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Stock Market Trading through Mobile Application: An Analysis of Reaction to COVID-19

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ABSTRACT: This article aims to assess the need for a stock market mobile trading application in a developing country's capital market, such as Bangladesh's, where stock markets have been closed for more than two months during the first stages of the ongoing pandemic. The effect of COVID-19 is tested using an event study to evaluate if it has a statistically significant impact on the adoption rate of the DSE mobile app. A descriptive research approach has been implemented, and a t-statistic has been conducted. According to the statistics, COVID-19 significantly impacts the DSE mobile app adoption rate and the number of buy-sell transactions in Bangladesh's capital market. Compared to the total Beneficiary Owners account holders, only 3.75 percent of investors use the DSE mobile app for transactions. All of this indicates that the stock market in Bangladesh has only partial digitalization, and as a result, it does not provide a suitable platform for coping with negative occurrences. As a result, authorities must encourage the adoption of full-fledged digitizing by involving all stakeholders in the chain to deal with the sudden and long-lasting shock caused by pandemics such as the coronavirus epidemic in 2019.

KEYWORDS: COVID-19, Dhaka Stock Exchange, digitalization, mobile trading app, stock market.

1. INTRODUCTION

When the COVID-19 epidemic broke out, there was no choice but to learn more about implementing online stock market trading. A developing country's capital market, such as Bangladesh, must be digitalised. The stock markets were halted for more than two months during the earliest stages of the ongoing pandemic (Uddin et al., 2021). As a result, more digitalization was required for Bangladesh's stock market to catch up.

The ongoing pandemic coronavirus disease 2019 (COVID-19) is regarded as one of the most severe humanitarian crises. As a direct result of the epidemic, worldwide stock markets saw a significant reduction in their market prices. Since the start of the crisis, the value of the world's leading stock indexes, such as the NASDAQ100, Nikkei225, and S&P500, has dropped by about 30%. (Ding et al., 2020). Interestingly, the global stock markets observed a highly noticeable drop in their market prices as an immediate effect of the pandemic. On March 8, 2020, the first COVID-19 case in Bangladesh was disclosed, causing a significant decline in investor confidence (Alam, 2020). Although one of the DSE's indexes, the Dhaka Stock Exchange Broad Index (DSEX), plummeted to 3953.38 points, the lowest in 13 years, the regulator set a floor price to limit market price falls (Rahman et al., 2021). Bangladesh was one of the few countries where the stock markets were closed for more than two months owing to the ongoing pandemic (Ashraf, 2020) before the two exchanges reopened on May 31st, 2020.

The market's regulator, the Bangladesh Securities and Exchange Commission (BSEC), has taken a number of steps to encourage digitization in Bangladesh's capital market, including making it easier for investors and stakeholders to invest and monitoring the market with an advanced surveillance system. Mobile-based platforms for security trading are the most emerging, which are xpected to enable investors to put buy-sale orders directly and to get price alerts. Thus, the web-based software applications and packaged software applications, namely mobile trading apps (MTA), help investors do many tasks related to stock trading. Investors can easily buy or sell their stocks, maintain the portfolios, transfer funds from a Bank account to a BO account, compare company profiles and do technical studies by planning.

Despite the massive scope for future growth of mobile Internet and devices, stock trading in these devices is still in infancy in a developing country like Bangladesh (Dey et al., 2019). This scope leaves tremendous opportunities for the development of using mobile as a trading platform, especially for those investors who do not have direct access to other electronic equipment like a personal computer (Vimalkumar et al., 2021). With the improvement of the lifestyle of the people of Bangladesh, many of them

are using smartphones in this age of affordable and enriched technology. However, mobile devices have several confines for mobile stock trading apps, and in Bangladesh, only the Dhaka Stock Exchange is offering the service currency. A better understanding of stock investors' usage intention would have great practical value (Parl et al., 2013), not only for the current service provider, i.e., DSE, but also for the brokerage houses in Bangladesh who wish to introduce their mobile trading platform to consider stock investors' demands for mobile stock trading.

