The Impact of Financial Inclusion and Fin-Tech on Financial Sustainability: Empirical Evidence- Emerging and Frontier Markets

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Abstract

The objective of this research is to explore the impact of financial inclusion on financial sustainability via emerging markets. And to explore the role of fin-tech in boosting the financial sustainability of these markets. Many countries on the globe have been facing financial dilemma which have stunted its economic growth and have resulted in their lagging behind other countries. One of the most prominent factors attributed to the current financial state is the lack of personal financing, mainly due to lack of financial inclusion, effecting financial stability of the economy of these countries. Many different countries have emerged of the economic growth list with their continuous efforts and smart policies, related to smooth running of commercial banks via Fin-Tech. Fin-Tech is the aspect suggested by most researchers in their research. However, the relationship between financial inclusion and financial sustainability via emerging markets, is mainly not taken into consideration. Therefore, the aim of this research is to put a focus towards this expect. The method chosen to carry out the quantitative study is online, related to the three (3) main variables to measure their relationship and effect on each other and there twenty-one (21) indicators.

Keywords: *Financial inclusion, financial sustainability, emerging markets, Fin-tech*

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1. INTRODUCTION

Financial inclusion also known as inclusive finance, includes all the efforts of associated people, economists and government officials. Financial inclusion seeks to increase the accessibility and affordability for businessperson and all the other individuals, towards financial products and services, regardless of the size of the company or personnel net worth. In financial inclusion, savings, transactions, credit, payments, and insurance are all delivered with all the responsibility and sustainability. By these services it is possible to eliminate the hurdles that restrict us from participating in financial sectors and can improve our standard of living. Ahmed and Mallick (2019) and Ahmed et al., (2018) state that financial inclusion is useful; supporting tool for banks to stabilize their financing mechanism. Financial inclusion is not only the result but also drives economic growth (Abdul Hadi et al., 2018; Babajide et al. 2015; Galdeano et al., 2019). It has various benefits for not only an individual or business personnel but also for the entire economy. These benefits include higher productivity, causing the economy to grow, which in return diminishes the income inequality and reduces the ratio of poverty in the country. It also gives access to international markets and increases the international financial activities, gives a boost to national income and employment opportunities. Moreover, implementation of social security schemes, including old-age pensions, widow pensions along with direct, and effective distribution of subsidies; better incomes, safety of assets, smoothing consumption are some of the benefits of financial inclusion.

Lopez and Winkler (2019) taking 189 sample countries have concluded that the nations having higher financial inclusion are less likely to be affected during credit crunch. However, accompanied with many benefits there are some issues and challenges which are caused by financial inclusion. It is stated that most of financial inclusion is largely related to individual borrowing which can lead to the events of extreme risk, sudden losses in financial system that in return leads to more frequent banking crises. Financial inclusion can also reduce financial efficiency, because of intensive participation in the financial markets, leading towards expansion of social costs of individual institutional imperfections. In contrast, Neaime and Gaysset (2018) explored the ways, how financial inclusion influence income inequality, financial stability and poverty in some countries realizing the fact, that how financial inclusion plays a vital role in improving the economic condition of those countries. Similarly, a strong and positive relationship between financial inclusion and economic development of various countries was noticed by (Van et al. 2021).

The emerging markets hold a very important role and position in the global economic system. As these markets will grow even more in the future, having a greater impact on the global economy. However, with multiple benefits, many issues are accompanied. One of the most important issues that prevail in emerging markets is; political instability, lack of awareness and means. Furthermore, there are a lot of challenges that are to be faced by different financial institutions in emerging markets. One of the key challenges is the literacy rate. Most of us living in different countries including developed countries do not possess sufficient financial knowledge. Because of which we are unaware of ways, means, and profitable areas

of investments, in addition to this we are not or less inclined towards banks. With less use of banks, financial inclusion, and fin-tech most of us fail to have foreign as well as local investments in the emerging economies. Vo et al (2019) has highlighted the critical role of financial literacy in enhancing disposable income for SMEs as well as rural households.

