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# **Fear of COVID-19, Social Isolation and Digital Financial Services during the COVID-19 Pandemic: The Unified Theory of Acceptance and Use Technology (UTAUT) model**

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## **Abstracts**

As of the end of May 2021, more than 170 million people worldwide were infected with COVID-19, with the total death toll exceeding 3.7 million. The COVID-19 pandemic and the demand for physical distancing and social isolation have highlighted digital financial services (DFS) as a typical solution for getting the basic services we need in our daily lives. Thus, to understand the behavior of people using digital financial services during a pandemic, in particular in developing countries, we used the UTAUT model, expanding it with two constructions: fear of COVID-19 as a moderator and social isolation as a direct determinant for behaviour intention. A survey method is used, in which primary data is collected through survey platforms and social networks from people from developing countries, more than 400 participants aged 18 and over. This study uses structural equation modeling (SEM) to test our constructs and hypotheses, analyze relationships, and determine the overall fit of the model. The study used factor analysis (EFA, CFA) and covariance-based SEM. As a result, we found that all UTAUT constructs and social isolation positively influence behavioral intent and actual use of DFS during a pandemic. Testing the moderating role of COVID fear for other constructs plays a positive role, with the exception of the relationship between expected performance and behavior intensity and the relationship between behavioral intent and actual use.

**Keywords:** *Behaviour study, UTAUT model, structural equation modeling (SEM), digital financial service (DFS), social isolation, COVID-19 pandemic.*

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## 1. Introduction

In early 2020, the world was confronted with one of the new infectious diseases called coronavirus disease (COVID-19), which came from Wuhan, China. This coronavirus differs little from the previously known coronavirus diseases, Severe Acute Respiratory Syndrome (SARS / 2003) and Middle East Respiratory Syndrome (MERS / 2012). All of these coronaviruses cause severe respiratory infections, are zoonotic pathogens that appear in infected animals and are transmitted from animal to person. However, COVID-19 is considered the most dangerous among them, as it is easily transmitted from person to person, badly affecting the respiratory system of people and health in general.

According to World Health Organization (WHO) report, more than 170 million people worldwide were infected with COVID-19 at the end of May 2021, and the total death toll exceeded 3.7 million. Consequently, highly infectious diseases with high mortality rates can increase fear among people for the risk of being infected. There is current evidence that the infection spreads between people directly and indirectly, or close contact through the mouth and nose secretions from infected people. Hence, concerns about COVID-19 focus on interactions with people who may be cause for infection with the disease, which naturally raises fears (Ahorsu et al., 2020).

The physical distancing policy promoted by the World Health Organization (WHO) strongly recommends that people avoid crowded places, be isolated and engage in non-contact activities during a pandemic. Governments are changing strategies and policies to combat and overcome this disease. The most effective tools for dealing with infectious disease outbreaks are isolation, quarantine and social distancing (Wilder-Smith & Freedman, 2020)

The COVID-19 pandemic and the demand for physical distancing and social isolation have highlighted digital financial services (DFS) as a typical solution for getting the basic services we need in our daily lives. As an example, DFS provides social distancing and enables governments to disburse funds rapidly and productively to those in need, and allows many households and businesses to easily access payments and other traditional financial services remotely (Agur et al., 2020).

Furthermore, DFS has tremendous potential to offer a variety of smart, convenient and secure financial services to low-income people through technological innovations such as digital platforms and e-money solutions. Also, DFS enables people without bank accounts to digitally access financial services (Rana et. al, 2019).

Moreover, widespread use of DFS can help increase financial inclusion and can also impact poverty reduction, especially in developing countries. Previous studies on poverty indicate that one way to reduce poverty in emerging economies is to widely access to formal financial services to all members of society, which means financial inclusion (Burgess & Pande, 2005; Chibba, 2009; Sharma et al., 2014; Park & Mercado, 2015; Ozili, 2018; Omar & Inaba 2020).

In addition, due to fear of COVID-19 and caring for their own families, people stay at home, maintaining social isolation and physical distancing. This pandemic has changed the way people live, remote working and distance learning are widely used, and the online community in general has grown. Also access to formal financial services could expand globally.

Therefore, in order to understand human behavior on usage of digital financial services during a pandemic, in particular in emerging economies, we set these objectives: 1) to determine the human behavior in the adoption of digital financial services in a pandemic in developing countries; 2) to

explore the impact of social isolation on behavioral intentions in digital financial services in developing countries; 3) to determine the impact of COVID-19, in particular fear of COVID-19, on model constructs and behavioral intent with actual use of digital financial services in developing countries.

This study uses a questionnaire method, in which primary data is collected through survey platforms and social networks from people from developing countries, more than 400 participants aged 18 and over. As a research model, there is used the unified theory of acceptance and use technology (UTAUT) model, which is as of now the most broadly utilized model of technology adoption, which incorporates three constructs of behaviour intention to use (performance expectancy, effort expectancy, and social influence) and two constructs of usage behaviour (intention and facilitating condition) by extending with other two factors, the fear of COVID-19 as a moderator and social isolation as a one factor of behaviour intention to use of digital financial services. All elements intended for structural measurement in this study is taken from previously validated instruments.

The study uses structural equation modeling (SEM) to test new factors and proposed hypotheses and analyze relationships. Also, exploratory and confirmatory factor analysis (EFA, CFA) approaches are used to analyze and verify the general consistency of the UTAUT model. The study uses RStudio (R) and Jupyter Notebook (Python) as analytical tools for data analysis, hypothesis testing and path analysis.

The research outcomes may be useful for policy makers to encourage the digital financial services during the pandemic as part of strategic solutions, because while COVID-19 vaccination is under development, fear of COVID-19 and social isolation will continue to work.

The study is organized as follows. Beginning with a review of previous studies in Section 2. Next, research methodology and data analysis in Section 3. Then, the results of the analysis in Section 4. After that, the discussion in Section 5. And finally, the conclusion in Section 6.

## **2. Literature review**

### **2.1 COVID-19 and Digital Financial Services**

The COVID-19 pandemic has affected everything from simple lifestyles to global economic growth. There is no country where the coronavirus is not found. The pandemic shows not only the real situation with medical preparedness in the country, but also opens up real gaps in any industry, including the financial sector. Kasradze (2020) shows that the pandemic had a negative impact on the financial sector, but it had a positive impact on remote services, as people actively use digital financial services due to the high risk of the virus spreading.

According to Machasio (2020), while COVID-19 is generally negative, it has great potential to leverage the scale of mobile phone ownership and Internet access to spur technological innovation in the financial sector. Agur et al. (2020) mentioned that digital financial services provide social distancing and enables governments to disburse funds rapidly and productively to those in need, and allows many households and businesses to easily access payments and other traditional financial services remotely. Ayadi & Shaban (2020) proposed as a policy recommendation during the pandemic to promote greater use of mobile wallets, raise digital awareness, and increase digital financial literacy to drive the adoption of mobile and digital financial services in country.