The existing literature focuses on the impact of the pandemic on the capital market of Bangladesh (Aktar et al., 2020; Ahmed, 2021; Adnan and Hasan, 2021; Golder et al., 2022; Adnan et al., 2020). However, there is no such study concentrating on the necessity of stock market trading using the DSE mobile application in the capital market of a developing country like Bangladesh. Therefore, the purpose of this study is to first, illustrate a brief description of the DSE mobile trading app's launching history, operation, usage and cyber security issues for the current unaware and prospective trading app users of capital market investors in Bangladesh. Secondly, to identify the facts and figures on the usage of the DSE mobile trading app with particular emphasis on the current pandemic situation which eventually show the necessity of digitalization in Bangladesh's capital market.

2. LITERATURE REVIEW

2.1 Overview of Mobile Trading Application in Bangladesh

2.1.1 Introduction to DSE Mobile App

The premier bourse of Bangladesh, i.e., the Dhaka Stock Exchange, launched its mobile-based stock/share trading app on March 9, 2016. To use this app, the investors who have BO accounts with brokerage houses need to fill up a registration form available at DSE Website and submit it to the broker house with whom they opened their BO account. Once the broker completes the due process of registration, the investors will get the credentials (user ID and Password) to use the app. A detailed feature of the DSE Mobile Trading App is presented in table 1.

According to a report by Financial Express, the number of active users of the DSE Mobile application increased to 53,254 as of March 25, 2020. In 2019, the investors placed above 7.09 million orders through the DSE mobile app. Of them, 4.96 million orders were executed, the DSE data shows. Moreover, during the pandemic of COVID-19 in 2020, the usage of the DSE Mobile apps has increased very high compared to other years.

Table 1: Summary of Features of the DSE Mobile App

Features	Elucidation of DSE Mobile Trading App (MTA)
Inauguration	March 2016
Developer	DSE Mobile is a part of DSE's 'Order Management System' (OMS), which was created by Flex Trade Systems Ltd. DSE receives all technical assistance from Flex Trade System Ltd. in Singapore.
The associate expenses for the operation	DSE only spends money on the Internet and per-user membership fees after the system is purchased once. The monthly Internet charge is roughly 50,000 BDT, and the DSE Mobile App subscription fee is 1 USD per month.
Personnel	The DSE Mobile App is managed by a team of seven individuals.
Fees	Free
Versions	The Mobile App is available in two editions. First for trading, and second is for non-trading or informational purposes.
Fit for Brokers	The DSE created a standard structure for each broker company. This method can be used by brokerage firms that have one or more terminals. Some brokerage firms have developed their own OMS, which includes a mobile app.
Time	10 am to 2:30 pm
Security	Two factor SMS verification code is needed as a security code for logging in to the Mobile App through a password.
Automatic log-out feature	Automatic log-out increases the investors' cyber security. Once a person logs in with a password or with a verification code, he is logged in for 30 minutes. If a user jumps into another app while using DSE Mobile App, it will automatically log out immediately.

**** Source:** From an interview of the DSE personnel.*

2.1.2 Operation of DSE Mobile App

Firstly, the users must open the app on their smartphones and log in with their user ID and passwords. After successful login, the app will open a dashboard that will lead to the notification window. The notification window will let the users know information about their accounts and interests in the market. On the right of the Notification button, there remains the Watchlist button which allows the users to look at the securities in their portfolio, securities they follow and indices. Then it comes to the order blotter button to see the users' order summary. By tapping the My Orders button, users may see their working orders inside this window. Moreover, by tapping on the Working Orders button, users can view the executed and terminated orders. The users may check the cash balance and remaining balance by tapping the My Account button next to the order blotter. The users may close and end their session by tapping the LOGOUT button.

