Telecommunication, Socioeconomic, and Financial Inclusion : An Empirical Evidence from Bihar

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Abstract

This article aimed to examine the relationship between determinants of telecommunication, socioeconomic variables, and financial inclusion in India. The current study adopted a cross-sectional design and quantitative approach. A sample of 400 was randomly drawn using a predetermined schedule from the adult individuals of two villages of Madhubani district of Bihar. The randomly selected villages are Chaparia and Jagatpur of Madhubani district. The three dimensions considered for the study are financial inclusion, telecommunication, and socioeconomic factors. SmartPLS was used to establish the hypothesized relationship between telecommunication, socioeconomic, and financial inclusion. The impact of telecommunication and socioeconomic constructs on financial inclusion was evident from the current study in several constructs. Out of 18 paths, 12 paths were significant at a 5% significance level, and three paths were significant at a 10% significance level. The results are vital for policymakers. Fintech innovation and revolution are a vivacious tool to achieve financial inclusion by including the financially excluded sections. The financial institutions may tie-up with the telecom companies to make them their channel partners.

Keywords : **Bihar, financial inclusion, SmartPLS, socioeconomic, structural equation modelling, telecommunication**

JEL Classification : G1, G2, I3, L96

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The real growth of any nation is impracticable without inclusive growth. Financial inclusion is an inseparable element of overall economic growth. The term 'financial inclusion' was first coined in 2005 in the RBI report on the Khan Commission's recommendation set up in 2004 by the Reserve Bank of India. Financial inclusion may be defined as the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low-income groups at an affordable cost (Rangarajan, 2008). Financial inclusion comprises the steps towards empowering the vulnerable groups by providing access to financial services at an affordable cost. The Government of India and Reserve Bank of India have taken various initiatives for financial inclusion. The first step towards it was the opening of no-frills accounts. Further initiatives are the operation of business correspondent, technology use, relaxation of KYC norms, the opening of rural branches, direct benefits transfer, financial literacy program, and Pradhan Mantri Jan Dhan Yojana.

Telecom is an upcoming driving force for economic development in the present information-based scenario. India should modify its socioeconomic scenario by adopting exclusive steps towards providing reasonably priced

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and high-quality telecommunication services in remote areas. National Telecom Policy, 2012 was formulated with the vision to provide secure, reliable, affordable, and high quality converged telecommunication services anytime, anywhere, for an accelerated inclusive socioeconomic development. The increase in the number of mobile users in India provides a great prospect through competent and capable modern and innovative communication technology to reach the unbanked population in rural and remote areas.

Arner, Barberis, and Buckley (2015) perceived fintech as technology-enabled financial solutions. Fintech innovation and revolution are essential tools to achieve the goal of financial inclusion. The transformation of the traditional banking system to digital banking is the result of the fintech revolution. Infrastructural issues are the major obstacles in India to reach the unbanked. The increase in smartphone penetration and low-cost telecom facilities can be leveraged to capitalize on the opportunity. Using information and communication technology (ICT) in the rural areas will help in timely and adequate financial access affordably. ICT can play a catalytic role in achieving social objectives and sustainability (Bhatt, Patel, & Kaur, 2020).

Literature Review

In the following paragraphs, various studies have been reviewed on diverse aspects of financial inclusion. Demirgüç-Kunt, Klapper, Singer, and Oudheusden (2015) illustrated a decrease in the number of unbanked between 2011 and 2014. Sarma and Pais (2011) identified the relationship between financial inclusion and development. The outcomes disclosed that socioeconomic and infrastructure-related factors, such as literacy, income, inequality, urbanization, and physical infrastructure for connectivity and information played a constructive role in enhancing financial inclusion. Similarly, Kavita and Suman (2019) talked about financial literacy, institutional factors, psychological factors, technological factors, and government schemes as essential determinants of financial inclusion.

Further review shows a positive association between financial inclusion and development (Stephen & Tom, 2015). Bagli and Dutta (2012), in their study, revealed a strong positive association between human development and financial inclusion in the states of India. Cnaan, Moodithaya, and Handy (2012) found that social and personal deprivation is a crucial barrier to financial inclusion.

