingness of the user to use the technology given a choice they have. This is called voluntary action (Schultze-Kraft et al., 2020).</p> <p>The study aims to measure whether or not users will intent to download if it is not mandatory to download</p>	<p>If the Ehteraz app is Voluntary to install, would you install it? ___Yes ___No</p>
Chronic Diseases (DC) Moderate variable	<p>Souri et al. (2017) mentioned that there is no accepted definition, but terms such as long-lasting, underlying, or complex combinations of conditions are aspects of chronic</p> <p>The study aimed to measure whether or not users who have chronic diseases intend to download Ehteraz more than users who have not had chronic diseases</p>	<p>Do you suffer from any chronic diseases? ___Yes, please specify: _____ ___No</p>
User Satisfaction (US) Dependent variable	<p>Parasuranam et al. (1985) defined it as the difference between expectations and perceptions</p> <p>The study aims to measure to what extent users are satisfied when they use the Ehteraz app</p>	<p>US1: Ehteraz App has met my expectations US2: I am comfortable when using the Ehteraz app US3: Overall, I am satisfied with the Ehteraz app. (Ganapathi & Abu-Shanab, 2020)</p>

Appendix B: Consent Form and Survey in English



Consent Form and Survey in English

Factors that Impact User's Satisfaction When Using Digital-Contact Tracing App in Qatar: The Case of Ehteraz

Dear Respondent,

We would like to invite you to participate in this research study titled “factors that impact user’s satisfaction when digital-contact tracing app in Qatar: the case of Ehteraz” and approved by Qatar University Institutional Review Board QU-IRB board under the reference number -----

If you have any questions related to the ethical compliance of the study you may contact the board at QU-IRB@qu.edu.qa.

The primary purpose of this study is to specify the factors that identify users' satisfaction when using Ehteraz and explore the impact of these factors on user’s satisfaction. All citizens and residents who live in Qatar particularly whose ages start from 18 and above years old will be included in the study. The participants who cannot participate, do not live in Qatar will be, or below 18 years old will be excluded from the study. The sample size will be approximately 340 in the study. There are no associated risks or harms involved in participating in this survey. This research study will give the opportunity to the government to get more knowledge about users’ satisfaction regarding the Ehteraz app and they will add more features in the future if there will be similar pandemic spread the aim of this research is purely academic, and no part of this information will be given to third parties. The information collected will be kept strictly confidential and secure, where only the researchers will have access to it.

You are requested to participate in an online questionnaire, and it is expected that it will not take more than 10 minutes of your valuable time. Your participation in this study is completely voluntary and anonymous. You may withdraw from this survey at any time. The data will not be re-used for any other purpose in the future. If you are less than 18 years old, please do not take the survey. The data will be collected anonymously, sorted in SPSS software, and will be used for academic purposes only. The collected data will be kept in a secured protected laptop and will be saved in a folder that would require a password to access it. The collected data will be deleted within five years of conducting this study, i.e. by 2025.

If you have any questions, feel free to contact me and/or my supervisor at this email address:

- Emad A. Abu-Shanab, Qatar University.
Email: eabushanab@qu.edu.qa, Office Number: +974 4403 5077
- Sally Mohamed, MBA student. Qatar University,
E-mail: 200756814@qu.edu.qa

Please indicate that you have read and understood the guidelines. If you agree to participate, kindly click on Yes.

Yes No

Appendix B: Consent Form and Survey in English (continued)

1.	I think Ehteraz system provides accurate information.					
2.	I think Ehteraz system provides reliable information.					
3.	I think Ehteraz app provides complete information.					
4.	Ehteraz provides updated information regarding confirmed cases					
No.	System Quality	1	2	3	4	5
1.	I think Ehteraz system is very secure.					
2.	I could use Ehteraz system at any time					
3.	I find Ehteraz system is flexible to interact with					
4.	Ehteraz system provides convenient access.					
5.	The use of Ehteraz system provides the desired services.					
No.	Technical experience	1	2	3	4	5
1.	Keeping Ehteraz active drains my battery					
2.	With Ehteraz, I have to enable the location all the time					
3.	With Ehteraz, I receive annoying notifications to turn off my Bluetooth					
4.	With Ehteraz, I cannot access warnings, notifications in the “notification” option of the App					
5.	Ehteraz app is not compatible with some smart phones					
No.	Privacy Risk	1	2	3	4	5
1.	My personal information on Ehteraz can be misused by the developers					
2.	I worry that my personal info on Ehteraz would be at risk					
3.	I don’t remember signing privacy’s statement on Ehteraz app					
4.	It would be risky to give access to my personal information to Ehteraz					

Appendix B: Consent Form and Survey in English (continued)