2.1.3 Alerts, Buy & Sell and News of Securities by DSE Mobile App

The user may get an alert of their target price for any security by getting an alert notification on their smartphones. The users need to tap the Set Alert button while remaining on the desired securities' detailed page to get an alert. Once the market price meets the users' desired target price, immediately, the app will alert the users. To buy or place any buying order of any security, the users must go to the Watchlist, then find their desired security and tap on it. Then, they should tap on BUY and set their desired quantity and price. A preview order will be shown after that. If the Order is correct, the users must type their password and tap the Place Order button. Once the order is placed, users may see their order details again. The users may also find their order lists at Order Blotter. To get news updates on any security, the users should go to the Watchlist again, tap their desired security, go inside the page, and scroll down. At the bottom of the security's detailed page, the updates and news about the security/company will appear.

2.2. Literature of the Study

From the evolution of the Computerized Internet-based Online Stock Trading System, the Mobile trading system is the latest technology that has added a new dimension to the stock trading systems executed by the investors (Zaman, 2019). The new electronic trading operations have made a breakthrough where the stocks can be traded in Demat form through electronic media. Through Web-based software applications, investors can easily buy or sell their stocks, maintain their portfolios, transfer funds from Bank account to BO account, compare company profiles and do technical study by planning (Nurunnabi & Hossain, 2011).

Adopting mobile stock trading is a critical business challenge. Investment firms should take a holistic approach to assess the potential adoption of mobile stock trading and understand the factors driving the adoption of mobile-based services (Man, 2019). This information enables investment firms to proactively develop solutions tailored to groups of equity investors who would otherwise be less inclined to engage in mobile equity trading. (Zhang and Teo, 2014; Teschner et al., 2012). Since mobile stock trading is an innovative service that uses information systems accessed through mobile technologies, this study suggests making investors aware of the mobile app more rigorously. However, only one mobile trading app platform cannot significantly contribute. The brokerage houses should come forward and introduce their own MTA.

Many countries have several MTAs that accelerate the process of altering business operations, products, and services by adopting technologies to minimize costs, improve turnaround times, and introduce automation instead of the manual process (Bouwman et al. 2019; Parviainen et al., 2017). In order to get cope with the COVID pandemic, exchange and brokerage houses are emphasizing doing trade through MTA, where investors can trade in real-time without any physical contact. In order to do online trading through MTA as digitalized business, it is highly needed to incorporate partial or complete digital technologies into operational activities (Soto-Acosta, 2020).

Despite all these developments, the negative trend created by the pandemic hits the stock market and leads to a decline in stock prices. According to Yu and Aviso (2020), the stock market has seen the toughest one-day reduction in market indices worldwide, causing an 80 percent fall in stock prices. Even countries with highly digitalized stock markets, including the USA, Germany, and the UK, observed 30 percent, 33 percent, and 37 percent respective fall in the overall stock market index compared to the peak prices (Shkarlet et al., 2020). In the same way, developing countries like Brazil and Poland also noticed a respective reduction of 48 percent and 38 percent. This is highly likely as "studies in behavioral finance have shown that investors may over-react in the short term when they become extremely pessimistic during downturns or place too much importance on recent events while ignoring historical data" (Ding et al., 2020, p. 2 of 21).

However, a subsequent possible market correction was reported in the stock market. By observing the top 25 most affected countries' stock markets, Phan and Narayan (2020) mention that during the initial stages of the pandemic, the stock prices in a majority of these countries responded negatively, while with the passage of time, especially when countries observed 100,000 infections and 100 deaths, the reaction in 50 percent of these markets was positive (Liu et al., 2021). Nevertheless, the ongoing pandemic has made dramatic changes since the beginning of 2020 by introducing social distancing and lockdown around the

world, which forced the businesses to embrace new normal situations such as adopting work from home policy, teleworking, and most importantly, the use of digital technologies in the office (Soto-Acosta, 2020). Stock markets and the listed companies need to embrace the changes fluently to overturn the investors' confidence. Bangladesh, like other countries, focuses on mobile trading (DSE smartphone app), which replaces the current physical interactions between buyers and sellers in the capital market. However, no research has been conducted to determine whether investors would use mobile trading platforms to recognize the importance of digitalization during the epidemic. The paper fills this need by examining the influence of the COVID-19 outbreak on the adoption of stock market trading applications in Bangladesh's capital market.