Thus, the pandemic is likely to bring about significant changes in the provision of financial services, primarily an increase in the use of traditional financial services through digital channels such as the Internet or mobile phones.

## 2.2 Theoretical background

There are several theoretical models explaining the adoption and use of technology, mostly based on theories of psychology and sociology. Venkatesh et. al (2003) analyzed eight theories and models of technology use, resulting in a new unified theory of technology adoption and use (UTAUT) model. The main reason for the development this model was to explore a common view of information technology. In a longitudinal study, the study found that the model explains 70% of the differences in behavioral intent to use technology and 50% of actual use. According to Dečman (2015), the UTAUT theory is viewed by researchers as a well-developed, updated, and relevant theory of technology adoption as it aligns with existing recognized technology adoption theories.

According to this theory, there are three direct constructs of behavioral intention such as performance expectancy, effort expectancy, social influence, and two direct constructs of use behavior: facilitating conditions and behavioral intention. The model has also four moderate variables, such as gender, age, experience, and voluntary use. (Figure 1.)

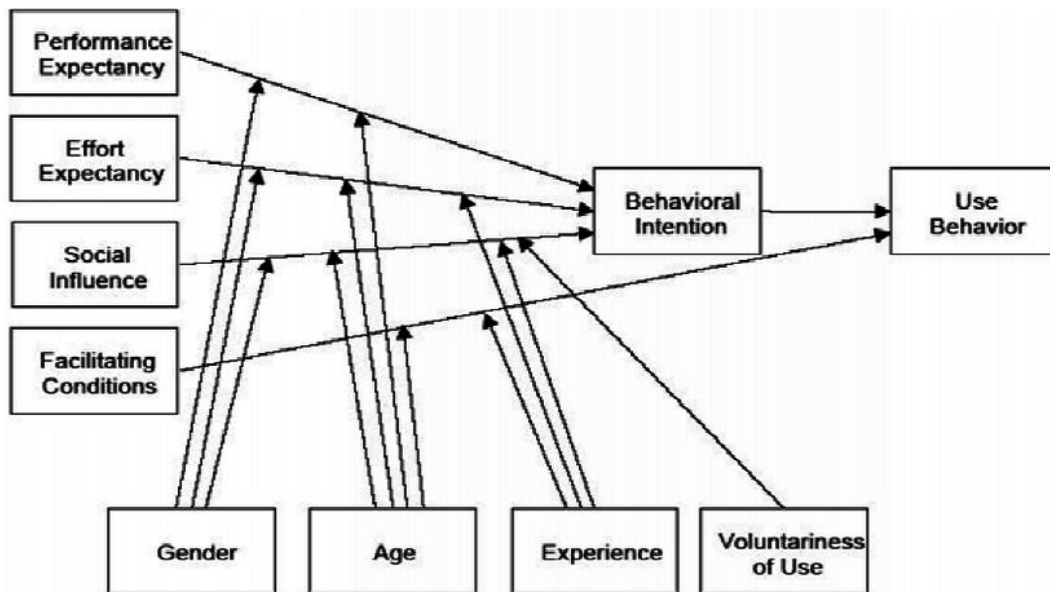


Figure 1. Conceptual framework - UTAUT model

There are many cases of using the UTAUT model in similar studies. Raza et al. (2019) indicated that all variables, with the exception of social influence, have a significant positive effect on behavioral intention that leads to actual use mobile banking (M-Banking) in Islamic banks in Pakistan. A similar finding by Daka & Phiri (2019) is that, in addition to social inclusion, other elements of the model have a significant impact on the adoption of e-banking. Raza et al. (2020) tested the intention and use hypothesis of learning management systems and demonstration that a positive relationship between UTAUT model constructs and fear of COVID reduces social impact and behavioral intentions.

## 2.3 Development of hypotheses

There are several studies on the adoption of M-Banking, mobile payments and / or mobile financial services (MFS) that used the UTAUT model. Essentially, MFS or M-Banking are only one side of DFS where mobile devices and/or the Internet are used to achieve financial objectives. However, DFS can be used also other digital channels such as near field communication (NFC), QR codes, biometric technologies, ATMs, portable POS terminals (debit card payments) or using other smart devices such as smart watches, smart bracelets, smart speakers (Amazon Echo) etc. Thus, the study develops hypotheses based on the determinants of UTAUT model for adapting DFS in a pandemic.

### 2.3.1 Performance Expectancy

Performance Expectancy (PE) is the degree to which a person believes that using a system will help him or her to attain gains in job performance (Venkatesh et al, 2003). In our study, PE is seen as convincing users of the effectiveness of using DFS to achieve their financial goals. Previous studies have shown that performance expectancy (PE) is a vital prerequisite for user adoption of M-Banking (Sarfaraz, 2017; Raza et al., 2019; Purwanto & Loisa, 2020), internet banking services (Daka & Phiri, 2019), and mobile payments (Abrahão et al., 2016; Patil et al., 2020). These studies have shown that the impact of PE on behavior and intentions to use financial services remotely is positively significant. Thus, the existing literature shows that convincing people to use DFS will increase their productivity by making it easier to achieve financial objectives and tasks. Therefore, based on these studies, the following hypothesis is proposed:

*H1: Performance Expectancy (PE) = “+” => Behavior Intention of DFS.*

### 2.3.2 Effort Expectancy

According to Venkatesh et al. (2003), Effort Expectancy (EE) is the degree of ease of use of the system. This is a vital factor in technology adoption because people put so much effort into using it. In our study, EE is understood as the ease of use of DFS. Studies in mobile banking illustrated that a user's EE plays an important role in predicting his / her intent to use mobile financial services in developing countries (Sarfaraz, 2017; Raza et al., 2019; Purwanto & Loisa, 2020). Similar findings were found in studies of digital / mobile payments, where the impact of EE on behavior intentions to use non-cash payments is positively significant (Abrahão et al., 2016; Sivathanu 2019; Patil et al., 2020). Thus, it is assumed that people believe that using DFS does not require a lot of effort, leading to a higher intent for human behavior. Therefore, based on a literature review, the study put forward the following hypothesis:

*H2: Effort Expectancy (EE) = “+” => Behavior Intention of DFS.*

### 2.3.3 Social Influence

Venkatesh et al. (2003) defined Social Influence (SI) as the degree to which a person realizes how important others think he or she should use a novel system. That is, it is a reflection of the views of family members, friends and colleagues regarding the use of technology on the behavioral intentions of a person in a social environment. In our study, SI is viewed as the degree to which a

person is encouraged by others (such as family members, friends, and colleagues) to use DFS for financial activities. While studies in mobile banking show that the impact of SI on the behaviour intension of M-Banking adoption is insignificant, other studies (cashless payments) have shown that there is a positively significant relationship (Abrahão et al., 2016; Sivathanu 2019; Patil et al. 2020). Similar results were found in internet banking studies (AbuShanab & Pearson, 2007; Martins et al. 2014; Rahi et al. 2018), which showed that the impact of SI on behavioral intent in relation to internet banking was positively significant. Therefore, based on these studies, we assume that SI can positively influence behavioral intent to use DFS, and make the following hypothesis:

