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RESEARCH PAPER

The Role of Mobile Banking in Pakistan with Regard to Financial Inclusion

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ABSTRACT

The main purpose of this study is to determine the role of mobile banking and its effects on economic growth and financial inclusion in Pakistan when gender acts as a moderating variable. As we know, mobile banking services remove time and space barriers from banking tasks like checking account balances and transferring funds between accounts, saving customers' time when visiting banks to use various banking services. Data was collected from the secondary source website of 'State Bank of Pakistan' as well as from various journals and articles spanning ten years, i.e., 2011–2021. Also, various analyses were applied to the secondary data, i.e., the unit root test, multicollinearity, descriptive statistics, and Ordinary Least Square (OLS) regression analysis by using E-views 7.0, and it was concluded that mobile banking was among the significant determinants of financial inclusion and economic growth (GDP). Whereas, in moderator gender male behavior effects significantly among mobile banking variables, i.e., Access to Mobile Phone & financial inclusion variables, i.e., (Number of mobile banking accounts & Savings) and the G.D.P. And female behavior seemed to act as a key moderating factor among both the mobile banking & financial inclusion determining factors, i.e., Number of mobile banking accounts. However, it has insignificant effects between the mobile banking variable, i.e., Access to Mobile Phone and financial inclusion variable, i.e., savings. Moreover, to improve generalizability, future research on other countries could be undertaken in addition to this one, using a larger data set because this study was limited to Pakistan only**.**

Introduction

These days, the mobile banking situation in developing countries is entirely different due to the quick development of mobile technology, and the majority of the banks utilize mobile technology, also referred to as virtual banking or mobile banking (m-banking), to offer financial services to those who don't have approach to banks. Through the use of a mobile device and mobile SMS (short message service), mobile banking provides customers with the support they need to unlock bank services whenever and wherever they are. Mobile banking services remove time and space barriers from banking tasks like checking account balances and transferring funds between accounts, saving customers' time when visiting banks to use various banking services. M-banking additionally advances the nation's financial sectors and financial inclusion. Additionally, it was noted that the most researched phenomenon in developing nations such as Pakistan is financial inclusion (FI), since it has become essential to the country's growth in terms of social development & financial sector improvement. By establishing cutting-edge models, innovation in the mobile phone industry has transformed the financial sector. Mobile financial services appear to be relatively affordable, secure, reliable, and controllable, allowing low- and impoverished individuals to improve their financial platforms, including agency banking, mobile banking, and other

financial services. In particular, consumers in places where baking services are not offered globally have access to new markets thanks to the widespread use of cell phone technology.

Furthermore, financial inclusion was defined by the Rangarajan Committee (2008) as the process of guaranteeing that vulnerable groups connected to lower-income and weaker groups can access financial services appropriately and that they can obtain sufficient credit at a reasonable cost when needed. Financial inclusion, according to the International Monetary Fund (IMF), is the organized effort to make financial services accessible to everyone, with a focus on the impoverished and destitute. Moreover, Zulfiqar et. al. (2016) stated in their study that a crucial component of financial inclusion is timely and equitable access to lines of credit. Over half of Pakistan's population lacks control over resources and is therefore monetarily exempt. Therefore, the current study investigated how mobile banking services can increase financial inclusion & spur economic growth in Pakistan over a period of 2011–2021. This research holds practical significance for policymakers and organizations such as the State Bank of Pakistan, as it aids in the development of policies that specifically address the regulation of mobile banking services. The results of this study will provide fresh perspectives that could aid in enhancing the laws governing mobile banking policies and regulations, enabling everyone in Pakistan to easily access mobile banking services, and supporting the nation's economic development.