Kempson, Atkinson, and Pilley (2004) revealed the six common obstacles for financial exclusion. These obstacles included identity requirements, physical access problems due to bank branch closures, terms and conditions of bank accounts, levels of bank charges, psychological and cultural barriers. Factors like income, financial information, and education lead to inclusion (Bhanot, Bapat, & Bera, 2012). Likewise, Kumbhar (2011) studied the problems associated with financial inclusion through m-banking in India. The critical problems identified in m-banking services are computer literacy, network, security, cost-effectiveness, and inconvenience in using mobile phones. Financial literacy and awareness level are significant concerns in the usage of financial services (Joshi, 2014). Atkinson and Messy (2013), in their study, confirmed that the low levels of financial inclusion were associated with lower levels of financial literacy.

On the other hand, few authors developed indexes for financial inclusion. Sarma (2008) developed an index based on three dimensions, that is, banking penetration, availability, and usability of banking services. Similarly, Chattopadhyay (2011) ; Gupte, Venkataramani, and Gupta (2012) ; and Cámara and Tuesta (2014) also studied indexes based on these dimensions. CRISIL studied a more diverse view of the financial inclusion index. CRISIL (2013) measured the extent of financial inclusion using three critical parameters: branch, deposit, and credit penetration. They further included insurance apart from these parameters to measure financial inclusion (CRISIL, 2018).

Paramasivan and Ganeshkumar (2013), in their paper, suggested that the synergy between the technology provider and banking channel reached the unbanked through a proper emphasis on financial literacy. Likewise, Siddiqui and Siddiqui (2020) evaluated telecommunication's role within the contexts of rural development and poverty reduction. The study confirmed the positive and significant impact of telecommunication on financial inclusion, irrespective of the state's development level. However, various authors suggested using telecom technology to achieve financial inclusion (Siddiqui & Siddiqui, 2018b ; Singh, Mittal, Garg, Goenka, Goud, Ram, Suresh, Chandrakar, & Kumar, 2014). Behl and Pal (2016), in their paper, confirmed that the perception of users played an essential role in the degree of usage of mobile banking.

Objectives of the Study

(1) To examine the impact of telecommunication and socioeconomic constructs on financial inclusion.

(2) To validate and develop a model based on the latent constructs.

Research Hypotheses

➭ **H_1:** There is a significant impact of awareness, ability, and usability of mobile phones on awareness, ability, and usability of banking services.

➭ **H_2:** There is a significant impact of community, infrastructure, and education on awareness, ability, and usability of banking services.

Methodology

Data Collection

The current study adopted a cross-sectional design to identify the relationship between the variables at a particular point in time. A sample of 400 respondents was randomly collected using a predetermined schedule from the adult individuals of two villages of Madhubani district of Bihar. The randomly selected villages are Chaparia and Jagatpur of Madhubani district. CRISIL Inclusix reports ranked Bihar in 33^{rd} position out of 35 states and UTs and Madhubani district in the bottom 50 districts in terms of the CRISIL Inclusix score (CRISIL, 2015). The sampling unit for the data collection was households. The survey was conducted from August – September 2018.

The minimum sample size requirement for multivariate analysis technique of partial least square structural equation modelling should be equal to the largest number of formative indicators used to measure one construct, or ten times the largest number of structural paths directed at a particular latent construct (Hair, Ringle, & Sarstedt, 2011). As far as the most number of structural paths directed towards a particular latent construct is concerned, the paths are six. Therefore, a sample size of more than 60 is adequate for the study.

Instruments

The three dimensions considered for the study are financial inclusion, telecommunication, and socioeconomic variables. There are three latent constructs for each dimension. Awareness, usability, and ability are the three latent constructs for financial inclusion as well as telecommunication. Moreover, infrastructure, community, and education are the three latent constructs of the socioeconomic dimension. The list of the indicators is given in Table 1.