On the other hand, after the international situation of the financial crisis, financial sustainability has become the key concept in public administration (Bolivar, 2015; Hernawati et al., 2021; Abdul Hadi et al., 2019). The ability of public administration to continue their current and future policies, without allowing the debt to rise continuously, is referred to as financial sustainability. It helps to manage environmental risk, to provide financial transparency, and increases both internal as well as external business relations. Financial sustainability is highly effective and beneficial to avoid issues and crises related to financial activities and conditions of not only the country itself, but the entire world. According to Okpara (2011) financial inclusion and stability has a bidirectional correlation between them, he claims that they both have a long-run causality that exists between them. This can be stated with the help of the fact that financial inclusion mitigates income inequality by motivating poor people with economic benefits so that they strive for improving their standard of living rather than just living their lives in persistent poverty (Li, 2018). However, there are multiple challenges that are to be met to make the financial system more sustainable. These challenges include an improvement in the securitization, limitation of distribution of loans, regulation of financial actors, removing tax havens, regulation of OTC markets including derivatives market, improvements in bank's quality of internal control, separation of banking activities and others. These challenges should be met as the priority to regulate financial sustainability in the economy. For this, firstly, we need to find out whether financial inclusion is known or practiced. Secondly to explore whether financial inclusion and Fin-Tech has any impact on economic growth and financial sustainability in emerging and frontier market.

2. LITERATURE REVIEW

Financial inclusion is said to be a supply side policy applied by emerging markets to improve their economy (Khan and Rehan, 2022). It gathers and re-purposes the un-utilized and un-realized resources, for investment purposes. Financial inclusion is achieved with wider use of mobile and other accessible banking services, by making affordable financial services and credit transaction facilities available, and by flourishing reliable saving methods (Mehrotra & Yetman, 2015; Rehan & Abdul Hadi, 2019; Demirgüç-Kunt, et al. 2015). Financial inclusion in today's era plays a vital role as everything in this fast-moving world is shifting towards online transactions, financial activities, products and services. Therefore, if there will be inaccessibility to basic financial products and services than it can cause a lot of problems for us. For instance, if there were an individual who does not hold a bank account, that means he/she does not have a credit card. And he/she is willing to start his/her small business for which he/she wants to order the products from Alibaba. With no financial services available he/she will surely fail to become an entrepreneur. Therefore, in this fast-moving world it is essential to have these

financial products and services available for us, as they will provide means of storing money, managing cash-flows along with payments, making investments, accessing credits and accumulating savings. According to Allen et al (2014) enhancing the financial infrastructure and initiating mobile banking, distance deficiencies can be eliminated or reduced as they make financial services more deliverable.

Financial inclusion, from an economic point of view, ranges from the reduction in poverty, long-term economic growth to financial and monetary stability (Salahuddin, Kashif and Rehman, 2021; Mehrotra & Yetman, 2015). However, the results derived from the measurement of financial inclusion varies, based on the way through which it is measured. It is realized from the case of Nigeria that, only increasing the access of banks by opening new branches fails to create a reasonable positive effect on the monetary policy of the country (Salahuddin, Karamat and Javed, 2021; Mbutor & Uba, 2013). The access and usage measures should be observed to calculate financial inclusion's impact on financial stability with more accurate ways. Financial inclusion plays a major role in developing financial markets. It has been proven by the behavior of developing countries, who rapidly focus on the enhancement of financial inclusion and their integration of the financial system into the global financial market; Helping them to achieve higher economic growth and reaching to the level of emerging economies. For implementing financial inclusion, in any country or nation it is very important to improve the financial literacy of every nation, as our knowledge will help us to better utilize these services, otherwise they will go waste. Moreover, most of us have lack of trust regarding their security and reliability. It is another challenge that must be met by the authorized people to increase our trust in these services, so that we are at ease to deposit our hard-earned money into financial accounts. Gender inequality, poor rural population, long documenting procedures, and illiteracy are some of the other challengers faced by associated people to implement smooth and effective financial inclusion in their respective countries (Aduda & Kalunda, 2012).

Pakistan is also one of these countries which is facing multiple challenges in the smooth implementation of effective financial inclusion. Although after adoption of national financial inclusion strategy of 2015, a rapid progress in respect to financial inclusion was expected. However, the 2017 Global index revealed only a modest level of growth from 2014-2017. It was stated that despite, expecting a higher growth of financial inclusion, it remained on a moderate level mainly because of the mistrust of most customers on banks, other financial institutions and their services. While trust is a long-term challenge for smooth and effective financial inclusion in Pakistan; Overall illiteracy, lack of financial literacy, gender inequality, unavailability of internet services in rural areas, unawareness about financial inclusion, preference of cash transactions over credit transactions, and less interest towards business are other long-term challenges that are playing the role of hurdles in the way of implementation of financial inclusion in Pakistan (Noreen et al. 2022).