Literature Review

In Pakistan, mobile banking began in 2005–06 when the State Bank of Pakistan (SBP) entered into agreements with foreign agencies to develop its data for internationally recognized protocols. Through the use of a mobile device and mobile text messaging, mobile banking provides customers with the support they really need to obtain bank services whenever & wherever they are. Mobile banking services remove time and space barriers from banking tasks like checking account balances and transferring funds between accounts, saving customers' time when visiting banks to use various banking services. According to Atman (2013), the remarkable growth of the data and correspondence revolution has coincided with its expansion in the banking industry. Currently, portable money is an essential component of the banking systems in many different countries. As per the point of view of Etim, A. S. (2014), mobile phones were once used to provide services for high-demand projects like mobile banking or mobile cash exchanges, even though they were mostly adopted and used for communication with family and friends. Msweli & Mawela, (2021) demonstrated that older adults had a low adoption rate for mobile banking. Furthermore, it was clear that a number of obstacles, such as a lack of knowledge and comprehension, concerns about security and trust, language barriers, demographics, the ambiguity of mobile banking apps, and a lack of commitment, affect how easily older people adopt mobile banking. Okello & Ntayi, (2020) examined how the acceptance of digital mobile money has an impact on financial inclusion both intrinsically and extrinsically. Furthermore, the adoption and use of mobile money, along with electronic consumer protection, have an impact on financial inclusion. Amoa Korle & Asiama, (2020) suggested that regular use of mobile money to obtain social and economic services can significantly improve people's overall well-being, financial inclusion, and financial empowerment. But as per Siddik et al. (2014), mobile banking is an additional choice to traditional banks and "ATM" networks, which allow many people—including those who live in remote areas—to easily access official financial services. Khan & Rashid (2015) looked into the possibility of successfully using the savings to increase private investment in framework, social insurance, and training. For consumers, mobile banking improves the accessibility, affordability, and range of products related to money. According to Saibal Ghosh's (2016) research, mobile phones have a positive and quantifiably significant impact on development. Additionally, it suggested that mobile phones have a significant and positive impact on economic advancement. Seng. K. (2017) suggested that mobile phones will likely convince families to accept the recognition provided by microfinance institutions, particularly for non-

agricultural ventures; however, this will discourage families from using credit for purposes that are not advantageous. Also, in the research done in India by Kamboj (2014), there seems to be a constructive direct affiliation amongst the number of A.T.M.s and major bank networks and the turnover ratio of the nation. Mago & Chitokwindo, (2014) recommended that those with low incomes would now be able to benefit from the comparable array of financial services provided by mobile banking. The non-banked mobile framework is undoubtedly ideal for remote areas where it can be easily accessed by everyone and offers faster, more convenient, and less costly ways to send and receive money. McKinsey Global Institute, (2016) portrayed that digital payments are improving incomes by reducing the amount of the informal economy and unregistered businesses that either don't pay taxes or simply follow business regulations. This leads to cost savings and increases in productivity. Furthermore, mobile banking improves the G.D.P. by eliminating the need to exchange cash, leading to more settlements and the completion of fund transfers for investments and savings. Asongu & Odhiambo, (2017) examined the relationship between mobile banking and economic development using three estimates: poverty, non-equality, and development quality. Encouraging applications of mobile banking would do the sustainable job of responding to the challenges of ignoring development, inequality, and poverty in developing countries as a fundamental strategy execution. George, (2012) revealed that the following factors are likely to influence the likelihood of increased financial service usage: tariffs, gender, age, and educational attainment of the population. Ouma et. al, (2017) evaluated the association between gender identification and financial inclusion as assessed mostly via savings, and reported that women will likely save much more than men, but by running logit regression, it came out to be that men seem to save more than women. Malaquias, & Silva, (2020) showed that the primary constructs relating to the use of m-bbanking by the agricultural producers who took the survey were performance expectancy, convenience of use, and honesty. Moreover, there was a negative correlation between using mobile banking & social influence. Ahassan, Blokhina, & Kouadio, (2021) established that the growth of mobile money has a major impact on economic growth, with GDP per capita serving as the dependent variable. However, the model's findings may vary significantly depending on the variable used as a stand-in for economic growth. Aron, J. (2018) explored that although direct evidence of the promotion of welfare and saving is still largely weak, it has been suggested that mobile money encourages risk-sharing through its channels of economic influence from a micro perspective. Tariq, et al., (2021) revealed that the characteristics of mobile financial services that affect populations in both rural and urban areas differ significantly. But only in the rural sample was the moderating role of gender found to be supported. Dzogbenuku, et. al., (2022) concluded that age and gender categories have an impact on the digital payment systems' user experience. It seemed that women prioritized security over an excellent customer experience, while men prioritized ease of use.

Hypothesis

H_1: Mobile banking has the significant impact on financial inclusion.

H_{1a}: Access to Mobile Phone (ATM) has the influence on Number of mobile banking accounts (NMB).

H_{1b}: Access to Mobile Phone (ATM) has the influence on Savings(S).