Table 1. ***List of Indicators***

Awareness About Telecom Terms *(ATT)*	**Awareness About Banking Services *(AWBS)***
A member knowing 2G/3G *(KA2G)*	Knowledge about cheque *(KC)*
A member knowing ISD *(KISD)*	Knowledge about credit card *(KCC)*
A member knowing MB/GB *(KMB)*	Knowledge about mutual funds *(KMF)*
A member knowing MMS *(KMMS)*	Knowledge about RD & FD *(KFD)*
A member knowing about SMS *(KSMS)*	Knowledge about savings account *(KSA)*
A member knowing STD *(KSTD)*	Knowledge about mobile banking *(KMBA)*
A member knowing MNP *(KMNP)*	Knowledge about ATM/debit card *(KAC)*
A member knowing OTP *(KOTP)*	Knowledge about ATM services *(KAS)*
A member knowing roaming *(KR)*	Knowledge about Internet banking *(KIB)*
Ability to Use Mobile Phone *(AMP)*	**Ability to Use Banking Services *(AUBS)***
Number of family members able to call *(MAC)*	Number of members who can use cheque *(NC)*
Number of family members able to receive SMS *(MRSM)*	Number of members who can use ATM/debit card *(NUA)*
Number of family members able to receive a call *(MARC)*	Number of members who can use a credit card *(NUC)*
Number of family members able to send SMS *(MASM)*	Number of members who can withdraw cash *(NWC)*
Number of family members able to use the Internet *(MAUI)*	Number of members who can deposit money *(NDM)*
Usability of Mobile Phone *(UMP)*	**Usability of Banking Services *(UBS)***
Work-related use of mobile phone *(UMW)*	ATM card users *(ACU)*
Use of a mobile phone for entertainment *(UME)*	Deposited by business or employment *(DB)*
Use of a mobile phone for Internet *(UMI)*	Deposited by others *(DO)*
Use of a mobile phone for social activities *(UMSA)*	Deposited by self *(DS)*
Use of a mobile phone for games *(UMG)*	Frequency of using ATM card *(FUAC)*
Infrastructure *(INFR)*	Use of E-banking *(UEB)*
Bathroom *(BR)*	Withdraw money by ATM *(WMA)*
Cooking Fuel *(CF)*	Withdraw money by cheque *(WMC)*
Floor Type *(FT)*	Withdraw money by self (WMS)
Household Appliance *(HA)*	Credit card users *(CCU)*
Kitchen *(KT)*	Frequency of using credit card *(FUCC)*
No. of Rooms *(NR)*	**Education *(EDU)***
Roof Type *(RT)*	Head Education *(HE)*
Sources of Drinking water *(SDW)*	Others' Education *(OFE)*
Toilet *(TO)*	Outside for Education *(OTE)*
Wall Type *(WT)*	**Community *(COMM)***
Electricity *(EL)*	Religion *(RL)*
Housing Tenure *(HT)*	Family Type *(FTA)*
	Caste *(CAS)*

Model Development

The model is tested and developed by structural equation modelling based software SmartPLS. SmartPLS by Ringle, Wende, and Becker (2015) is one of the vital software applications for partial least squares structural equation modelling. Financial inclusion is the endogenous dimension ; whereas, telecommunication and socioeconomic constructs are the two exogenous dimensions of the model.

Analysis and Results

Results of Outer Model

The outer model is the association between the indicators to their latent construct. Here, we emphasize assessing the reliability and validity of the data that characterizes the latent constructs.

Indicator Reliability

Hulland (1999) suggested that the absolute standardized indicators loading should be ≥ 0.70. In exploratory

Table 2. ***Outer Loadings***

	Original	Revised		Original	Revised		Original	Revised
	AMP			*AUBS*			*INFR*	
MAC	0.364		***NC***	0.720	0.857	***TO***	0.821	0.822
MARC	0.589	0.560	***NDM***	0.946		***BR***	0.796	0.798
MASM	0.684	0.720	***NUA***	0.950		***CF***	0.769	0.767
MAUI	0.797	0.823	***NUC***	0.372	0.578	***EL***	0.207	
MRSM	0.903	0.884	***NWC***	0.948	0.848	***FT***	0.807	0.806
	ATT			***AWBS***		***HA***	0.788	0.786
KA2G	0.913		***KAS***	0.850	0.849	***HT***	0.079	
KISD	0.878	0.876	***KC***	0.853	0.853	***KT***	0.666	0.670
KMB	0.885	0.859	***KCC***	0.588	0.590	***NR***	0.789	0.792
KMMS	0.654	0.663	***KFD***	0.844	0.844	***RT***	0.785	0.783
KMNP	0.680	0.702	***KIB***	0.663	0.664	***SDW***	0.625	0.628
KOTP	0.604	0.629	***KIN***	0.859	0.859	***WT***	0.774	0.773
KR	0.779	0.781	***KMBA***	0.412	0.413		***UBS***	
KSMS	0.766	0.768	***KMF***	0.559	0.560	***ACU***	0.865	0.872
KSTD	0.585	0.594	***KSA***	0.820	0.819	***CCU***	0.215	
	UMP		***KAC***	0.791	0.790	***DB***	0.797	0.772
UME	0.828	0.831		***EDU***		***DO***	0.482	0.564
UMG	0.857	0.872	***HE***	0.894	0.912	***DS***	0.375	
UMI	0.878	0.875	***OFE***	0.651	0.711	***FUAC***	0.647	0.637
UMSA	0.280		***OTE***	0.369		***FUCC***	0.300	
UMW	0.769	0.774				***UEB***	0.363	
	COMM					***WMA***	0.824	0.890
CAS	0.734	0.666				***WMC***	0.482	
FTA	0.833	0.904				***WMS***	0.770	0.806
REL	–0.607							