However, it is highly important for the emerging countries to effectively tackle the challenges, related to financial inclusion (Salahuddin, Kashif and Rehman, 2021). Challenges including the size of the shadow economy, by implementing and creating

reform programs that will result in expanding the access of financial services and products, leading towards reduction in poverty and increase in income equality. Furthermore, if the emerging countries improve the availability, quality of financial services and products to the households and firms, that have remained unserved, underserved, and financially excluded, will boost emerging country's financial market development as well as economic growth (Hajilee et al. 2017). Besides, functioning of financial markets do not only need good infrastructure, but informed customers also. As they play a vital role in implementing financial inclusion. The higher the degree of financial literacy, the greater the chances that people will make better and effective financial decisions. Financial literacy allows information about financial securities, products and aids in investment decisions (Altman, 2012). It has components such as financial education and important knowledge (Lusardi and Mitchell, 2014).

However, most of the countries all around the world have a lower financial literacy rate, and it is even lower in women. According to Rasool, (2020) and Abreu, (2010) the male participants have greater financial literacy than female participants. It is observed that males are often seen as the major influence and manager of family health. So, in Asian society literacy for males, especially financial literacy is a priority compared to females. However, with changing times and societal improvements the gender gap in financial literacy should be eliminated (Mohamed, 2017). If the human capital is not well-educated, skilled, and well-informed, it will negatively affect the production capacity of the country. Berrittella (2015), stated that there is a negative relationship between the shadow economy and education.

Financial literacy has a strong and positive relationship with I-Banking behavior as it is suggested that greater financial literacy and consumer confidence creates more long-term balanced behavior between the management of wealth and budget. The higher the level of digital financial literacy the greater are the chances of us to make a well-informed and sound decision, a better judgment of risks and benefits associated with products and services offered through financial technologies. Those with higher level of financial literacy are less vulnerable from getting deceived and exploited (Andreou and Philip, 2018), less prone from getting overly indebted, (Lusardi and Tufano, 2015), better at making plans related to retirement (van Rooij et al., 2012), often participate in financial markets (Balloch et al., 2015), and gain higher returns on saving accounts (Deuflhard et al., 2018).

In modern world, expectations towards banks have increased rapidly but loyalty towards them is decreasing continuously because of technological advancement, shift towards financial inclusion and fin-tech. For the smooth running of the economic activities of emerging markets, it is vital to overcome these challenges. Zamani and Giaglis, (2018) suggested that block-chain technology can be essential in developing peer-to-peer decentralized transaction ledger systems. Furthermore, FSB, (2017) is of opinion that decentralized system may reduce the financial crisis caused due to failure of individual financial institution. However, capital fundraising methods can be diversified via crowdfunding platforms. In this regard, according to Weller and Zulfiqar, (2013) higher diversity is linked with fast growth, large lending markets, wider deposit bases as well as a small possibility of financial

crisis, thus all of these could result in more stability. As per the finding of Guerineau and Leon's, (2019), it is stated that with the use of Fin-tech the financial stability can consequently be enhanced, as sharing credit information improves financial stability. The FSB (2017) also suggests that innovations related to Fin-tech can improve the efficiency level of financial institutes, and the convenience of their financial services resulting in greater financial stability. Artificial intelligence or machine learning and robo-advisors are the technologies that enhance productivity, strengthening the financial institutions' business model. Moreover, digital identity as well as mobile banking too increase access to financial services, providing in-home and online services anytime anywhere. FSB, (2017) highlights that the positive side of Fin-tech is comparatively more noticeable in markets, having less financial inclusion, as these markets consist of a higher unbanked population, where more of us hold cellphone than bank accounts.