H_2: Mobile banking in terms of Access to Mobile Phone (ATM) has significant impact on growth rate (GDP).

H_3: Gender act as the moderator in between the relationship of mobile banking and financial inclusion.

H_{3a}: Male act as the moderating factor amongst the Access to Mobile Phone (ATM) and the Number of mobile banking accounts (NMB).

H3b: Male act as the moderating factor amongst the Access to Mobile Phone (ATM) and Savings(S).

H3c: Female act as the moderating factor amongst the Access to Mobile Phone Access to Mobile Phone (ATM) and Number of mobile banking accounts (NMB).

H3d: Female act as the moderating factor amongst the (ATM) and Savings(S).

H4: Gender act as the moderator in between the relationship of mobile banking and growth rate (G.D.P).

H4a: Male act as the moderating factor amongst the Access to Mobile Phone (ATM) and growth rate (G.D.P).

H4b: Female act as the moderating factor amongst the Access to Mobile Phone (ATM) and growth rate (G.D.P).

Conceptual Frame Work
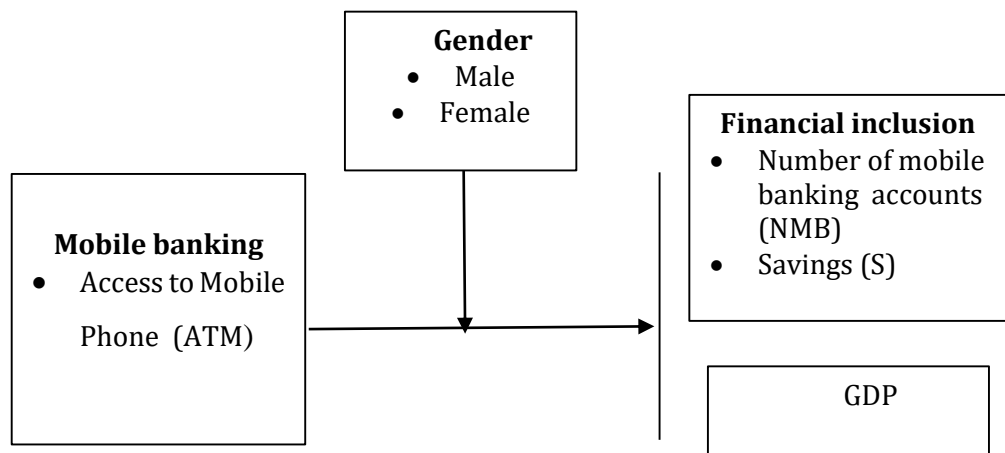
Material and Methods

Empirical Model

The following empirical models can be developed using the prior literature as a basis i.e.

$NMB_{it} = \alpha_0 + \beta_1 ATM_{it} + \varepsilon_{it}$

$NMB_{it} = \alpha_0 + \beta_1 ATM_{it} * F_{it} + \varepsilon_{it}$

$NMB_{it} = \alpha_0 + \beta_1 ATM_{it} * M_{it} + \varepsilon_{it}$

$S._{it} = \alpha_0 + \beta_1 ATM_{it} + \varepsilon_{it}$

$S._{it} = \alpha_0 + \beta_1 ATM_{it} * F._{it} + \varepsilon_{it}$

$S._{it} = \alpha_0 + \beta_1 ATM_{it} * M._{it} + \varepsilon_{it}$

$GDP._{it} = \alpha_0 + \beta_1 ATM_{it} + \varepsilon_{it}$

$GDP._{it} = \alpha_0 + \beta_1 ATM_{it} F._{it} + \varepsilon_{it}$

$$\text{GDP.}_{it} = \alpha_0 + \beta_1 \text{ATM}_{it} * \text{M.}_{it} + \varepsilon_{it}$$

Where:

β = Regression coefficient of independent variables $\alpha0$ =
Constant

ε_{it} = The error term   F=Female   M=Male

Data collection and Analysis technique

The study uses both explanatory & statistical analysis to look at the relationship amongst the use of mobile phone banking, financial inclusion, and the country's economic growth, utilizing secondary data from various sources mainly data collected from the website of 'State Bank of Pakistan', Reports on Pakistan's banking industry's advancement, Research Journals and Articles, etc. The study's considered period spanned ten years i.e. from 2011 to 2021. Also, it utilized Unit root test, Multicollinearity, descriptive statistics, & regression analysis using E-views 7.0 to examine the correlation between Mobile Banking, Financial Inclusion, and the country's economic growth. Hence, the existing study acquired Financial inclusion (i.e. number of bank accounts, savings), GDP as the D.V, mobile banking (i.e. Access to Mobile Phone) as the I.V and the gender as the moderator.