*H3: Social Influence (SI) = “+” => Behavior Intention of DFS.*

#### **2.3.4 Facilitating Conditions**

Venkatesh et al. (2003) explained Facilitating Conditions (FC) as having adequate support and resources for the proper use of technology. In our study, FC refers to the degree to which a person believes there is an organizational and technical infrastructure to support the use of DFS. Previous research has shown that the actual use of financial services remotely must be maintained and supported by the supply side, such as technical infrastructure, as without them the demand factors would not be covered. Thus, FC can be seen as a basic condition and as an important factor for the actual use of mobile banking and mobile payments (Rahi et al. 2018; Raza et al. 2019; Sivathanu 2019; Patil et al. 2020). Similar results in the MFS study show that FC has a positive influence on use behavior of MFS in Tanzania (Rahman et.al, 2020). In fact, there are found opposite results, a study by Martin et al. (2014) showed that the FC factor is not statistically significant for a direct relationship between FC and the behavior of Internet banking services in Portugal. Therefore, based on previous research on MFS and M-Banking, we assume that the direct effect of FC on use behavior of DFS is positively significant, and develop the following hypothesis:

*H4: Facilitating Conditions (FC) = “+” => Use Behavior of DFS.*

#### **2.3.5 Social Isolation**

According to Gierveld et al. (2016), Social isolation (Iso) is the absence of a person or a small number of meaningful connections with other people, which makes them socially isolated. In our study, Iso is understood as the degree to which people reduce their frequency of contact and increase their physical distance from others. The pandemic has forced the entire world to isolate itself and drastically reduce public gatherings, encouraging social distancing as it is necessary to eradicate the spread of COVID-19 in society. There are several studies on physical distancing and social isolation, in particular on the pandemic. Raza et al. (2020) showed that the extended Iso construct in the UTAUT model has a positive and significant relationship with behavioral intent and learning management systems. Marston et al. (2020) showed that during social inclusion in UK, the number of Internet users increases and the Internet becomes a lifeline, allowing you to perform everyday activities (e.g. internet banking, online shopping), as well as maintain social connections with friends and family. Similar results from Stockwell et al. (2020) showed that there is a strong link between social isolation and all online activity. Therefore, based on previous research, we assume that the impact of social isolation on behavioral intention of using DFS is highly correlated and positively significant, so we develop the following hypothesis:

*H5: Social Isolation (Iso) = “+” => Behavior Intention of DFS.*

### **2.3.6 Behavioral Intention**

According to Huang & Kao (2015), Behavioral Intention (BI) refers to the degree to which a person chooses to use or not use electronic mobile technology in his/her daily activities. In our study, BI refers to the degree to which individuals are willing to agree to use DFS to carry out their financial activities. Many previous researchers have found that behavioral intent plays an important role in actual use of MFS and M-Banking. As Malik (2020) illustrated, all studies from 2015 to 2020 on adapting internet and mobile banking in developing countries showed that the impact of BI on User Behavior was positively significant. Similar findings by Purwanto & Loisa (2020) showed that the impact of BI on User Behavior is positive and significant for M-banking adoption in Indonesia. Therefore, based on these studies, we hypothesized that the impact of BI on the actual use of DFS is positive and significant, we show this as follows:

*H6: Behavioral Intention (BI) of DFS = “+” => User Behavior (US) of DFS.*

### **2.3.7 Fear of COVID-19**

Reisler (1944) characterized fear as an emotionally negative feeling caused by worry and anxiety about something in the mind. As Furedi (2007) noted, in society, fear is associated with a well-defined threat: fear of something (e.g. fear of death, fear of illness, fear of hunger, etc.). Because the threat was defined as the object of fear and what people actually feared: death, illness, hunger. Pakpour & Griffiths (2020) have shown that unexpected and emergency situations, such as outbreaks of disease, can cause fear in people, and therefore, this is one of the psychological aspects of the COVID-19 pandemic. According to Ahorsu et al. (2020), the COVID-19 outbreak and its aftermath have triggered fear, anxiety and concern among people around the world due to high infection rates and high mortality rates, making it one of the deadliest pandemics in history. There are several studies that show that a factor such as fear of COVID plays a direct moderating role with other constructs in research (Raza et al. 2020; Gasparro et al. 2020; Koçak et al. 2021; Ye et al. 2021). Therefore, based on previous research, we develop the following hypotheses to analyze the deterrent role of fear of COVID-19 (FoC):

*H7: Fear of COVID-19 (FoC) → the relationship between Iso and the BI of DFS.*

*H8: Fear of COVID-19 (FoC) → the relationship between PE and the BI of DFS.*

*H9: Fear of COVID-19 (FoC) → the relationship between EE and the BI of DFS.*

*H10: Fear of COVID-19 (FoC) → the relationship between SI and the BI of DFS.*

*H11: Fear of COVID-19 (FoC) → the relationship between FC and the UB of DFS.*

*H12: Fear of COVID-19 (FoC) → the relationship between BI and the UB of DFS.*



### 3. Research Methodology

#### 3.1 Research model

Since the original UTAUT model proposed relevant factors to determine a person's behavioral intention for DFS and their use behavior, based on our hypotheses, we expand two more factors: social isolation (Iso) as the independent variable and fear of COVID-19 (FoC) as the moderator into the model. (Figure 2.)