2.1 Conceptual Framework
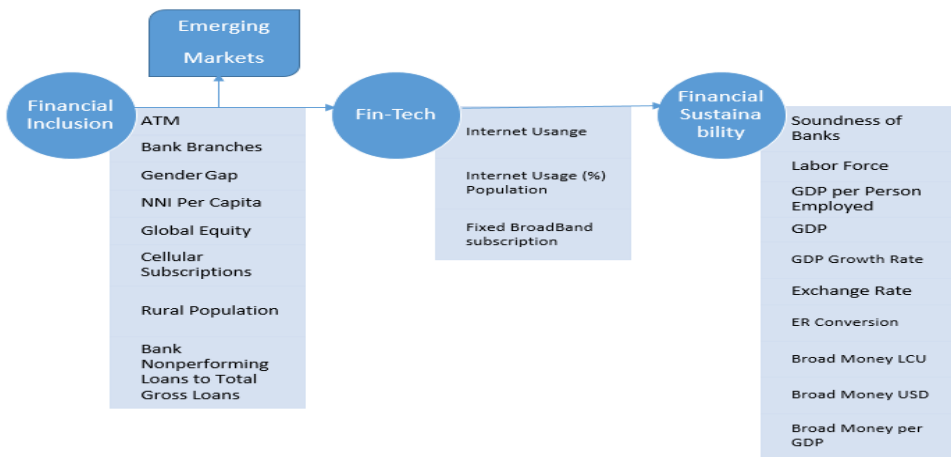
Figure 1:Conceptual Model

3. METHODOLOGY

Following the practices of former researchers (see Zandi et al., 2022) this research has adopted explanatory research approach. As the first objective of this research is to find more understanding about the relationship between financial inclusion and financial sustainability, with the help of economic trends of emerging markets of the world including multiple indicators. As this topic is less explored and researched, therefore this research aims to provide a clear explanation of the aspects related to financial inclusion and financial sustainability. The secondary data was extracted from scholarly research articles, Thompson Reuters, World Bank official website and official data of large listed commercial banks of emerging countries available on net.

As the data was collected from official site of World Bank, Thompson Reuters, research articles, and from internet, therefore it can be stated that they have high

validity and reliability. As all the sites used to collect data are well trusted by scholars. For this research the data of seven Asian developing countries (Refer to Table 1), from the year 2006-2020 is collected. This Data is collected though secondary resources such as scholarly articles, official site of World Bank, Thompson Reuters, and official data available on net.

In this research principal component analysis (PCA) technique along with Minimum-Maximum normalization, and z-score is used. So that the relationship strength between the variables can easily be identified and studied. As well as the chosen indicators can be converted into normalized variables, so the results can be more accurate and reliable.

Table 1. List of Countries (Seven Asian Developing countries, 2006-2020)

1. **China**
2. **Indonesia**
3. **India**
4. **Malaysia**
5. **Pakistan**
6. **Philippines**
7. **Thailand**

4. RESULTS

For driving the results principal component analysis is used, which is used to maximize variance, where the chosen indicators can be converted into normalized variables. As this conversion is essential prior to aggregating the indicators, before the formation of composite index. In this study Z-Score and Min-Max techniques are used for the analysis of the data extracted. Where Z-score is the most used standardization method, for the normalization of the indicators, where the scaling is based deviation from the mean. This method helps in cross country comparison. On the other hand, in Min-Max, as the name suggest, the minimum and maximum values are taken to form a scale, where the other values are than placed with reference to the values taken before. Through this method best and worst performances of the values can be derived, that indicates the performance of the variables. Below is the description of variables.

Table 2 Variable Discription

Variable	Topic	Indicator
Fi1	Financial Inclusion	ATM
Fi2	Financial Inclusion	Bank Branches
Fi3	Financial Inclusion	Gender Gap
Fi4	Financial Inclusion	NNI Per Capita
Fi5	Financial Inclusion	Global Equity
Fi6	Financial Inclusion	Cellular Subscriptions
Fi7	Financial Inclusion	Rural Population
Fi8	Financial Inclusion	Bank Nonperforming
		Loans to Total Gross Loans (%)
Ft1	Fin-Tech	Internet Usage
Ft2	Fin-Tech	Internet Usage %
		Population
Ft3	Fin-Tech	Fixed broadband
		Subscription (Per 100 people)
Fs1	Financial Sustainability	Soundness of Banks
Fs2	Financial Sustainability	Labor Force
Fs3	Financial Sustainability	GDP per Person Employed
Fs4	Financial Sustainability	GDP
Fs5	Financial Sustainability	GDP Growth Rate
Fs6	Financial Sustainability	Exchange Rate
Fs7	Financial Sustainability	ER Conversion
Fs8	Financial Sustainability	Broad Money LCU
Fs9	Financial Sustainability	Broad Money USD
Fs10	Financial Sustainability	Bank Nonperforming
		Loans to Total Gross Loans (%)

Table 2 indicates the Asian financial indicators that are considered in this study. Data between 2006 to 2020 is extracted from World Bank's official data base and Thompson Reuters.