Results and Discussion

Descriptive Statistics

Descriptive statistics, according to McClave and Sincich (2000), typically provide an easy-to-understand description of the data set. Descriptive statistics are thus shown numerically below for each of the study's variables.

Table 1
Results of Descriptive statistics

	ATM	NMB	S	GDP	M	F
Mean	387.67	739.89	651.33	326.13	573.05	378.98
Max	359.83	362.59	762.00	397.89	296.80	867.99
Mini	26.597	12.351	46.617	30.276	87.636	26.986
Skewness	-0.38757	1.81968	-0.64790	0.32608	1.81760	1.56195
Kurtosis	1.92682	5.27387	2.71338	1.84285	5.27387	3.14642

Source: E-views 7.

Test of multi-collinearity

Matrix of the correlation coefficients for each dependent, independent, and moderated variable is displayed in Table 2. Furthermore, the outcomes of the following table demonstrated that the degree of correlation is low, as per the cut off rule described by the Wooldridge's (2015).

Table: 2
Correlation Coefficient Matrix

	ATM	NMB	S	GDP	M	F	M*ATM	F*ATM
ATM	1	-0.1285	-0.0935	-0.0382	0.0339	0.0846	0.0682	0.0682
NMB	-0.1285	1	-0.2327	-0.2167	0.4399	0.5496	0.3931	0.2923
S	-0.0935	-0.1316	1	0.9152	0.0937	0.0757	0.0829	0.0929
GDP	-0.0372	-0.1257	0.9151	1	0.0457	0.0576	0.0251	0.0251
M	0.0339	0.4390	0.1837	0.0457	1	0.0983	0.5270	0.4271
F	0.0836	0.4486	0.0757	0.0586	0.0983	1	0.4278	0.7527

M* ATM	0.0672	0.3943	0.0929	0.0241	0.5171	0.4278	1	0.0983
F* ATM	0.0672	0.3023	0.0939	0.0251	0.5171	0.7527	0.0983	1

Source: E-views 7.0

Test of non-stationarity

Table 3
ADF unit root test

Variables	A.D.F (at level)	A.D.F (1st difference)	A.D.F (2nd difference)	'p'
D(ATM)	-	-5.52406	-	0.0004
D(S)	-	-7.345830	-	0.0000
D(GDP,2)	-	-	-37.36701	0.0000
D(F,2)	-	-	-4.928612	0.0035
D(M,2)	-	-	-4.378947	0.0038
NMB	-4.923884	-	-	0.0025

Since the study's data are time series, a non-stationarity evaluation was conducted prior to executing an ordinary least squares regression. Variables like GDP, FEMALE (F), and MALE (M) have found no unit root in it & are substantial at the second difference, while panel data of variables like the Number of mobile banking accounts (NMB) appear to be non-stationarity and significant at the level.

Ordinary Least Square Regression (OLS)

Current study used the OLS regression technique for panel data analysis using E-views 7 software to quantify the effect of mobile banking on financial inclusion and economic growth.

Table: 4
OLS regression b/w NMB & ATM

Variable	Co-efficient	Std-error	't'	'p'
C	15.87432	0.472856	41.922190	0.6067
ATM	0.250251	0.156925	1.5970860	0.0000
R-squared	0.3131295	Mean D.V		15.522055
Adjusted R-squared	0.2902338	S.D. D.V		3.4652410
F-stats	13.676360			
Prob(F-stats)	0.0008689			

D.V: NMB
Sample: 2011Q1 2021Q4
Included observations: 32

Table 4 exhibited the acceptance of hypothesis H1a i.e. the number of mobile banking accounts (NMB) is significantly impacted by access to mobile phones (ATM), having 'p' value= 0.0000

Table 5
OLS Regression b/w Savings & ATM

Variable	Co-efficient	Std-error	't'	'p'
C	2.379000	5.540000	0.412423	0.6830
ATM	0.550667	0.100362	5.486807	0.0000
R-squared	0.575983	Mean D.V		8.640000
Adjusted R-squared	0.356823	S.D. D.V		5.270000
F-stats	27.34902			
Prob(F-stats)	0.000022			