studies, loading of 0.40 is also acceptable. Generally, the indicators with loading between 0.40 and 0.70 should only be considered for removal from the scale if deleting this indicator would lead to an increase in composite reliability above the suggested threshold value.

Table 2 encapsulates the list of indicators with their corresponding outer loading values. Eleven indicators are dropped from the original model, which contains 63 indicators.

The indicators : member able to call (MAC) and use of a mobile phone for social activity (UMSA) of independent latent constructs : ability to use a mobile phone (AMP) and usability of mobile phone (UMP) are removed due to low outer loading values of 0.364 and 0.280, respectively.

Similarly, religion (REL) and outside for education (OTE) are dropped in the revised model due to smaller outer loading values of –0.607 and 0.369 of independent latent constructs : community (COMM) and education (EDU). Likewise, in another independent construct : infrastructure (INFR), two indicators, namely, electricity (EL) and house type (HT) are dropped with outer loading values of 0.207 and 0.079, respectively.

The indicators : credit card users (CCU), deposit by self (DS), frequency of using credit card (FUCC), the usability of e-banking (UEB), and withdraw money by card (WMC) are also eliminated from the dependent construct : usability of banking services (UBS) due to nominal outer loading values of 0.215, 0.375, 0.300, 0.363, and 0.482, respectively.

Internal Consistency Reliability

Composite reliability computes the internal consistency reliability. Composite reliability is another measure of reliability that is more comprehensive than Cronbach's alpha. It takes into account the individual contribution of each item and its error for each latent construct (Starkweather, 2012). The composite reliability should be greater than or equal to 0.70 for confirmatory research and greater than or equal to 0.60 for exploratory research (Bagozzi & Yi, 1988). The value of composite reliability is depicted in Table 3. The composite reliability of all the constructs except 'community' (COMM) and 'education' (EDU) with a value of 0.397 and 0.691, respectively is less than 0.70. The composite reliability of these two latent constructs is improved by dropping the indicators with lower outer loading.

The composite reliability of all the latent constructs is more than 0.70 in the revised model. The values of : ability to use a mobile phone (AMP), awareness about telecom terms (ATT), ability to use banking services (AUBS), awareness about banking services (AWBS), community (COMM), education (EDU), infrastructure

Table 3. ***Composite Reliability***

	Composite Reliability	
	Original	**Revised**
AMP	0.811	0.839
ATT	0.922	0.905
AUBS	0.904	0.811
AWBS	0.920	0.920
COMM	0.397	0.769
EDU	0.691	0.799
INFR	0.911	0.933
UBS	0.842	0.893
UMP	0.859	0.905

(INFR), usability of banking services (UBS), and usability of mobile phone (UMP) are 0.839, 0.905, 0.811, 0.920, 0.769, 0.799, 0.933, 0.893, and 0.905, respectively.

Convergent Validity

Convergent validity is explained by the value of average variance extracted (AVE). The value of AVE should be more than 0.50 (Chin, 2010). It refers to the degree by which multiple measures of a construct agree with one another. Table 4 depicts the value of the average variance extracted. The average variance extracted (AVE) value is less than the specified limit in four latent constructs, namely, ability to use a mobile phone (AMP), education (EDU), infrastructure (INFR), and usability of banking services (UBS) with the values 0.480, 0.453, 0.491, and 0.359, respectively. The values are further improved by dropping the indicators with lower outer loading.