3. RESEARCH DESIGN

The purpose of this study is to explore the trading behaviors and judgment patterns of investors using the DSE Mobile trading app during COVID-19. In addition, this study investigates whether results obtained from the statistics are significant when investors are constructing trading through the mobile app before and after the pandemic.

Daily data have been collected from the IT division of Dhaka Stock Exchange from January 2019 to December 2021. DSE has started keeping the data recorded from 2021, and hence this study presents holistic information regarding the trading usage, trading and execution behavior of the registered users. In this study, several graphical displays show the trading actions and decision patterns of the investors who are using digital platforms in the COVID period. Here, the t-statistics has been conducted, which is commonly used to examine the significant status to compare the means average of two groups (Ibragimov and Müller, 2010; Rahman et al., 2020; Nanayakkaraa, 1992). It is a powerful research tool which shows the significance level of whether the treatment (DSE MTA) affects the population of interest, here the registered users, in the capital market of Bangladesh in the presence of a historic pandemic breakthrough. SPSS 24 has been used to conduct the statistical examination here.

4. FINDINGS OF THE STUDY

Flex Trade Systems, a global leader in broker-neutral trading platforms, created the DSE mobile trading app. The software is available on both the Google Play Store (for Android users) and the App Store (for iOS users) (iPhone users). The smartphone must have a minimum screen size of 4 inches (4 inches), a resolution of 320 pixels (320px), and an Android version of 4.4 to run this app correctly (Android KitKat).

4.1 Daily DSE-Mobile Trade Status

Since the app's launch, the whole DSE MTA team has worked to encourage investors to use it and undertake trading using it. DSE, on the other hand, began keeping a record of the user on January 1, 2019. 1) Registered Mobile User, 2) Logged-In Status, 3) Submitted Order, and 4) Executed Trade — the complete record-keeping phase has been divided into four categories. These four classes are further divided into sub-categories. The visual sub-categories are shown in Figure 1, and the descriptions are given in Table 2.

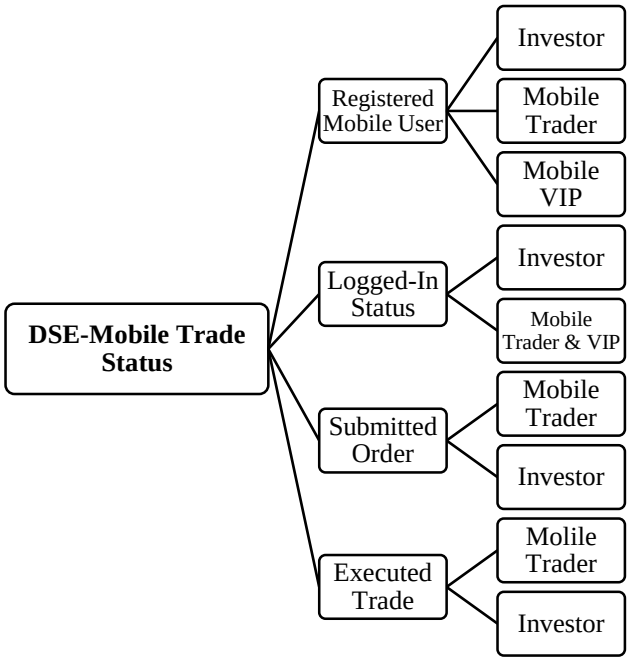


Figure 1: DSE-Mobile Trade Status

*__Source:__ DSE, IT Division.