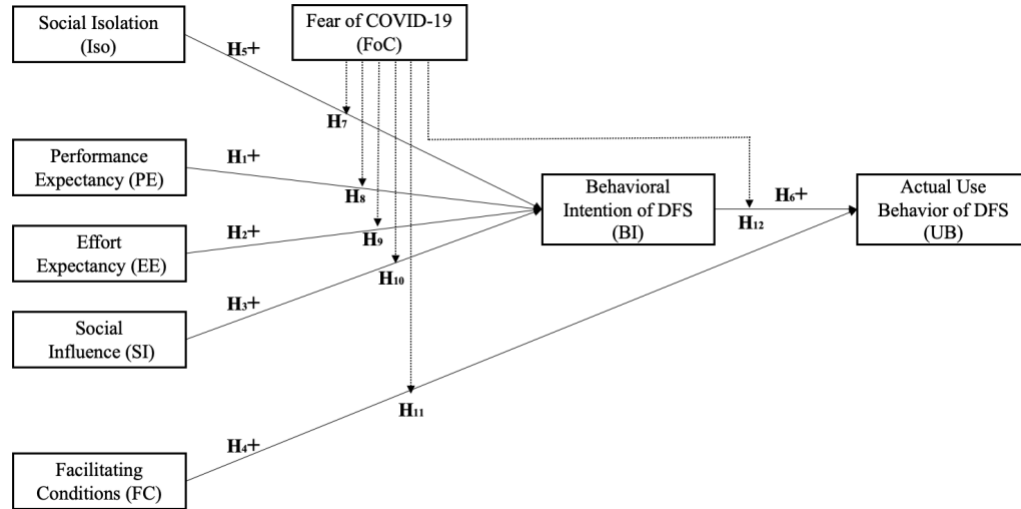


Figure 2. Research model

Constructs		Meaning	Role
Performance Expectancy	<b>PE</b>	The degree to which people believe that the use of a particular technology (DFS) will facilitate their performance of certain activities (financial goals).	Independent variable
Effort Expectancy	<b>EE</b>	The degree of ease with which people can use a particular technology (DFS).	Independent variable
Social Influence	<b>SI</b>	The degree to which people are encouraged by others (i.e., family members, friends, and colleagues) to use a particular technology (DFS).	Independent variable
Facilitating Conditions	<b>FC</b>	The degree to which people believe there is an organizational and technical infrastructure to support for using a particular technology (DFS).	Independent variable
Social Isolation	<b>Iso</b>	The degree to which users reduce their frequency of contact and increase their physical distance from others.	Independent variable
Behavioral Intention of DFS	<b>BI</b>	The degree to which users are willing to agree to use DFS to meet their financial objectives.	<b>Dependent variable</b>
Use Behavior of DFS	<b>UB</b>	The degree to which users are continued commitment to use of a particular technology (DFS), usage volume (frequency) and quality (variety of use).	<b>Dependent variable</b>
Fear of COVID-19	<b>FoC</b>	The degree to which people believe there is a risk of contracting coronavirus (COVID-19) and fears getting sick.	Moderator

Table 1. Model variables

### 3.2 Data and descriptive statistics

This study uses a questionnaire method and was developed in the course of the study based on previous research. It is divided into two sections, Section A - demographic related questions such as gender, age, education, and income. In section B, behavioral questions rated on a 5-point Likert scale ranged from strongly disagree (1) to strongly agree (5) to measure intent to use digital financial services.

Primary data was collected using survey platforms and social media from people around the world over a two-month period (March-April 2021). To collect more data, the survey questions were translated from English into other languages such as Russian and Kazakh. As a result, survey participants who used non-English languages were one of three survey participants. (Figure 3). Overall, social demographic characteristics were shown in Table 2.

Items		Frequency	Percentile
Sample Size		405	100%
Gender	Female	187	46.17%
	Male	218	53.83%
Age	18>	18	4.44%
	19-24	60	14.81%
	25-34	129	31.85%
	35-44	132	32.59%
	45-54	52	12.84%
	55<	14	3.46%
Education	High school	15	3.7%
	Associate	7	1.73%
	BSc	160	39.51%
	MSc	112	27.65%
	PhD	92	22.72%
Employment	Post-Doc	19	4.69%
	Full-time	235	58.02%
	Part-time	35	8.64%
	Trade/vocational/technical	2	0.49%
	Unemployed	13	3.21%
	Self-employed	12	2.96%
Income	Student	106	26.17%
	Retired	2	0.49%
	No income	40	9.88%
	Less than \$2,500	75	18.52%
	\$2,501 to \$5,000	47	11.6%
	\$5,001 to \$10,000	106	26.17%
	\$10,001 to \$15,000	72	17.78%
	\$15,001 to \$20,000	20	4.94%
	\$20,001 to \$30,000	19	4.69%
	\$30,001 to \$50,000	18	4.44%
Frequency	\$50,001 to \$75,000	6	1.48%
	\$75,001 and above	2	0.49%
	1-2 times/day	165	40.74%
	3-5 times/day	86	21.23%
	1-2 times/week	68	16.79%
	3-5 times/week	47	11.6%
	1-2 times/month	36	8.89%
	Never use	3	0.74%

Table 2. Social demographic characteristics

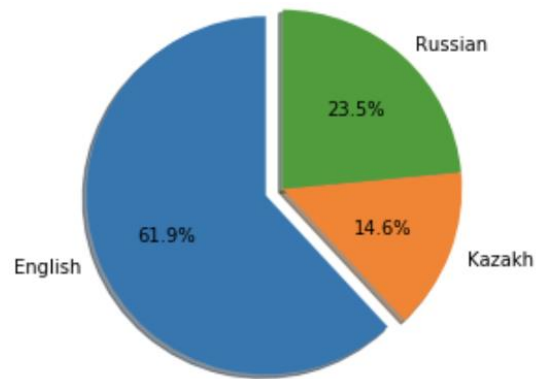


Figure 3. Percentage of survey languages

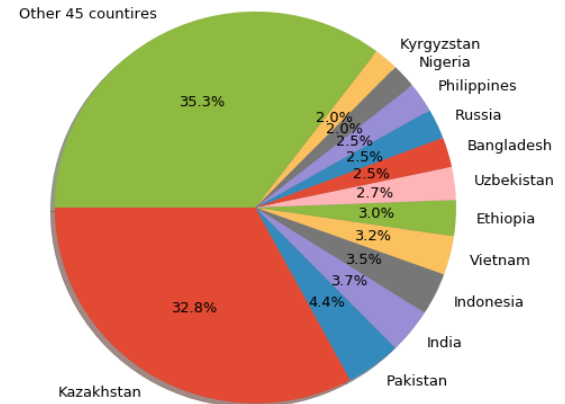


Figure 4. Participants among countries

At the end of the survey, the total number of participants was 437 people from 63 countries. As this study focused on developing countries, so the appropriate responses were selected for the study, the total number of observations was 405 out of 57 developing countries. These countries were selected based on the World Bank list, with the exception of high-income countries such as the Republic of Korea, the United States and most of Europe. (Figure 4.) A complete country list of survey participants is available in *Appendix 1*.

#### 4. Result of analyses

The study uses programming languages such as R (4.0.5) in RStudio (1.3.1093) and Python (3.9.1) in Jupyter Notebook to perform structural equation modeling (SEM) with factor analysis and path analysis. First of all, we scaled data for analysis.