Table 4. ***Average Variance Extracted***

	Average Variance Extracted	
	Original	**Revised**
AMP	0.480	0.573
ATT	0.575	0.548
AUBS	0.671	0.596
AWBS	0.547	0.547
COMM	0.534	0.630
EDU	0.453	0.668
INFR	0.491	0.585
UBS	0.359	0.587
UMP	0.572	0.704

The average variance extracted values of the revised model for the latent constructs : ability to use a mobile phone (AMP), awareness about telecom terms (ATT), ability to use banking services (AUBS), awareness about banking services (AWBS), community (COMM), education (EDU), infrastructure (INFR), usability of banking services (UBS), and usability of mobile phone (UMP) are 0.573, 0.548, 0.596, 0.547, 0.630, 0.668, 0.585, 0.587, and 0.704, respectively.

Discriminant Validity

It is the degree to which measure of a single construct is distinct from the other constructs of a model (Campbell & Fiske, 1959). Each construct's AVE should be higher than the squared correlation with any other construct (Fornell & Larcker, 1981). Higher is the value of AVE, the better is the discriminant validity. Table 5 contains the square root value of AVE, which is marked bold, and the non-diagonal elements represent the correlation among other respective latent constructs.

The correlation value of all the constructs is smaller than or nearly equivalent to the square root of AVE except for a few instances. The square root values of AVE of the latent constructs, namely, ability to use a mobile phone (AMP), awareness about telecom terms (ATT), the ability to use banking services (AUBS), awareness about banking services (AWBS), community (COMM), education (EDU), infrastructure (INFR), the usability of banking services (UBS), and usability of mobile phone (UMP) are 0.757, 0.740, 0.772, 0.739, 0.794, 0.817, 0.765, 0.766, and 0.839, respectively.

Table 5. *Discriminant Validity*

	AMP	*ATT*	*AUBS*	*AWBS*	*COMM*	*EDU*	*INFR*	*UBS*	*UMP*
AMP	**0.757**								
ATT	0.810	**0.740**							
AUBS	0.709	0.749	**0.772**						
AWBS	0.754	0.855	0.854	**0.739**					
COMM	0.590	0.596	0.485	0.610	**0.794**				
EDU	0.500	0.658	0.662	0.705	0.383	**0.817**			
INFR	0.745	0.762	0.772	0.813	0.695	0.632	**0.765**		
UBS	0.716	0.756	0.700	0.768	0.468	0.493	0.731	**0.766**	
UMP	0.495	0.675	0.647	0.703	0.371	0.618	0.658	0.701	**0.839**

Multicollinearity (Inner)

Variance inflation factor (VIF) is used for examining the multicollinearity. The acceptable limit for the VIF is less than or equal to five (Hair et al., 2011). Table 6 encapsulates the VIF value of the original as well as the revised model. Out of 63 indicators, three indicators are dropped due to high VIF value. These indicators are : knowledge

Table 6. *VIF (Inner)*

	Original	Revised		Original	Revised		Original	Revised
TO	3.241	3.036	*FTA*	1.089	1.087	*KIB*	1.892	1.892
ACU	2.914	2.630	*FUAC*	1.826	1.723	*KIN*	3.223	3.223
BR	3.684	3.403	*FUCC*	2.158		*KISD*	3.484	3.484
CAS	1.865	1.087	*HA*	2.768	2.192	*KMB*	7.853	3.526
CCU	1.650		*HE*	1.188	1.148	*KMBA*	1.327	1.327
CF	2.219	2.141	*HT*	1.195		*KMF*	1.748	1.748
DB	3.133	2.243	*KA2G*	8.494		*KMMS*	2.191	2.179
DO	1.645	1.444	*KAS*	3.077	3.077	*KMNP*	3.443	3.439
DS	1.601		*KC*	3.471	3.471	*KOTP*	2.325	2.318
EL	1.748		*KCC*	1.649	1.649	*KR*	2.591	2.585
FT	3.267	2.929	*KFD*	3.237	3.237	*KSA*	4.544	4.544
KSMS	3.230	3.095	*MASM*	2.946	2.359	*NR*	2.378	2.306
KSTD	2.662	2.626	*MAUI*	2.725	2.708	*NUA*	9.554	
KT	2.271	2.215	*MRSM*	3.131	2.947	*NUC*	1.319	1.256
MAC	1.547		*NC*	1.846	1.64	*NWC*	12.097	1.381
MARC	3.363	2.963	*NDM*	17.428		*OFE*	1.162	1.148
OTE	1.037		*SDW*	1.929	1.851	*UMG*	3.481	3.481
REL	1.760		*UEB*	1.279		*UMI*	2.341	2.341
RT	3.344	3.192	*UME*	3.101	3.047	*UMSA*	1.099	
UMW	1.523	1.519	*WMC*	1.806		*WT*	3.233	3.232
WMA	4.348	3.686	*WMS*	3.918	3.287	*KAC*	4.726	4.726