No.	Trust	1	2	3	4	5
1.	Ehteraz app is trustworthy					
2.	I believe Ehteraz is transparent					
3.	I trust in a high degree Ehteraz App					
4.	Developers of Ehteraz app keep users' interests in mind v					
No.	User Satisfaction	1	2	3	4	5
1.	Ehteraz App has met my expectations					
2.	I am comfortable when using Ehteraz app					
3.	Overall, I am satisfied with Ehteraz app					

Part 3: Demographic Information

Please indicate the following:

1- Age

___ 18 to 25 ___ 26 to 40

___ 41 and above

2- Gender

___ Male ___ Female

Appendix B: Consent Form and Survey in English (continued)

3- Educational level

High School or Diploma

PHD

Bachelor's Degree

others, please specify _____

Master

4- Voluntariness

If Ehteraz app is Voluntary to install, would you install it?

Yes

No

5- Do you suffer from any chronic diseases?

Yes, please specify: _____

No

6- Occupation

student

Self-Employed

Employee

Other

7- Status

single

Married

8- Nationality

Qatari

Non-Qatari



Appendix C: Consent Form and Survey in Arabic



نموذج الموافقة والاستبيان باللغة العربية

العوامل التي تؤثر على رضا المستخدم عند استخدام تطبيق تتبع جهات الاتصال الرقمية في قطر: حالة تطبيق Ehteraz

عزيزي المشارك في الاستبيان،

يسعدنا دعوتك للمشاركة في هذه الدراسة البحثية بعنوان "العوامل التي تؤثر على رضا المستخدم عند استخدام تطبيق احتراز، ومدى تأثير هذه العوامل على رضا المستخدم". ستشمل الدراسة جميع المواطنين والمقيمين الذين يعيشون في قطر وخاصة الذين تبدأ أعمارهم من 18 عامًا فما فوق. سيتم استبعاد كل من لا يستطيعون تعبئة الاستبيان، أو الذين لا يعيشون في قطر، أو أقل من 18 عامًا. سيكون حجم العينة حوالي 340 في الدراسة. لا توجد مخاطر أو أضرار مرتبطة بالمشاركة في هذا الاستطلاع. ستمنح هذه الدراسة البحثية الفرصة للحكومة للحصول على مزيد من البيانات اللازمة حول رضا المستخدمين فيما يتعلق بتطبيق Ehteraz للعمل على تحسين التطبيق في المستقبل. هدف هذا البحث أكاديمي بحت، ولن تُقدّم أي معلومات منها إلى أي شخص آخر. سيتم الاحتفاظ بسرية وأمان المعلومات التي يتم جمعها، حيث سيتمكن الباحثون فقط من الوصول إليها.

لا توجد مخاطر أو أضرار مرتبطة من خلال المشاركة في هذا الاستطلاع. لن يتم إعادة استخدام البيانات لأي غرض آخر في المستقبل. إذا كان عمرك أقل من 18 عامًا، فيرجى عدم المشاركة في الاستبيان. سيتم جمع البيانات بشكل مجهول، وفرزها في برنامج إحصائي، وسيتم استخدامها للأغراض الأكاديمية فقط. سيتم الاحتفاظ بالبيانات التي تم جمعها في كمبيوتر محمول بسرية وأمن وسيتم حفظها في مجلد يتطلب كلمة مرور للوصول إليه. كما سيتم حذف البيانات التي تم جمعها في غضون خمس سنوات من إجراء هذه الدراسة، أي بحلول عام 2025. ونطلب منك التفضل بالمشاركة في استبيان عبر الإنترنت، ومن المتوقع ألا يأخذ من وقتك أكثر من عشر دقائق. ومشاركتك في هذا الاستبيان تطوعية ومجهولة بالكامل. ويمكنك الانسحاب من هذا الاستبيان في أي وقت.

في حالة وجود أي استفسارات، يمكنك التواصل معي أو مع مشرفتي عبر عنوان البريد الإلكتروني الآتي:

- الدكتور عماد أبو شنب، كلية الإدارة والاقتصاد، جامعة قطر
البريد الإلكتروني: abushanab@qu.edu.qa، رقم المكتب: 4403 5077
- سالي محمد، طالبة ماجستير إدارة الأعمال، جامعة قطر.
البريد الإلكتروني: 200756814@qu.edu.qa

برجاء التوضيح أنك قرأت وفهمت التوجيهات. إن كنت تود المشاركة، برجاء اختيار "نعم".