Table 3: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Fi1	98	37.873	32.563	1.87	117.79
Fi2	92	10.533	2.767	5.72	17.83
Fi3	91	74.286	40.014	1	151
Fi4	98	3401.916	2283.861	700.5	8393.68
Fi5	97	13.333	35.09	-64.14	130.07
Fi6	98	94.084	39.131	14.25	186.16
Fi7	98	52.14	12.658	23.39	70.43
Fi8	87	4.48	3.664	.954	16.207
Ft1	77	93.519	29.942	29	144
Ft2	98	30.567	22.127	2.81	84.19
Ft3	88	5.372	6.618	.016	31.335
Fs1	84	63.952	26.185	25	128
Fs2	98	217,800,000	273,700,000	11,000,000	790,000,000
Fs3	98	23,237	12,846	9,431	59,391
Fs4	98	1,771,000,000,000	3,158,000,000,000	130,000,000,000	14,000,000,000,000
Fs5	98	6	2	(2)	14
Fs6	98	1,631	3,991	3	14,237
Fs7	98	0	0	-	0
Fs8	98	547,100,000,000,000	1,384,000,000,000,000	770,000,000,000	6,100,000,000,000,000
Fs9	98	2,729,000,000,000	6,317,000,000,000	74,000,000,000	28,000,000,000,000
Fs10	98	95	48	36	208

Table 3 is an indicator of variance, where it is indicating that some variables have small variance, while on the other hand, the other variables have high variance. Because, principal component analysis aims to maximize variance, it loads more laboriously on large variables, because of which the chosen indicators are to be converted into normalized variables. As this conversion is essential prior to aggregating the indicators, before the formation of composite index. For which Z-score and Min-Max techniques are used.

For the results the normalized data of all the variables financial inclusion, Fin-Tech and financial sustainability along with their total twenty-one (21) indicators, was processed by the means of principal composite analysis (Rotated and Un-Rotated), which assessed that impact of the changes of the values of selected variables on the final result derived. And then Kaiser-Meyer-Olkin (KMO) test, was performed to realize the suitability of these data for factor analysis and to measure sampling adequacy. KMO's normal index range fall between 0- 1, however, the results greater than 0.5 normally indicates that the factor analysis is suitable. The test was performed, on the actual data, as well as the data derived from Z-score and MMX.

Table 4: Principal Components/Correlation

Rotation: (Un-Rotated = Principal)

Component	Eigenvalue	Differetnce	Proportion	Cumulative
Comp1	3.573	2.329	0.447	0.447
Comp2	1.243	0.115	0.155	0.602
Comp3	1.128	0.267	0.141	0.743
Comp4	0.861	0.333	0.108	0.851
Comp5	0.528	0.083	0.066	0.916
Comp6	0.445	0.256	0.056	0.972
Comp7	0.189	0.155	0.024	0.996
Comp8	0.034	.	0.004	1.000

Number of Observations =   83
 Number of Components =   8
  Trace =   8
Rho =   1.0000

Table 4, indicates that the Eigenvalues of the first three components are more than 1, that means they are explaining the variable, more, as compare to other five components. The three components define the variable up-to 74%, where component one is explaining the variable up-to 44.7%, component two is explaining 15.5% and component three is explaining 14.1%. According to Kaiser, we take the data of the components with the proportion greater than 10%. Therefore, we will focus on these three components and will eliminate the other five.