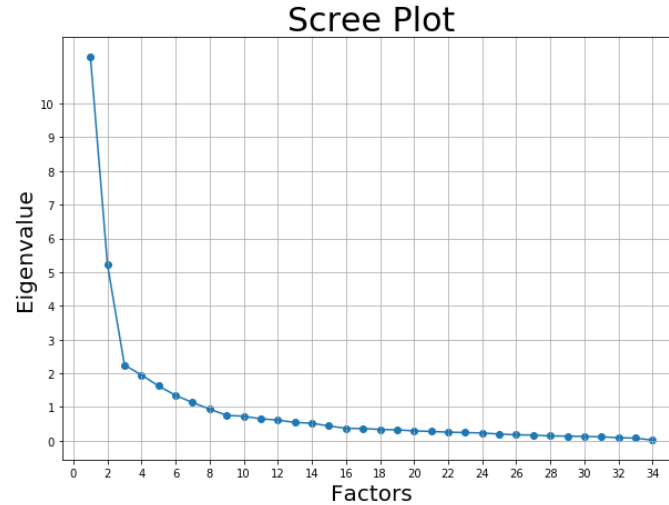


Figure 5. Scree plot of Eigenvalue by factors

To test items and latent variables, we do exploratory factor analysis (EFA) and scree plot to see how they fit into the data. As shown the screen plot that an eigenvalue less than 1 is displayed in 8 factors. (Figure 5) This is a truth value because we are using 8 latent variables of 34 items.

	PE	EE	SI	FC	BI	UB	FoC	Iso
PE1	<b>0.682</b>	0.171	0.200	0.189	0.182	0.259	0.006	0.014
PE2	<b>0.736</b>	0.264	0.103	0.182	0.172	0.213	-0.040	-0.017
PE3	<b>0.736</b>	0.317	0.154	0.132	0.178	0.075	-0.007	-0.078
PE4	<b>0.670</b>	0.226	0.181	0.154	0.246	0.109	-0.029	-0.052
EE1	0.310	<b>0.733</b>	0.181	0.283	0.104	0.191	0.048	0.012
EE2	0.363	<b>0.724</b>	0.107	0.252	0.102	0.137	0.002	0.003
EE3	0.263	<b>0.670</b>	0.189	0.293	0.152	0.201	0.032	0.025
EE4	0.251	<b>0.640</b>	0.136	0.356	0.145	0.165	0.026	0.014
SI1	0.154	0.053	<b>0.731</b>	0.210	0.116	0.219	0.048	0.105
SI2	0.177	0.151	<b>0.802</b>	0.119	0.121	0.202	0.016	0.151
SI3	0.114	0.176	<b>0.673</b>	0.174	0.108	0.023	0.105	0.103
SI4	0.304	0.260	<b>0.446</b>	0.279	0.132	0.047	0.097	0.041
FC1	0.143	0.198	0.178	<b>0.761</b>	0.103	0.099	0.046	0.022
FC2	0.162	0.217	0.176	<b>0.917</b>	0.120	0.168	0.076	0.039
FC3	0.241	0.302	0.199	<b>0.683</b>	0.141	0.169	0.090	0.056
FC4	0.141	0.241	0.170	<b>0.893</b>	0.146	0.195	0.092	0.044
BI1	0.364	0.117	0.229	0.255	<b>0.639</b>	0.189	0.042	0.040
BI2	0.280	0.226	0.154	0.238	<b>0.740</b>	0.249	0.034	0.037
BI3	0.394	0.146	0.167	0.113	<b>0.709</b>	0.252	0.058	0.033
UB1	0.381	0.235	0.155	0.185	0.327	<b>0.645</b>	0.016	0.005
UB2	0.134	0.335	0.155	0.245	0.208	<b>0.768</b>	0.053	-0.032
UB3	0.128	-0.034	0.285	0.134	0.031	<b>0.403</b>	0.245	0.067
UB4	0.254	0.269	0.155	0.225	0.235	<b>0.806</b>	0.048	-0.058
FoC1	-0.079	0.067	0.129	0.101	0.099	-0.046	<b>0.661</b>	0.176
FoC2	-0.009	-0.081	0.012	-0.003	-0.064	0.090	<b>0.849</b>	0.140
FoC3	-0.021	0.112	0.055	0.035	0.086	0.022	<b>0.785</b>	0.210
FoC4	0.174	-0.022	-0.070	0.072	-0.001	0.160	<b>0.687</b>	0.098
FoC5	-0.036	-0.016	0.078	0.045	0.010	-0.057	<b>0.769</b>	0.213
FoC6	-0.036	0.050	0.049	0.003	-0.015	0.044	<b>0.747</b>	0.167
Iso1	-0.059	-0.007	0.037	-0.028	-0.001	0.011	0.180	<b>0.804</b>
Iso2	0.060	-0.022	-0.031	0.003	0.075	0.068	0.224	<b>0.812</b>
Iso3	-0.062	-0.066	0.183	0.079	-0.072	-0.010	0.191	<b>0.557</b>
Iso4	0.042	0.066	0.009	0.012	0.097	-0.003	0.189	<b>0.648</b>
Iso5	-0.053	0.062	0.167	0.061	-0.031	-0.065	0.173	<b>0.777</b>

Table 3. EFA cross loadings

Construct	Outer	Loadings	CA	CR	AVE
Performance Expectancy	PE1	0.682	0.894	0.895	0.680
	PE2	0.736			
	PE3	0.736			
	PE4	0.670			
Effort Expectancy	EE1	0.733	0.915	0.916	0.732
	EE2	0.724			
	EE3	0.670			
	EE4	0.640			
Social Influence	SI1	0.731	0.843	0.849	0.587
	SI2	0.802			
	SI3	0.673			
	SI4	0.446			
Facilitating Conditions	FC1	0.761	0.949	0.954	0.840
	FC2	0.917			
	FC3	0.683			
	FC4	0.893			
Behavioral Intention	BI1	0.639	0.904	0.905	0.761
	BI2	0.740			
	BI3	0.709			
	UB1	0.645			
Use Behavior	UB2	0.768	0.849	0.875	0.652
	UB3	0.403			
	UB4	0.806			
	FoC1	0.661			
Fear of COVID-19	FoC2	0.849	0.896	0.898	0.595
	FoC3	0.785			
	FoC4	0.687			
	FoC5	0.769			
Social Isolation	FoC6	0.747	0.875	0.875	0.589
	Iso1	0.804			
	Iso2	0.812			
	Iso3	0.557			
	Iso4	0.648			
	Iso5	0.777			

CA: Cronbach's Alpha, CR: Composite Reliability,  
AVE: Average Variance Extracted

Table 4. Reliability and convergent validity

From the EFA cross-loading results in Table 3, we noticed that all values may explain their latent variables, although the values of some of them are less than the comparison of similar items. Then, we also checked for reliability and convergent validity. As shown in Table 4, all Cronbach's alpha (CA) and composite reliability (CR) values are greater than 0.7, and the average variance extracted (AVE) is greater than 0.5 values, which means that all items are sufficient for the model (Fornell & Larcker, 1981).

Next, in order to validate the high-fit model, we perform Confirmatory Factor Analysis (CFA) with all items and find that our model does not meet the research requirements. According to Schreiber et. al (2006), there are several indices to check for acceptance such as Comparative fit index ( $CFI \geq 0.95$ ), Goodness-of-fit ( $GFI \geq 0.95$ ), Tucker-Lewis's index ( $TLI \geq 0.95$ ), Normed fit index ( $NFI \geq 0.95$ ), Root mean square error of approximation ( $RMSEA \leq 0.80$ ), Standardized Root mean square residual ( $SRMR \leq 0.80$ ) and etc.