D.V: Savings
Sample: 2011Q1 2021Q4

Included observations: 32

Table 5 revealed the acceptance of hypothesis H1b i.e. the Access to Mobile Phone (ATM) is significantly impacted by the savings, having 'p' value= 0.0000

Table 6
OLS Regression b/w GDP & ATM

Variable	Co-efficient	Std-error	't'	'p'
C	0.001049	0.011593	0.090490	0.9285
ATM	0.754209	0.021724	34.71777	0.0016
R-squared	0.387226	Mean D.V		0.021982
Adjusted R-squared	0.275376	S.D. D.V		0.085172
F-stats	14.17817			
Prob(F-stats)	0.002652			

D.V: GDP
Sample: 2011Q1 2021Q4
Included observations: 32

Table 6 depicted the acceptance of hypothesis H2 i.e. the Access to Mobile Phone (ATM) is significantly impacted by the GDP, having 'p' value= 0.0000

Table 7
OLS Regression b/w NMB & MALE*ATM

Variable	Co-efficient	Std-error	't'	'p'
C	15.59865	0.394729	36.98397	0.0000
MALE*ATM	-0.640007	0.103408	-6.189143	0.0361
R-squared	0.756624	Mean D.V		16.54486
Adjusted R-squared	0.528512	S.D. D.V		2.465342
F-stats	5.571339			
Prob(F-stats)	0.024954			

D.V: NMB
Sample: 2011Q1 2021Q4
Included observations: 32

The outcomes of table 7 demonstrated that hypothesis H3a can be approved because the "p" value is less than 0.05 and the "R-squared" value has increased positively.

Table 8
OLS Regression b/w SAVINGS & MALE*ATM

Variable	Co-efficient	Std-error	't'	'p'
C	8.381120	7.610120	1.225925	0.3849
MALE*ATM	0.350179	0.017112	20.46394	0. 0284
R-squared	0.485005	Mean D.V		9.6411121
Adjusted R-squared	0.117494	S.D. D.V		5.2710022
F-stats	0.878510			
Prob(F-stats)	0.496483			

D.V: SAVINGS
Sample: 2011Q1 2021Q4
Included observations: 32

The outcomes of table 8 demonstrated that hypothesis H3b can be approved due to the "p" = 0.0284 and the "R-squared" value has increased definitely.

Table 9
OLS Regression b/w NMB & FEMALE*ATM

Variable	Co-efficient	Std-error	't'	'p'
C	15.60976	0.405830	37.87408	0.0000
FEMALE*ATM	-0.328622	0.148641	-1.463331	0.0390
R-squared	0.259621	Mean D.V		15.52287
Adjusted R-squared	0.158513	S.D. D.V		3.467344
F-stats	5.571339			
Prob(F-stats)	0.024954			

D.V: NMB
Sample: 2011Q1 2021Q4
Included observations: 32

The outcomes of table 9 confirmed that hypothesis H3c is approved due to the "p" = 0.0390 and the positive change in "R-squared" value.

Table 10
OLS Regression b/w SAVINGS & FEMALE*ATM

Variable	Co-efficient	Std-error	't'	'p'
C	9.834810	7.593510	1.295476	0.2050
FEMALE*ATM	0.053308	0.129536	0.411530	0.3874
R-squared	0.001745	Mean D.V		9.5364810
Adjusted R-squared	-0.031530	S.D. D.V		4.1474911
F-stats	0.052446			
Prob(F-stats)	0.820415			

D.V: SAVINGS
Sample: 2011Q1 2021Q4
Included observations: 32

The outcomes of table 10 confirmed that hypothesis H3d is rejected due to the "p" = 0.3874 which is higher than the 0.05.

Table 11
OLS Regression b/w GDP & MALE*ATM

Variable	Co-efficient	Std-error	't'	'p'
C	0.010965	0.013522	0.810907	0.4238
MALE*ATM	0.684612	0.030859	22.18516	0.0076
R-squared	0.002527	Mean D.V		0.121768
Adjusted R-squared	-0.033333	S.D. D.V		0.285283
F-stats	4.925406			
Prob(F-stats)	0.998246			

D.V: GDP
Sample: 2011Q1 2021Q4
Included observations: 32

The outcomes of table 11 confirmed that hypothesis H4a is approved due to the "p" = 0.0076 i.e. less than 0.05 & the affirmative change in the value of "R-squared".