Table 2: Daily DSE-Mobile trade status categories and sub-categories

Categories	Descriptions & Subcategories		
Registered Mobile User	Total number of investors that have been registered to use the app for trading purposes	Investor	App user who conducts the trading through a desktop computer
		Mobile Trade	App user who conducts the trading through mobile phone
		Mobile VIP	App user who does not conduct any trading but uses it for knowing available information shown in the mobile app.
Logged-In Status	Total number of app users who logged-in on that particular day	Investor	Logged-in through a desktop computer
		Mobile Trader & VIP	Logged-in through mobile phone
Submitted Order	Total number of buy-sell orders submitted through the app	Investor	Number of buy-sell orders submitted through a desktop computer
		Mobile Trader	Number of buy-sell orders submitted through the mobile phone
Executed Trade	Total number of orders that have been executed finally on that particular day	Investor	Number of orders that have been executed desktop computer
		Mobile Trader	Number of orders that have been executed mobile phone

The DSE-Mobile App was deployed by almost 36 thousand investors at the start of 2019. Up to March 2019, it grew slowly. When the COVID-19 pandemic broke out, DSE was shut down for two months, until May 2019. Table 3 shows that there was a significant decrease in the use of the trading app, which appears reasonable. However, app user logged-in status grew dramatically after COVID, with a 56 percent gain, whereas it was even negative before COVID.

Table 3: Semi-Annually DSE-Mobile Trade Growth Status

Date	Total Registered Mobile User	% Growth	Total Logged-In User	% Growth	Total Submitted Order	% Growth	Total Executed Order	% Growth
1/1/2019	36,201		8,868		22,920		17,602	
1/31/2019	40,550	12.01%	11,731	32.28%	44,707	95.06%	32,242	83.17%
6/30/2019	46,283	14.14%	10,756	-8.31%	30,224	-32.40%	21,639	-32.89%
12/30/2019	51,199	10.62%	9,827	-8.64%	25,768	-14.74%	18,039	-16.64%
6/30/2020	53,754	4.99%	6,065	-38.28%	11,335	-56.01%	4,829	-73.23%
12/30/2020	50,151	-6.70%	21,659	257.11%	78,124	589.23%	58,141	1104%
6/30/2021	68,895	37.38%	26,779	23.64%	83,125	6.40%	58,653	0.88%
12/30/2021	77,058	11.85%	24,993	-6.67%	54,024	-35.01%	40,678	-30.65%

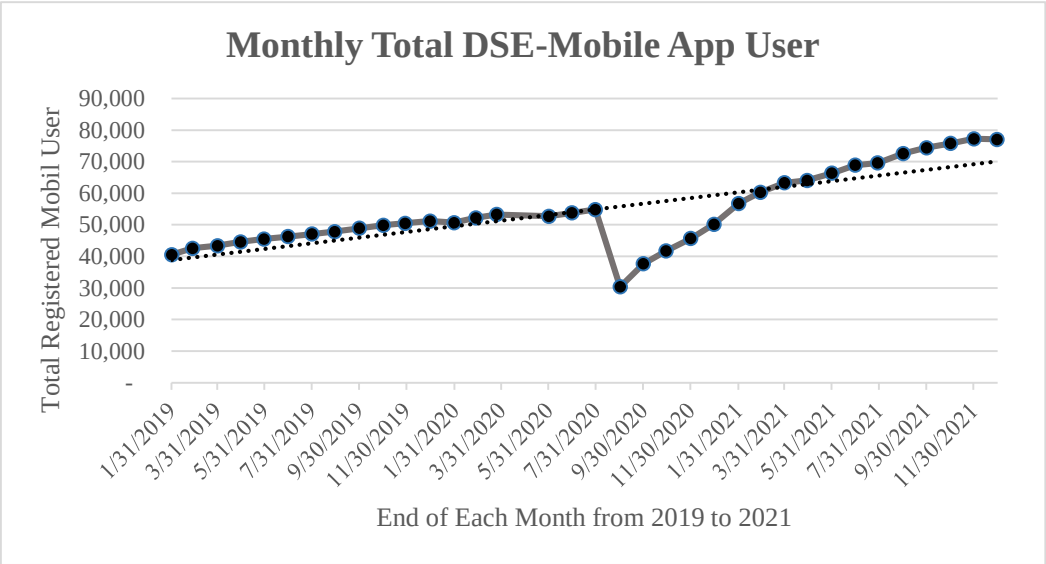
Users also placed more buy-sell orders through the mobile app after roughly a year, representing a 290 percent increase. Surprisingly, the program executes nearly double (500%) the buy-sell orders that are submitted. Unfortunately, despite the fact that more individuals are using the app these days, the number of transitions has decreased significantly.