Based on these indices, we tried to test our CFA results for acceptance. However, at the beginning the results with 34 items, the CFA results were unacceptable. Therefore, we used Chin's (1998) suggestions for a fit, discarding the lower values from the EFA cross-loads. First, discarding values less than 0.6 (dropped 3 items) but still not satisfactory acceptance, then values less than 0.7 (rejecting other 11 items) still not acceptable for some indices. Finally, by dropping the other three elements in the model, the CFA results were satisfied main indices for acceptance. Thus, our items were discarded doubled, at the end by having only 17 items for 8 latent variables. All CFA results were shown in Table 5.

With all items	$\chi^2/df$ 4.052	chisq 2022.055	df 499.000	gfi 0.784	agfi 0.742	rmsea 0.087	srmr 0.063	cfi 0.871	tli 0.855	nfi 0.837	34 items used
After dropping items < 0.6	$\chi^2/df$ 3.905	chisq 1585.343	df 406.000	gfi 0.808	agfi 0.766	rmsea 0.085	srmr 0.052	cfi 0.894	tli 0.878	nfi 0.863	31 items used
After dropping items < 0.7	$\chi^2/df$ 2.600	chisq 322.446	df 124.000	gfi 0.925	agfi 0.885	rmsea 0.063	srmr 0.034	cfi 0.967	tli 0.954	nfi 0.948	20 items used
Dropping items: FC1, FoC6, Iso5	$\chi^2/df$ 2.924	chisq 266.139	df 91.000	gfi 0.951	agfi 0.880	rmsea 0.069	srmr 0.034	cfi 0.967	tli 0.951	nfi 0.951	17 items used

*Table 5. CFA results for acceptance*

To see the correlations among variables, we run the correlation matrix. We noticed that there is no high correlation, but there are two group relationships: positive and negative. One group consists of determinants such as PE, EE, SI, FC, BI, UB, while the other opposite group variables are FoC and Iso. The same group variables are positively correlated but negatively correlated with other group variables. (Figure 6).

We also performed Covariance-based structural equation modelling (CB-SEM) analysis to test relationship between latent variables. There are high covariances among variables PE, EE, SI, FC, BI, UB, but less covariance with Iso and FoC. However, the relationship between Iso and FoC has high covariance relationship (Figure 7).

According to CB-SEM results, all constructs of UTAUT have statistically significant (p-value) connections. Moderating variable (Fear of COVID) has significant covariance with Social Influence (SI) and Facilitating Conditions (FC), and statistically significant covariance with Social Isolation (Iso). Lastly, the relationship between SI and Iso also has significant connection (Table 6).

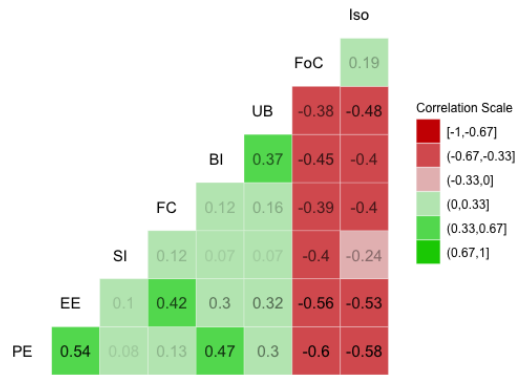


Figure 6. Correlation matrix between latent variables

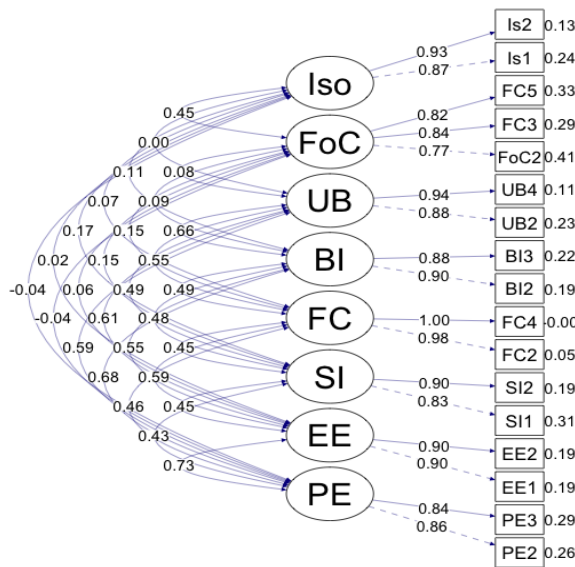


Figure 7. Covariance-based SEM

Covariances:				
	Estimate	Std.Err	z-value	P(> z )
PE ~				
EE	0.565	0.056	10.124	0.000
SI	0.309	0.047	6.536	0.000
FC	0.383	0.051	7.571	0.000
BI	0.525	0.055	9.619	0.000
UB	0.443	0.051	8.658	0.000
FoC	-0.024	0.039	-0.628	0.530
Iso	-0.030	0.043	-0.697	0.486
EE ~				
SI	0.333	0.048	6.873	0.000
FC	0.520	0.055	9.480	0.000
BI	0.448	0.052	8.569	0.000
UB	0.481	0.053	9.119	0.000
FoC	0.042	0.039	1.073	0.283
Iso	0.019	0.043	0.450	0.652
SI ~				
FC	0.367	0.050	7.287	0.000
BI	0.362	0.050	7.279	0.000
UB	0.358	0.049	7.369	0.000
FoC	0.097	0.038	2.582	0.010
Iso	0.122	0.042	2.908	0.004
FC ~				
BI	0.431	0.052	8.225	0.000
UB	0.472	0.053	8.930	0.000
FoC	0.116	0.041	2.832	0.005
Iso	0.058	0.044	1.295	0.195
BI ~				
UB	0.519	0.054	9.564	0.000
FoC	0.063	0.040	1.590	0.112
Iso	0.084	0.044	1.912	0.056
UB ~				
FoC	0.051	0.038	1.344	0.179
Iso	0.004	0.041	0.088	0.930
FoC ~				
Iso	0.298	0.045	6.608	0.000

Table 6. CB-SEM results

According to SEM regression results, the moderating role of Fear of COVID (FoC) can regulate the links between behavioral intent (BI) for using of digital financial service with social influence (SI), social isolation (Iso) with statistical significance ( $p\text{-value} \leq 0.001$ ), and it also significantly moderates the relationship between facilitation conditions (FC) and actual use behavior (UB) of DFS ( $p\text{-value} \leq 0.01$ ). Finally, FoC less moderates the relationship between effort expectancy (EE) and behavior intent (BI) with significance level ( $p\text{-value} \leq 0.05$ ). Consequently, hypotheses about the moderating role of FoC in these links cannot be rejected. Although there are hypotheses that cannot be accepted, in particular in the connections between PE and BI, BI with UB, as moderating these links by FoC. (Table 7)

In addition, as shown in Table 7, all constructs of the UTAUT model (PE, EE, SI, BI, FC) were put forward and accepted because, based on the regression results, these constructs show a level of statistical significance ( $p\text{-value} \leq 0.001$ ). The new variable Social Isolation (Iso) also has a significance with a  $p\text{-value} \leq 0.023$ . Therefore, based on our hypotheses, all these constructs cannot be rejected.