Table 5: Principal Components (Eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Comp8	Unexplained
Fi1	0.425	0.117	-0.146	0.338	0.246	0.564	-0.450	-0.300	0
Fi2	0.166	0.632	0.445	0.299	-0.028	-0.456	-0.257	0.108	0
Fi3	0.084	-0.249	0.818	-0.301	0.026	0.372	-0.095	0.149	0
Fi4	0.469	-0.214	-0.227	-0.108	0.320	-0.183	-0.152	0.716	0
Fi5	-0.080	-0.583	0.173	0.765	-0.110	-0.148	0.006	0.061	0
Fi6	0.467	0.177	0.093	0.192	0.028	0.169	0.822	0.010	0
Fi7	-0.432	0.324	-0.094	0.247	-0.174	0.500	0.025	0.598	0
Fi8	-0.392	0.058	0.112	0.101	0.890	-0.041	0.153	-0.051	0

Table 5, indicates that all the components cumulatively explain all the variables completely, where no variable is left unexplained. This means all the eight variables of financial inclusion are completely explained by the eight components.

Table 6: Principal Components (Eigenvectors)

Variable	Comp1	Comp2	Comp3	Unexplained
Fi1	0.425	0.117	-0.146	0.313
Fi2	0.166	0.632	0.445	0.183
Fi3	0.084	-0.249	0.818	0.143
Fi4	0.469	-0.214	-0.227	0.101
Fi5	-0.080	-0.583	0.173	0.521
Fi6	0.467	0.177	0.093	0.173
Fi7	-0.432	0.324	-0.094	0.192
Fi8	-0.392	0.058	0.112	0.432

After eliminating the other five components with Eigenvalue less than 1, we have focused on the main three components which were explaining the data up-to 74.3% as indicated in Table 6. With focusing on the three components only we can find that the first variable Fi1 (ATM) is 68.7% being explained. Fi2 (Bank Branches) is 81.7% being explained, Fi3 (Gender Gap) is 85.7% being explained, Fi4 (NNI Per Capita) is 89.9% being explained, Fi5 (Global Equity) is 47.9% being explained, Fi6 (Cellular Subscriptions) is 82.7% being explained, Fi7 (Rural Population) is 80.8% being explained, and Fi8 (Bank Nonperforming Loans to Total Gross Loans (%)) is 56.8% being explained.

Note: The results of rotated and un-rotated components are the same, for reference see Appendix.

Table 7: Principal Components/Correlation
Rotation: Orthogonal Varimax (Kaiser off)

Component	Variance	Difference	Proportion	Cumulative
Comp1	3.416	2.050	0.427	0.427
Comp2	1.367	0.206	0.171	0.598
Comp3	1.161	.	0.145	0.743

Number of Observations= 83
Number of components= 3
Rho = 0.7429

All the three components at cumulative are explaining the variables up-to 74.29%; Where, component 1 is explaining the data up-to 42.7%, having the highest variance with the variable. Component 2 is explaining the data up-to 17.1%, having the second highest variance with the variable, and component 3 is explaining the data up-to 14.5%, having the least variance with the variable as compared to other components (Table 7).

Table 8: Kaiser-Meyer-Olkin (KMO)

Kaiser-Meyer-Olkin measure of sampling adequacy KMO
0.543
0.320
0.133
0.503
0.222
0.823
0.468
0.837
0.536

The total KMO of all the variables is more than 0.5, this means all the results derived from the indicators of financial inclusion are Significant (Table 8).

Table 9: Principal Components/Correlation

Rotation: (Un-Rotated = Principal)

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.387	1.917	0.796	0.796
Comp2	0.469	0.326	0.157	0.952
Comp3	0.144	.	0.048	1.000

The eigenvalue of only one component is more than 1, which is explaining the variable up-to 79.6%. Whereas component two is explaining the variable by 15.7% and component three is explaining the data up-to 4.8% only, (Table 9)

Table 10: Principal Components (Eigenvectors)

Variable	Comp1	Comp2	Comp3	Unexplained
Ft1	-0.578	0.570	0.584	0
Ft2	0.615	-0.166	0.771	0
Ft3	0.536	0.805	-0.254	0

All the three components cumulatively explain all the variables completely, where no variable is left unexplained. This means all the three variables of Fin-Tech are completely explained by the three components, as indicated in Table 10.

Table 11: Principal Components/Correlation

Rotation: Orthogonal Varimax (Kaiser Off)

Component	Variance	Difference	Proportion	Cumulative
Comp1	1.000	0.000	0.333	0.333
Comp2	1.000	0.000	0.333	0.667
Comp3	1.000	.	0.333	1.000

All the three components at cumulative are explaining the variables up-to 100%; Illustrated in Table 11. Where, component 1 is explaining the data up-to 33.3%, having the variance of 1 with the variable, component 2 is also explaining the data up-to 33.3% and having the same variance with the variable as component 1. Same is the case with proportion and variance of component 3.