In three years after the epidemic, the number of mobile app users nearly doubled, as shown in graph 1 below. Prior to COVID, growth was slower, but it picked up following the epidemic. It's reasonable to infer that the scene occurred for a cause. During the pandemic, investors were hesitant to visit the stock exchange in person, preferring to use the electronic platform.

Table 4: Comparison between before and after COVID effect of DSE-Mobile App trade growth

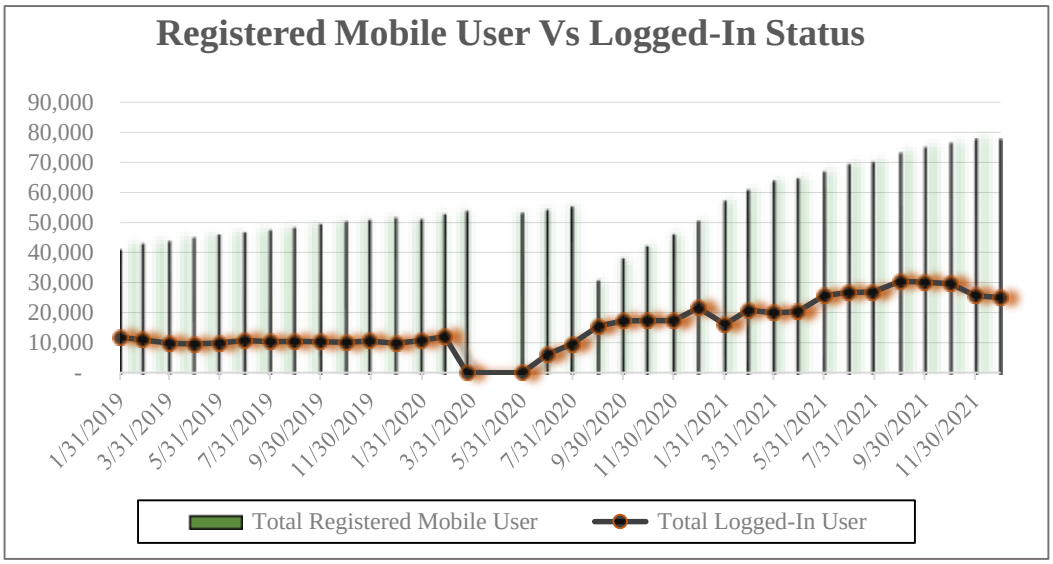
Date	Total Registered Mobile User	% Growth	Total Logged-In User	% Growth	Total Submitted Order	% Growth	Total Executed Order	% Growth
1/1/2019	36,201		8,868		22,920		17,602	
3/25/2019	53,254	47.11%	8,272	-6.72%	14,134	-38.33%	7,688	-56.32%
8/9/2020	55,104	3.47%	12,909	56.06%	55,571	293.17%	46,253	501.63%
12/30/2021	77,058	39.84%	24,993	93.61%	54,024	-2.78%	40,678	-12.05%

Graph 1: Status of mobile app users before and after COVID



The above situation is reflected in the below two cases. More people were logging in to the app (graph 2), and the number of submitted buy-sell orders increased noticeably. To avoid in-person contact, investors' dependency on this digital platform has increased. During the pandemic, consumer trading operations became increasingly reliant on online platforms, and investors eagerly adopted the mobile trading app to maintain the distance (He et al., 2020; Wu & Hui, 2021; Li et al., 2021).

Graph 2: Comparison between app users and logged-in users before and after COVID



Investor trust grows as a result of utilizing this mobile trading app, as seen by the number of buy-sell executed orders (graph 3). More than 75% of orders were fulfilled soon following the pandemic, which is still ongoing.