Regressions:

		Estimate	Std.Err	z-value	P(> z )	Std.lv	Std.all	Sig.lv
PE ~								
FoC	(PE)	0.013	0.036	0.367	0.714	0.004	0.004	
EE ~								
FoC	(EE)	0.087	0.039	2.267	0.023	0.120	0.120	*
SI ~								
FoC	(SI)	0.159	0.042	3.774	0.000	0.184	0.184	***
Iso ~								
FoC	(Iso)	0.510	0.063	8.050	0.000	0.435	0.435	***
BI ~								
FoC	(BI)	0.002	0.034	0.046	0.963	0.031	0.031	
FC ~								
FoC	(FC)	0.130	0.041	3.203	0.001	0.186	0.186	**
BI ~								
PE		0.498	0.051	9.708	0.000	0.578	0.578	***
EE		0.198	0.042	4.659	0.000	0.145	0.145	***
SI		0.230	0.049	4.680	0.000	0.257	0.257	***
Iso		0.059	0.029	2.020	0.043	0.085	0.085	*
UB ~								
BI		0.638	0.059	10.788	0.000	0.536	0.536	***
FC		0.417	0.052	8.035	0.000	0.333	0.333	***

Significance levels: \*  $p \leq 0.05$ , \*\*  $p \leq 0.01$ , \*\*\*  $p \leq 0.001$

Table 7. Regression results

Thus, after testing all of our hypotheses, we rejected two only hypotheses for containment impact on the connection in terms of expected performance with behavior and intent using behavior. In general, the results of the SEM analysis can be seen in Figure 8.

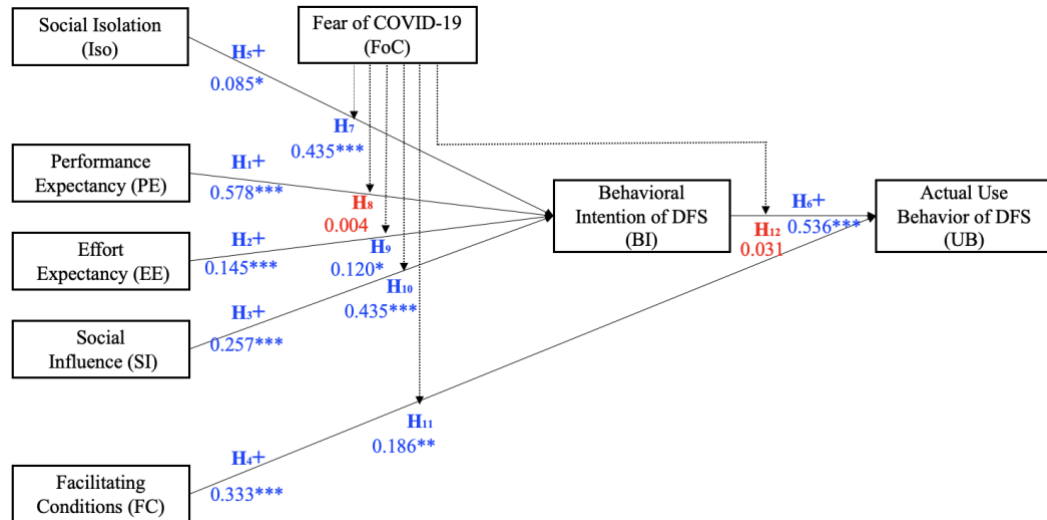


Figure 8. SEM analysis results

## 5. Discussion

To test behavioral intent constructs for digital financial services use during a pandemic, the study used the UTAUT model as a research framework, extending two constructs, fear of COVID and social isolation, to determine the relationship with dependent variables (behavioral intent and actual use of behavior in digital financial services). Thus, we developed 12 hypotheses for research and conducted several SEM analyzes, such as factor analysis (EFA, CFA), covariance-based structural equation modelling analysis (CB-SEM) and SEM regression.

According to our results, as one of main constructs in the model was performance expectancy (PE). Because it shows that if there would increase in one unit of PE, it may affect to about 0.578 units in the behaviour intention for using DFS in pandemic. In other words, PE can explain about 57.8% of the behavioral intentions to use this system. Moreover, similar results were obtained in previous studies: M-Banking (Sarfaraz, 2017; Raza et al., 2019; Purwanto & Loisa, 2020), Internet banking services (Daka & Phiri, 2019) and mobile payments (Abrahão et al., 2016; Patil et al., 2020), where they pointed out that performance expectancy (PE) is an important determinant for behaviour intention to use a particular system. However, our study has mainly focused on the use of DFS during a pandemic, so we did not reject the H1 hypothesis and we agreed that PE has a positive effect on the intention to use digital financial services in a pandemic based on our findings.

As we hypothesized that the effort expectancy (EE) positively influences the intention to use DFS during a pandemic, our results attributed this to statistically significant approximately. Previous studies have also illustrated similar findings (Abrahão et al., 2016; Sarfaraz, 2017; Sivathanu 2019; Raza et al., 2019; Purwanto & Loisa, 2020; Patil et al., 2020). Thus, during the COVID-19 pandemic, EE shows a statistically positive effect on behavior intention to usage of DFS. Hence, the hypothesis H2 is accepted in our study.

There was a positive impact on the intention to use DFS in a pandemic through social influence (SI). Our results show that this is statistically significant in the model. In addition, similar results have been illustrated in literature reviews (AbuShanab & Pearson, 2007; Martins et al. 2014; Abrahão et al., 2016; Rahi et al. 2018; Sivathanu 2019; Patil et al. 2020). So, agreeing with previous studies and based on our findings, we accepted the H3 hypothesis of a positive relationship between SI and BI in a pandemic.

While some studies have shown that facilitating conditions (FC) as opposing results (e.g. Martin et al., 2014), we found more similarities with most previous studies (Rahi et al., 2018; Raza et al., 2019; Sivathanu, 2019; Patil et al. 2020, Rahman et al., 2020), which explained that FC as vital factor for actual use of DFS. Therefore, based on our results, we came to the idea not to reject hypothesis (H4) in the relationship between FC and BI.

Despite the fact that social isolation (Iso) did not show the same high level of significance as the above constructs (its p-value is illustrated only less than 0.05), we do not reject the H5 hypothesis of a positive relationship between Iso and BI in a pandemic. Furthermore, previous studies have also shown results similar to our findings (Raza et al., 2020; Marston et al., 2020; Stockwell et al., 2020).