لا نعم

Appendix C: Consent Form and Survey in Arabic (Continued)



الجزء الأول: امتلاك الهاتف الذكي

1. هل لديك هاتف ذكي؟

--- لا

--- نعم

- إذا كانت إجابتك بنعم، يرجى إكمال الاستبيان .
- إذا كانت إجابتك بلا، فقد انتهى الاستبيان. شكرًا لوقتكم ومشاركاتكم

الجزء الثاني: العوامل التي تؤثر على رضا المستخدم عند استخدام تطبيق احتراز

برجاء اختيار المربع الذي يوضح رأيك.

1. نود منك تحديد العوامل المختلفة التي تؤثر على رضا المستخدم. لهذا الغرض، أنشأنا مقياسًا من 1 إلى 5. بحيث أن 1 تعني: لا أوافق بشدة على هذا البيان، 2: لا أوافق 3: لا أوافق ولا أعارض 4: موافق و5: موافق بشدة.

إلى أي مدى تتفق مع البيانات التالية:

الرقم	توقع الأداء	1	2	3	4	5
1.	Using Ehteraz will improve the knowledge about the hazard of being infected by COVID-19 استخدام تطبيق احتراز سيحسن المعرفة بخطر الإصابة بفيروس COVID-19					
2.	Ehteraz, sends alerts to be cautious from visiting the dangerous spots تطبيق احتراز يرسل تنبيهات لتوخي الحذر من زيارة المواقع الخطرة					
3.	Ehteraz is useful to contain the spread of Corona virus تطبيق احتراز مفيد في احتواء انتشار فيروس كورونا					
4.	I would find Ehteraz necessary in daily use أجد ان تطبيق احتراز ضروري في استخدامي اليومي.					
5.	Finding information from the Ehteraz is faster than the media أعثر على المعلومات من تطبيق احتراز، أسرع من وسائل الإعلام					
الرقم	توقع الجهد	1	2	3	4	5
1.	It is easy to use Ehteraz app. تطبيق احتراز سهل الاستخدام					
2.	I can learn how to operate Ehteraz app أستطيع تعلم كيفية تشغيل تطبيق احتراز					
3.	I get what I need from Ehteraz app أحصل على ما أريد من تطبيق احتراز					

Appendix C: Consent Form and Survey in Arabic (Continued)

4.	Using Ehteraz, I can access information on health status quickly باستخدام تطبيق احتراز، يمكنني الوصول الي المعلومات المتعلقة بالحالة الصحية بسرعة					
الرقم	جودة المعلومات	1	2	3	4	5
1.	I think Ehteraz system provides accurate information. أعتقد أن تطبيق احتراز يوفر معلومات دقيقة					
2.	I think Ehteraz system provides reliable information. أعتقد أن تطبيق احتراز يوفر معلومات موثوقة					
3.	I think Ehteraz app provides complete information. أعتقد أن تطبيق احتراز يوفر معلومات كاملة					
4.	Ehteraz provides updated information regarding confirmed cases يوفر تطبيق احتراز معلومات محدثة بشأن الحالات المؤكدة					
الرقم	جودة النظام	1	2	3	4	5
1.	I think Ehteraz system is very secure. أعتقد تطبيق احتراز أمن جدا					
2.	I could use Ehteraz system at any time أستطيع استخدام تطبيق احتراز في أي وقت					
3.	I find Ehteraz system is flexible to interact with اجد تطبيق احتراز مرن اثناء التفاعل معه					
4.	Ehteraz system provides convenient access. تطبيق احتراز سهل الوصول اليه					
5.	The use of Ehteraz system provides the desired services. استخدام تطبيق احتراز يزودك بالخدمة المطلوبة					
الرقم	الخبرة الفنية	1	2	3	4	5
1.	Keeping Ehteraz active drains my battery إبقاء تطبيق احتراز نشط، يستنزف بطارية هاتفي					
2.	With Ehteraz, I have to enable the location all the time مع تطبيق احتراز، يجب تفعيل خاصية تحديد الموقع طوال الوقت					
3.	With Ehteraz, I receive annoying notifications to turn on my Bluetooth مع تطبيق احتراز، أتلقى إخطارات مزعجة لتشغيل خاصية البلوتوث					
4.	With Ehteraz, I cannot access warnings, notifications in the "notification" option of the App مع تطبيق احتراز، لا يمكنني الوصول إلى التحذيرات، الإشعارات في خيار "الإشعارات" في التطبيق					
5.	Ehteraz app is not compatible with some smart phones تطبيق احتراز غير متوافق مع بعض الهواتف الذكية					
الرقم	مخاطر الخصوصية	1	2	3	4	5
1.	My personal information on Ehteraz can be misused by the developers بإمكان القانمون علي التطبيق، إساءة استخدام معلوماتي الشخصية علي تطبيق احتراز					
2.	I worry that my personal info on Ehteraz would be at risk أخشى أن تكون معلوماتي الشخصية علي تطبيق احتراز في خطر					
3.	I don't remember signing privacy's policy on Ehteraz app لا أتذكر توقيعي سياسة الخصوصية علي تطبيق احتراز					