about 2G (KA2G), number of family members able to deposit money (NDM), and number of family members able to use ATM (NUA) with values of 8.494, 17.428, and 9.554, respectively.

Multicollinearity (Outer)

The value of VIF should be less than five, as it is the same in the case of inner multicollinearity. Table 7 shows the outer VIF values. All the values are less than the specified limit in both the original and the revised model. Hence, it can be said that there is a low level of collinearity among the independent latent constructs.

Table 7. ***VIF (Outer)***

	All Dependent Constructs (Original)	All Dependent Constructs (Revised)
AMP	3.790	3.556
ATT	4.709	4.779
COMM	2.179	2.112
EDU	1.992	2.089
INFR	4.549	4.213
UMP	2.275	2.338

Results of Inner Model

The inner model shows the path relationship between the latent constructs. It has only one direction.

Coefficient of Determination

The adjusted R - squared value describes the variance explanation of the endogenous constructs. The model predictor for the variance is substantial if the value of the adjusted R square is high. Adjusted R^2 values of 0.25, 0.40, and 0.75 show a weak, moderate, and strong relationship, respectively (Hair et al., 2011). Table 8 shows the adjusted R^2 value of all the three endogenous constructs. The ability to use banking services (AUBS) and usability of banking services (UBS) have moderate ; whereas, awareness about banking services (AWBS) has a strong coefficient of determination.

Table 8. ***R Square Adjusted***

	R - Square Adjusted	Coefficient of Determination
AUBS	0.695	Moderate
AWBS	0.814	Strong
UBS	0.700	Moderate

Model Predictive Relevance

The Q^2 value measures model predictive relevance. The Q^2 value is obtained through the blindfolding procedure in

Table 9. Q^2

	Q^2	Predictive Relevance
AUBS	0.375	Large
AWBS	0.408	Large
UBS	0.377	Large

Smart PLS. Values of 0.02, 0.15, and 0.35, respectively indicate that an exogenous construct has a small, medium, or large predictive relevance for a selected endogenous construct (Stone, 1974). Table 9 outlines the values of Q^2. All the values of three endogenous constructs are above 0.35, which confirms considerable predictive relevance.

Assessment of Path Coefficient

The bootstrapping procedure has been applied with the significance of the path coefficient to evaluate the structural relationships (Henseler, Ringle, & Sinkovics, 2009). Table 10 contains the values of standard deviation, *t* - statistics, and level of significance (*p* - values) for the respective paths.

Based on the overall hypothesis testing, seven and eight paths are significant for H_1 and H_2, respectively. The results specify that 12 paths are significant at the 5% level of significance. The ability to use a mobile phone (AMP) has a significant effect on the ability to use banking services (AUBS) and usability of banking services (UBS), respectively. Similarly, awareness about telecom terms (ATT) and the usability of mobile phones (UMP)

Table 10. ***Bootstrapping Report***

	Path Coefficient	*t* - Statistics	*p* - values	Decisions
AMP -> AUBS	0.228	2.800	0.006	Supported
AMP -> AWBS	0.116	1.793	0.076	Supported*
AMP -> UBS	0.264	2.475	0.015	Supported
ATT -> AUBS	0.140	0.946	0.346	Not Supported
ATT -> AWBS	0.356	3.657	0.000	Supported
ATT -> UBS	0.266	2.812	0.006	Supported
COMM -> AUBS	–0.111	1.848	0.068	Supported*
COMM -> AWBS	0.065	1.256	0.212	Not Supported
COMM -> UBS	–0.110	1.856	0.066	Supported*
EDU -> AUBS	0.188	2.381	0.019	Supported
EDU -> AWBS	0.168	3.582	0.001	Supported
EDU -> UBS	–0.168	3.056	0.003	Supported
INFR -> AUBS	0.378	4.620	0.000	Supported
INFR -> AWBS	0.216	2.784	0.006	Supported
INFR -> UBS	0.286	3.234	0.002	Supported
UMP -> AUBS	0.117	1.606	0.111	Not Supported
UMP -> AWBS	0.135	2.584	0.011	Supported
UMP -> UBS	0.348	6.382	0.000	Supported

Note. * indicates significance at the 10% significance level.