According to our findings, the relationship between intent and actual use of digital financial services during the COVID-19 pandemic shows a strong relationship with a high level of significance, with a p-value  $\leq 0.001$  and 53.6% of the explanation for actual user behavior. This result is in good agreement with previous studies in a similar field. Because most studies of the Technology Acceptance Model (in particular UTAUT) have shown more than 50% of this close



relationship between BI and UB. Therefore, we are glad to confirm and accepting this hypothesis (H6) about a positive influence on behaviour intention and use behaviour of DFS in a pandemic.

Finally, discussion about the moderating role of fear of COVID-19 (FoC) in digital financial service users. The study proposed six hypotheses based on the model. However, two of them are rejected (connections PE & BI and BI & UB), since they have a lower level of significance. Overall, we can say that fear of COVID-19 may have some connection with intention to use DFS in people of developing countries. Some studies have also come to the same conclusion as we have. (Raza et al. 2020; Gasparro et al. 2020; Koçak et al. 2021; Ye et al. 2021).

### ***Some limitation of the study***

Although the study is focused on developing countries, we noticed that one third of the data was collected in one country (Kazakhstan). Therefore, we considered one of the shortcomings of the study. Because it can be explained as one case of a middle-income developing country, but it may not explain low-income developing countries. Another limitation may be thought as time period of taking survey. Because the current fear of COVID-19 may be completely different from the start of the COVID-19 pandemic. However, even if this is a one-year delay, there is still a good connection between the other constructs of the model.

## **6. Conclusion**

Over the past year, due to the COVID-19 outbreak, people have changed their lifestyles, work remotely and avoid public gatherings, stay at home and are socially isolated. Due to the high prevalence and death of COVID infections in humans, people fear COVID. All governments try to overcome until now, for developing social distancing policies. All governments are still trying to overcome and develop social distancing policies that emphasize digital financial services (DFS). Because DFS can help you buy, sell, or transfer money remotely. Overall, DFS can help you live easier and more contactless during a pandemic. So, how DFS may impact in behaviour intention, use behaviour in COVID period.

Thus, this study focusses on indicating of the behavior of people using DFS during a pandemic, in particular in developing countries, then make 12 hypotheses for the study. To test them study use the UTAUT model, expanding it with two constructions: fear of COVID-19 as a moderator and social isolation as a direct determinant for behaviour intention.

A survey method is used, in which primary data is collected through survey platforms and social networks from people from developing countries, more than 405 participants aged 18 and over. This study uses structural equation modeling (SEM) to test our variables and hypotheses, analyze relationships, and determine the overall fit of the model. The study used factor analysis (EFA, CFA) and covariance-based SEM. As a result, we found that all UTAUT constructs and social isolation positively influence behavioral intent and actual use of DFS during a pandemic. Testing the moderating role of COVID fear for other constructs plays a positive role, with the exception of the relationship between expected performance and behavior intensity and the relationship between behavioral intent and actual use.



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## Appendix 1.

Questionnaire items	Literature Reviews
PE1 – I believe DFS would be useful services in my day-to-day activities. PE2 – Using DFS would make me perform my financial objectives more quickly. PE3 – Using DFS would save time so I can do other activities in my day to day. PE4 – DFS would bring me greater convenience.	Adapted from Venkatesh et al. (2003), de Sena Abrahão et al. (2016), Tak & Panwar (2017), Daka & Phiri (2019), Razif et al. (2020), Purwanto & Loisa (2020), Raza et al. (2020).
EE1 – My interaction with DFS would be clear and easy to understand. EE2 – It would be easy for me to develop the skills to use the DFS. EE3 – I believe that it is easy to use the DFS. EE4 – Learning to use the DFS would be easy for me.	
SI1 – People who influence my behavior would think I should use DFS (when available). SI2 – People who are important to me would think that I should use DFS (when available). SI3 – People who are important to me could assist me in the use of DFS (when available). SI4 – In the future, organizations that offer DFS will guarantee its proper functioning.	
FC1 – I have access to the necessary resources to use DFS. FC2 – I have the knowledge necessary to use DFS. FC3 – DFS is well suited/compatible with the mobile devices/ PC/ gadgets I use.	
BI1 – If I had access to DFS, I would have the intention of using them. BI2 – If I had access to DFS, I would really use them. BI3 – I think it will be worth it for me to adopt DFS when it's available.	
UB1 – I use DFS frequently. UB2 – I use many functions of DFS (online payment, transactions, saving etc.). UB3 – I depend on DFS. UB4 – Use DFS make my life easy and interesting.	De Jong et al. (2016); Wilder-Smith et al. (2020); Raza et al. (2020)
Iso1 – I felt alone and friendless. Iso2 – I felt isolated from other people. Iso3 – I have someone to share my feeling with. Iso4 – I found it easy to get in touch with others when I needed others to felt they had to help me. Iso5 – When with other people, I feel separate from them.	
FoC1 – I do not want to leave the house because of the risk of getting infected by COVID. FoC2 – I am concerned that I may get sick from COVID-19 during the next 6 months. FoC3 – I am feeling anxious about COVID-19. FoC4 – I am concerned that someone in my immediate family may get sick from COVID during the next 6 months. FoC5 – I am scared about getting infected by COVID-19. FoC6 – I see the possibility that Covid-19 will break out in the area where	Ahorsu et al. (2020), Raza et al (2020)

## Appendix 2.

Country	Participants	Country	Participants	Country	Participants
1 Kazakhstan	133	21 Cambodia	5	41 Brazil	2
2 Pakistan	18	22 Kenya	5	42 Fiji	2
3 India	15	23 Nicaragua	5	43 Sierra Leone	2
4 Indonesia	14	24 Rwanda	5	44 Afghanistan	1
5 Vietnam	13	25 Laos	4	45 Algeria	1
6 Ethiopia	12	26 Mexico	4	46 Cameroon	1
7 Uzbekistan	11	27 South Africa	4	47 Congo, Republic	1
8 Bangladesh	10	28 Turkey	4	48 Gambia, The	1
9 Philippines	10	29 Ukraine	4	49 Guinea	1
10 Russia	10	30 Colombia	3	50 Haiti	1
11 Kyrgyzstan	8	31 Egypt	3	51 Liberia	1
12 Nigeria	8	32 Iran	3	52 Libya	1
13 Ghana	7	33 Iraq	3	53 Malawi	1
14 Mongolia	7	34 Myanmar	3	54 Mali	1
15 Nepal	7	35 Peru	3	55 Pomania	1
16 Uganda	7	36 Sri Lanka	3	56 Togo	1
17 Moldova	6	37 Sudan	3	57 Yemen, Republic	1
18 Morocco	6	38 Tanzania	3		
19 Thailand	6	39 Azerbaijan	2		
20 Tunisia	6	40 Bolivia	2		
				<b>Total</b>	<b>405</b>