Graph 3: Comparison between submitted and executed orders before and after COVID

5. RESULTS DISCUSSION

An independent t-test has been conducted to compare the mean total app users, total logged-in status, total submitted buy-sell orders and total executed orders. There are significant differences in the scores for the total registered app users before and after COVID with t (487) = -17.644, p*** = 0.000; total logged-in status before and after COVID with t (487) = -28.559, p*** = 0.000; total submitted buy-sell orders before and after COVID with t (487) = -22.106, p*** = 0.000; total executed buy-sell orders before and after COVID with t (487) = -21.382, p*** = 0.000.

Table 5: Independent t-test to see the reaction of COVID-19 on mobile trading app usage

		Levene's Test for Equality of Var.		t-test for Equality of Means (99% Confidence Interval of the Difference)				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Total_User	Equal variances assumed	331.486	.000	-15.897	680	.000	-12510.221	786.951
	Equal variances not assumed			-17.644	487.112	.000	-12510.221	709.017
To_Logged_In	Equal variances assumed	434.211	.000	-25.171	680	.000	-10335.399	410.613
	Equal variances not assumed			-28.559	397.980	.000	-10335.399	361.903
To_Submit_Ord	Equal variances assumed	198.660	.000	-19.748	680	.000	-31181.097	1578.919
	Equal variances not assumed			-22.106	458.137	.000	-31181.097	1410.522
To_Exec_Or	Equal variances assumed	221.730	.000	-19.090	680	.000	-26064.833	1365.388
	Equal variances not assumed			-21.382	449.489	.000	-26064.833	1219.022

These findings imply that COVID-19 considerably impacts DSE mobile app adoption and buy-sell transactions in Bangladesh's capital market. The t-statistic shows a significant mean difference between those who use the DSE mobile app before and after the COVID-19 pandemic. The findings reveal that after the COVID outbreak, the percentage of subscribers of the DSE mobile app increased. Investors placed significantly more orders during the epidemic and completed these transactions through the DSE mobile trading application. Even though trading through this app has expanded, it is still a small percentage of the total number of Beneficiary Owners (BO) account holders. Only 3.75 percent of the 2,055,381[1] BO accounts holders use the DSE mobile app.

[1] According to CDBL, as of 21 March 2022; considered only single (1,398,885) and joint (656,496) BO accounts.

5. CONCLUSION

Once tagged as a bottomless basket, Bangladesh is classified as one of the following eleven emerging markets with 163 million active mobile phone users (Uddin et al., 2021). Like other developed stock markets, our capital market has incorporated digitalized mobile applications for transactions (Jalabneh et al., 2021). However, despite being digitized, the stock market suffered during the initial stage of the pandemic; even the trading was surprisingly suspended for more than two months (Haque and Chowdhury, 2020). We are talking about Stock Market Trading through mobile applications, this study aimed at evaluating the urgency with particular emphasis on the pandemic situation. Our study finds that trade (buy-sell) submission and execution increased remarkably after the pandemic through the mobile app; however, interestingly, the number of users has not increased proportionally. The statistical result clearly shows significant effects of COVID-19 on the usage of the DSE mobile app.

It has been observed that many investors are unaware of the exchanges' digital apps. Only the DSE mobile app has the most users, with the rest of the apps being installed on only 2% of investors' devices (BSEC, 2021). None of the brokerage firms have introduced a stock trading app. They almost certainly possess the necessary technical expertise and infrastructure to enable this application. All of this suggests that the digitalization of a developing country's stock market, such as Bangladesh's, is only partial, and hence fails to provide an appropriate platform for coping with bad conditions.

A few policy recommendations might be made based on the findings of the study. According to the report, improvements from authorities and exchanges will not be enough to get the investors to use this application; instead, the entire network needs technological innovation. Because the number of smartphone users in Bangladesh is rapidly increasing, the brokerage houses, in addition to relying on the DSE mobile app, must guarantee that their clients are aware of the app because they have direct contact with investors. To deal with the COVID-19 pandemic's sudden shock, all brokerage companies are required to educate their clients about the existing DSE mobile app and should develop their own comprehensive mobile application.

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