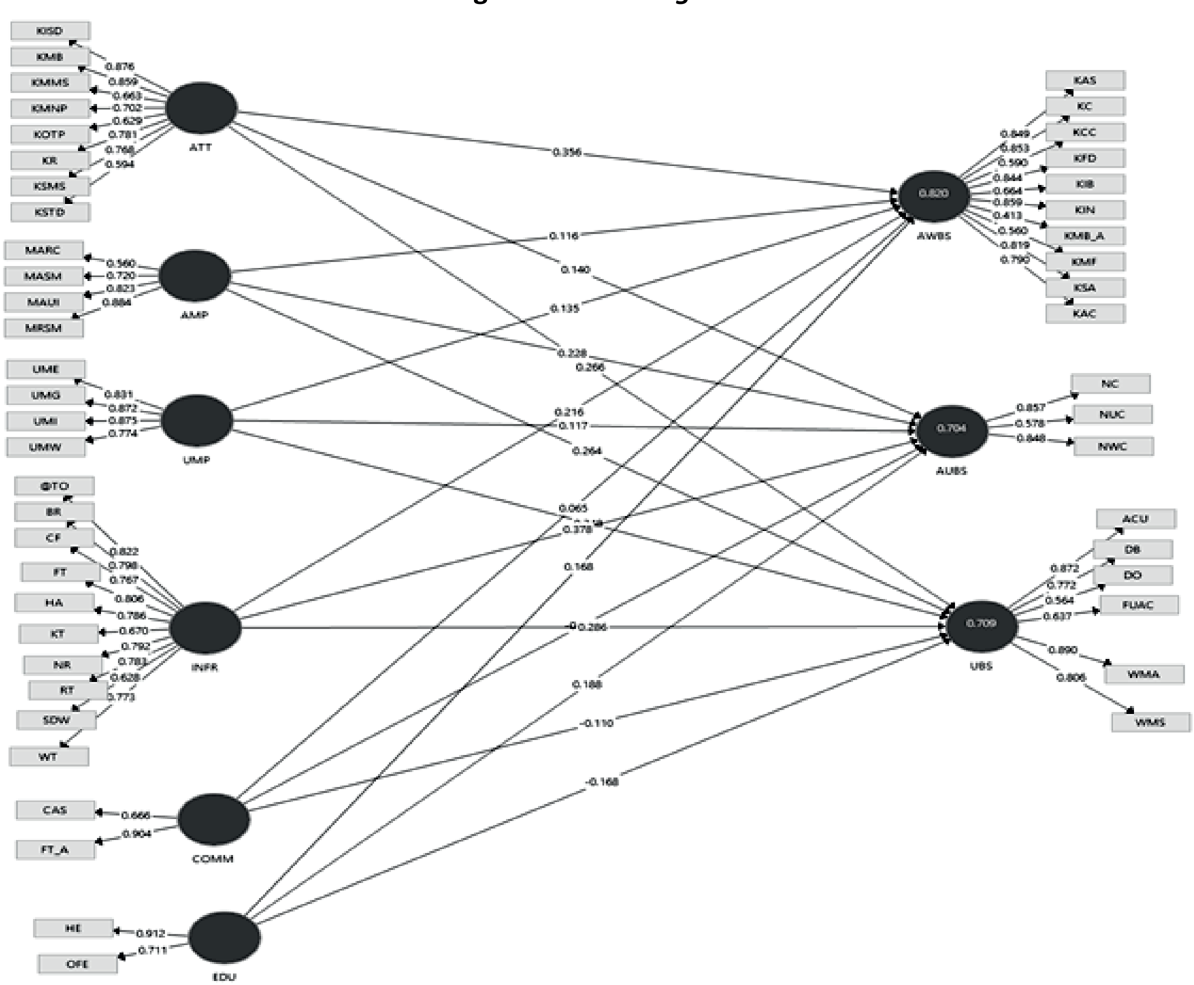
have an impact on awareness about banking services (AWBS) and usability of banking services (UBS).