Table 12: Rotated components

Variable	Comp1	Comp2	Comp3	Unexplained
Ft1	1.000	0.000	0.000	0
Ft2	0.000	0.000	1.000	0
Ft3	0.000	1.000	0.000	0

All the three components are explaining the data completely; Where, component 1 is completely explaining variable 1; Internet Usage (Ft1), Ft2 (Internet Usage % Population) is being completely explained by component 3, and component 2 is explaining Ft3 (Fixed broadband Subscriptions (per 100 people)) completely, indicated in Table 12.

Table 13: Kaiser-Meyer-Olkin (KMO)

Kaiser-Meyer-Olkin measure of sampling adequacy
KMO
0.637
0.587
0.741
0.639

The total KMO of all the indicators of Variable Fin-Tech is more than 0.5, this means all the results of Fin-Tech are Significant (Table 13).

Table 14: Principal Components/Correlation

Rotation: (Un-Rotated = Principal)

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.963	1.187	0.396	0.396
Comp2	2.776	1.202	0.278	0.674
Comp3	1.574	0.812	0.157	0.831
Comp4	0.762	0.170	0.076	0.907
Comp5	0.593	0.449	0.059	0.967
Comp6	0.144	0.035	0.014	0.981
Comp7	0.109	0.062	0.011	0.992
Comp8	0.047	0.015	0.005	0.997
Comp9	0.032	0.030	0.003	1.000
Comp10	0.002	.	0.000	1.000

Number of Observations = 84
Number of Components = 10
Trace = 10
Rho = 1.0000

The Eigenvalues of the first three components are more than 1, which means they are explaining the variable, more, as compared to other seven components, illustrated by Table 14. The three components define the variable up-to 83.1%, where component one is explaining the variable up-to 39.6%, component two is explaining 27.8% and component three is explaining 15.7%. According to Kaiser, we take the data of the components with the proportion greater than 10%. Therefore, we will focus on these three components and will eliminate the others.

Table 15: Principal Components (Eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Comp8	Comp9	Comp10	Unexplained
Fs1	-0.008	0.434	0.022	0.218	0.860	-0.002	0.119	0.048	0.091	-0.000	0
Fs2	0.403	0.299	-0.070	0.034	-0.168	0.730	0.009	0.373	-0.056	0.195	0
Fs3	0.065	-0.447	0.493	0.106	0.125	-0.154	0.141	0.689	0.036	0.079	0
Fs4	0.441	0.222	0.091	-0.296	-0.020	-0.200	-0.217	0.169	0.040	-0.737	0
Fs5	0.260	0.243	-0.017	0.799	-0.330	-0.353	0.040	-0.006	0.014	-0.002	0
Fs6	-0.237	0.336	0.528	-0.040	-0.102	0.016	0.059	-0.079	-0.727	-0.035	0
Fs7	0.270	-0.362	0.370	0.272	0.205	0.302	-0.520	-0.423	-0.018	-0.044	0
Fs8	-0.214	0.325	0.548	-0.085	-0.230	0.098	0.059	-0.136	0.675	0.039	0

Fs9	0.441	0.179	0.099	-0.351	0.038	-0.418	-0.236	-0.065	-0.027	0.636	0
Fs10	0.451	-0.180	0.132	-0.094	0.034	0.050	0.764	-0.383	-0.026	-0.059	0

Table 15, indicates that all the components cumulatively explain all the variables completely, where no variable is left unexplained. This means all the ten variables of financial sustainability are completely explained by the ten components.