Appendix C: Consent Form and Survey in Arabic (Continued)

4.	It would be risky to give access to my personal information to Ehteraz من المخاطرة ان اعطي للوصول إلى معلوماتي الشخصية على تطبيق احتراز					
الرقم	الثقة	1	2	3	4	5
1.	Ehteraz app is trustworthy تطبيق احتراز جدير بالثقة					
2.	I believe Ehteraz is transparent أعتقد ان تطبيق احتراز يتمتع بالشفافية					
3.	I trust in a high degree Ehteraz app اثق بدرجة عالية في تطبيق احتراز					
4.	Developers of Ehteraz app keep users' interests in mind يضع القانمون على تطبيق احتراز مصلحة مستخدميها في عين الاعتبار					
No.	رضاء المستخدم	1	2	3	4	5
1.	Ehteraz App has met my expectations تطبيق احتراز كان على مستوى توقعاتي					
2.	I am comfortable when using Ehteraz app أشعر بالارتياح حينما استخدم تطبيق احتراز					
3.	Overall, I am satisfied with Ehteraz app بشكل عام، أنا راض عن تطبيق احتراز					

الجزء الثالث: معلومات عامة (ديموغرافيا):

برجاء تحديد ما يلي:

1. السن

___ 18 to 25

___ 26 to 40

___ 41 and above

2. النوع

--- أنثى

--- ذكر

3. المستوى التعليمي

---- الماجستير

---- الثانوية العامة أو دبلوم

---- درجة البكالوريوس

---- الدكتوراة

---- أخرى، برجاء التحديد

4. الطوعية

Appendix C: Consent Form and Survey in Arabic (Continued)

إذا كان تثبيت تطبيق احتراز اختياريًا، فهل ستقوم بتثبيته؟

___ نعم

___ لا

5. الأمراض المزمنة

هل تعاني من أي مرض مزمن؟

___ نعم

___ لا

6. الوظيفة

--- عمل خاص

--- طالب

--- أخرى

--- موظف

7. الحالة الاجتماعية

--- متزوج

--- أعزب

8. الجنسية

--- غير قطري

--- قطري



Appendix D: QU-IRB Approval



Qatar University Institutional Review Board **QU-IRB**

QU-IRB Registration: IRB-QU-2020-006, QU-IRB, Assurance: IRB-A-QU-2019-0009

DATE: March 17, 2021

TO: Sally Mohamed, bachelor
FROM: Qatar University Institutional Review Board (QU-IRB)

PROJECT TITLE: 1718433-1Factors that Impact User's Satisfaction when Using Digital-Contact Tracing App in Qatar: The Case of Ehteraz

QU-IRB REFERENCE #: QU-IRB 1503-E/21
SUBMISSION TYPE: New Project

ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: March 17, 2021
REVIEW CATEGORY: Exemption category # 2 & 4

Thank you for your submission of New Project materials for this project. The Qatar University Institutional Review Board (QU-IRB) has determined this project is EXEMPT FROM IRB REVIEW according to Qatar Ministry of Public Health regulations. Please note that exempted proposals do not require renewals however, any changes/modifications to the original submitted protocol should be reported to the committee to seek approval prior to continuation.

We will retain a copy of this correspondence within our records.

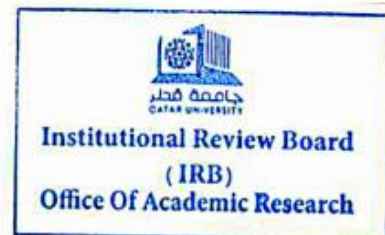
Documents Reviewed:

- Consent Form - Consent Form and Survey in Arabic.docx (UPLOADED: 02/9/2021)
- Consent Form - Consent Form and Survey in English.docx (UPLOADED: 02/9/2021)
- Other - sally Research Proposal .docx (UPLOADED: 02/9/2021)
- Other - QU-IRB Check List.pdf (UPLOADED: 02/9/2021)
- Qatar University - IRB Application - Qatar University - IRB Application (UPLOADED: 02/9/2021)

If you have any questions, please contact QU-IRB at 4403 5307 or qu-irb@qu.edu.qa. Please include your project title and reference number in all correspondence with this committee.

Best wishes,

Dr. Ahmed Awaisu
Chairperson, QU-IRB



This letter has been issued in accordance with all applicable regulations, and a copy is retained within Qatar University's records.

Qatar University-Institutional Review Board (QU-IRB), P.O. Box 2713 Doha, Qatar
Tel +974 4403-5307 (GMT +3hrs) email: QU-IRB@qu.edu.qa