Likewise, education (EDU) and infrastructure (INFR) have a significant effect on the ability to use banking services (AUBS), awareness about banking services (AWBS), and usability of banking services (UBS). Education (EDU) hurts the usability of banking services, which indicates that lower level of education of head and other members of the family and household with few or no members outside for education are more likely to lead to financial exclusion.

Three paths are significant at the 10% significance level. The impact of the ability to use mobile phones (AMP) on awareness about banking services (AWBS) is significant and positive. Similarly, the community (COMM) has a significant and negative impact on the ability to use banking services (AUBS) and the usability of banking services (UBS). The negative association between the community and the variables of financial inclusion indicates that backward caste, minority communities, and nuclear families are more likely to be excluded from the ability to use and usability of banking services.

Three paths are insignificant. The impact of awareness about telecom terms (ATT) and the usability of mobile phones (UMP) on the ability to use banking services (AUBS) is not significant. Similarly, community (COMM) has an insignificant impact on awareness about banking services (AWBS). Figure 1 shows the path diagram of the revised model.

Figure 1. ***Path Diagram***



Conclusion

The proposed model has been validated and developed to examine the impact of telecom and socioeconomic variables on financial inclusion using structural equation modeling. The telecommunication and socioeconomic dimensions are exogenous constructs ; whereas, financial inclusion is an endogenous construct. The impact of telecommunication and socioeconomic constructs on financial inclusion is evident from the current study in several constructs.

As per the study results, the community, infrastructure, and education are significant constructs that play a significant role in financial inclusion. The community construct includes religion, caste, and family type. Education embraces the level of education of family members ; whereas, infrastructure includes home, available facilities at home, etc. The infrastructure construct indicates the standard of living. Thus, living standards, community, and education play a vital role in achieving financial inclusion. Moreover, the ability to use a mobile phone, awareness about telecom terms, and usability of mobile phones significantly impact constructs of financial inclusion.

Previous studies also verify the results. A particular group of the community is more likely to be excluded (Atkinson & Messy, 2012). Income inequality, adult literacy, urbanization, physical and electronic connectivity, information availability, road network, telephone, and Internet usage also play a positive and significant role in augmenting financial inclusion (Sarma & Pais, 2011). Caste and religion significantly impact the ownership of a bank account (Siddiqui & Siddiqui, 2018a). In another study, Siddiqui and Siddiqui (2019) confirm the awareness and education as essential and significant factors for the ability to use financial services. The present study shows that telecommunication and socioeconomic infrastructure seem to be critical factors for achieving financial inclusion.

Implications

The finding is encouraging for fintech. Banks, along with telecom companies, can work for customized fintech solutions. Financial institutions, telecom companies, and the government may promote education in rural areas through their corporate social responsibility. Similarly, they may be instrumental in providing infrastructural support for rural residents. For instance, one can provide finance, and others may offer customized mobile solutions. The financial institutions may tie-up with the telecom companies to make aware of their services to the rural population. Telecommunication networks may provide the framework for providing financial services to the unbanked. There is an ample opportunity for telecom companies and financial institutions to work together, which will help them bring the marginalized sections of the society in the mainstream line. Moreover, it would generate positive synergy for their business and contribute to both the financial and telecom sectors' growth. Fintech can be an efficient and affordable delivery channel for financial products and services.

Limitations of the Study and Scope for Further Research

The present study has a few inevitable limitations. First, since the findings are based on 400 responses, the generalized results may not be accurate. Future studies may draw a large sample to generalize the results. Second, the current study is only limited to Bihar. Further studies may consider other states of India to cover more and more population to analyze relations. Third, the current study examines the relationship only on three grounds, that is, awareness, usability, and ability to use financial and telecom services. Future research may consider other variables to analyze the relationship between financial inclusion and telecommunication, such as penetration, affordability, etc.

Authors' Contribution

Dr. Taufeeque Ahmad Siddiqui conceived the idea and developed qualitative and quantitative design to undertake the study. Kashif Iqbal Siddiqui extracted research papers with high repute, filtered these based on keywords, and generated concepts and codes relevant to the study design. Dr. Taufeeque Ahmad Siddiqui verified the analytical methods and supervised the study. The data were collected by Kashif Iqbal Siddiqui and further analyzed using SmartPLS software.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter, or materials discussed in this manuscript.

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