Table 12
OLS Regression b/w GDP & FEMALE*ATM

Variable	Co-efficient	Std-error	't'	'p'
C	0.012777	0.013392	0.954042	0.3477
FEMALE*ATM	0.730153	0.148712	4.909845	0.0451
R-squared	0.019043	Mean D.V		0.021881
Adjusted R-squared	-0.013655	S.D. D.V		0.085172
F-stats	0.582391			

Prob(F-stats)	0.451336

D.V: GDP
Sample: 2011Q1 2021Q4
Included observations: 32

The outcomes of table 12 confirmed that hypothesis H_{4b} is approved due to the "p" = 0.0451 i.e. less than 0.05 & the affirmative change in the value of "R-squared".

Table13
Summary of Regression Results

Hypotheses	Co-efficient	'p' Value	Result
H_{1a}: ATM significantly influence on the NMB.	0.250251	0.0008	Accept
H_{1b}: ATM significantly influence on the Savings.	0.550667	0.0000	Accept
H_2: ATM significantly influence on the growth rate (GDP).	0.754209	0.0016	Accept
H_{3a}: Male act as the moderator amongst the association ATM and NMB.	0.640007	0.0361	Accept
H_{3b}: Male act as the moderator amongst the association of ATM and Savings.	0.350179	0.0284	Accept
H_{3c}: Female act as the moderator amongst the association of ATM and NMB.	-0.217511	0.0390	Accept
H_{3d}: Female act as the moderator amongst the association of ATM and Savings.	0.053308	0.3874	Reject
H_{4a}: Male act as the moderator amongst the association of ATM and growth rate (GDP).	0.684612	0.0076	Accept
H_{4b}: Female act as the moderator amongst the association of ATM and growth rate (GDP).	0.730153	0.0451	Accept

Conclusion

It can be determined by performing an Ordinary Least Square (OLS) regression amongst the variables of mobile banking, financial inclusion, & GDP for the interval of 2010–2017. It was explored that the independent variable, i.e., mobile banking, in terms of Access to Mobile Phone was found to be the substantial interpreter of financial inclusion, i.e., (Number of mobile banking accounts and Savings) and economic growth (GDP) and demonstrates that mobile banking enhances financial inclusion, which encourages the growth of the economy. It means that if mobile banking digital services are user-friendly, then more people found find ease in spending digital money rather than hard cash.

Furthermore, Gender was used as a moderating factor in the present study, and it was discovered that gender significantly influenced male behavior amongst the association of mobile banking variable, i.e., 'Access to Mobile Phone', and financial inclusion variables, i.e., (Number of mobile banking accounts & Savings) & the G.D.P. Additionally, gender—specifically, female gender—acts as a key moderating factor among both the mobile banking variables and the financial inclusion determinant, i.e., Number of mobile banking accounts. However, females did not actually noticeably moderate the effects between the mobile banking variable, i.e., Access to Mobile Phone and the financial inclusion variable, i.e., Savings., due to the 'p' value being higher than 0.05, i.e., 0.3874.

Recommendations

As it is well known, mobile banking has significantly revolutionized Pakistani consumers' financial habits in recent years. Based on the study's findings, mobile money services authorities are advised to reevaluate one's current regulatory framework, make absolutely sure mobile banking services should be freely accessible to one's clients, and maintain appropriate oversight over clients' potential threats and insecurities. In order to enable more customers to utilize banking services on their mobile devices and thereby

support Pakistan's economic growth, they should not have to worry about their privacy being compromised or lost. To do this, regulatory bodies must develop explicit guidelines for their drivers that address revenue growth, the use of facilities by businesses, and confidentiality. Therefore, by clearly defining the rules, the playing field becomes more predictable, which encourages more investment and competition.

Furthermore, the present study assesses mobile banking from the perspective of Access to Mobile Phone variable, and there were two determinants of financial inclusion, i.e., (Number of mobile banking accounts & Savings). So, in order to improve the accuracy of their research work, future investigators can use additional financial inclusion and mobile banking determinants. And also, to improve generalizability, future research on other countries could be undertaken in addition to this one, using a larger data set because this study was limited to Pakistan only.

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