Table 16: Principal Components (Eigenvectors)

Variable	Comp1	Comp2	Comp3	Unexplained
Fs1	-0.008	0.434	0.022	0.476
Fs2	0.403	0.299	-0.070	0.101
Fs3	0.065	-0.447	0.493	0.046
Fs4	0.441	0.222	0.091	0.080
Fs5	0.260	0.243	-0.017	0.569
Fs6	-0.237	0.336	0.528	0.025
Fs7	0.270	-0.362	0.370	0.132
Fs8	-0.214	0.325	0.548	0.054
Fs9	0.441	0.179	0.099	0.127
Fs10	0.451	-0.180	0.132	0.078

After eliminating the other seven components indicated by Table 16, we have focused on the main three components which were explaining the data up-to 83.1%. While, focusing on the three components only we can find that the first variable Fs1 (Soundness of Banks) is 52.4% being explained. Fs2 (Labor Force) is 89.9% being explained, Fs3 (GDP per Person Employed) is 95.4% being explained, Fs4 (GDP) is 92% being explained, Fs5 (GDP Growth Rate) is 43.1% being explained, Fs6 (Exchange Rate) is 97.5% being explained, Fs7 (ER Conversion) is 86.8% being explained, Fs8 (Broad Money LCU) is 94.6% being explained, Fs9 (Broad Money USD) is 87.3% being explained, and Fs10 (Broad Money Per GDP) is 92.2% being explained.

Note: The results of rotated and un-rotated components are the same, for reference see Appendix.

Table 17: Principal Components/Correlation

Rotation: Orthogonal Varimax (Kaiser Off)

Component	Variance	Difference	Proportion	Cumulative
Comp1	3.706	1.311	0.371	0.371
Comp2	2.395	0.183	0.239	0.610
Comp3	2.212	.	0.221	0.831

Number of Observations = 84
Number of Components = 3
Trace = 10

All the three components at cumulative are explaining the variables up-to 83.1%; Where, component 1 is explaining the data up-to 37.1%, having the highest variance with the variable. Component 2 is explaining the data up-to 23.9%, having the second highest variance with the variable, and component 3 is explaining the data up-to 22.1%, having the least variance with the variable as compare to other components, indicated by Table 17.

Table 18: Kaiser-Meyer-Olkin (KMO)

Kaiser-Meyer-Olkin mea-sure of sampling adequacy KMO
0.693
0.491
0.391
0.533
0.890
0.549
0.574
0.553
0.519
0.716
0.555

The total KMO of all the indicators of financial sustainability is more than 0.5, this means all the results of the variable financial sustainability are Significant as indicated by Table 18.

Note: The results for Actual, Z-score and MMX are the same. For reference see Appendix.

The results indicate that all the indicators of the three variables, financial inclusion, financial sustainability and Fin-Tech are significant. And financial sustainability can be achieved by financial inclusion by using Internet. The more the percentage of population uses internet the higher are the chances of achieving financial sustainability in emerging market. However, fixed broadband facility is also important for the boost of financial sustainability, as the faster the facilities of internet are available, the more efficiently are the financial activities performed, helping the financial boost in the economy along with increase in the usage to financial facilities provided. The results indicate that all the three indicators of Fin-Tech are equally explained by all the three components (Table 9), leaving no unexplained data, where component 1 is explaining the data of variable Fin-Tech up-to 79.6%. (Table 11). Financial inclusion and financial sustainability are also explained mostly by first three components, however, all of their indicators are significant. If all the three indicators of Fin-Tech are taken into consideration by government, economists, and financial institutes, by concentrating on the indicators of financial inclusion, they can successfully boost all the indicators of financial

sustainability, making the market of emerging countries sustainable.

5. CONCLUSION AND DISCUSSION

This research tried to measure the trends of financial inclusion, Fin-Tech and Financial sustainability, with the sample of seven (7) Asian developing countries, by using the data of fifteen (15) years, from 2006-2020. The main focus of this study was to identify whether financial sustainability can be achieved in emerging markets by financial inclusion, boosted through Fin-tech, using twenty-one (21) indicators. For the testing of our hypothesis Principal component analysis (PCA) was conducted on three different sets of normalized variables, in order to construct the main financial indicators.

The empirical result of this research indicates that financial inclusion, Fintech and financial sustainability are all interrelated, where the indicators of financial inclusion, if taken into consideration by law making bodies and economists, through fin-tech, can bring stable financial sustainability into the emerging markets; Where financial sustainability is limited and is required to flourish further in the economic market of the world. All in all, this can be stated that if policy makers, increase the fin-tech facilities in the country, this will promote the financial sustainability of the emerging markets, helping them to flourish well in the financial sectors, and improving their position in the world economy. This means financial inclusion should be promoted in the country, if the government, economist or policy makers want to achieve financial sustainability.

DECLARATION OF INTEREST

It is declared that authors of this research work have no competing interest.

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