Effect of Fintech on Financial Inclusion: Systematic Literature Review

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ABSTRACT

Technological inventions and innovations paved a way for development in the financial market. Existing literature shown that many studies on fintech but less studies on the effect of fintech on financial inclusion and their relationship theoretically and empirically. This study aims to analyse existing studies and their findings and to summarize the efforts of research in fintech on financial inclusion. The review for the study was based on standard publication namely PRISMA (Preferred reporting items for systematic review and meta-analysis). The study for selected articles using two leading database namely Scopus and Web of Science. In this context, the study summarize the literature that focuses on fintech variables that contribute for financial inclusion specifically considering two components: innovative digital and traditional digital fintech for both conventional and Islamic bank.

Keywords : Fintech; Financial Technology; Mobile Money; Financial Inclusion

INTRODUCTION

Financial technology, often known as fintech, is rapidly becoming a global phenomenon. Fintech refers to technology used by financial service providers to automate and improve their products. It is a form of digital financial management performed mostly via apps. Many financial service providers benefit from FinTech because it makes financial transactions easier and more inexpensive. The emergence of fintech may be attributed to its advantages, which include cost savings, convenience, and time savings. It is proven that fintech has helped to the financial inclusion as it successfully expands financial services, particularly for low-income households and unbanked individuals in underdeveloped regions.

Meanwhile, financial inclusion is the process by which individuals and companies get access to suitable, affordable, and timely financial products and services, for example banking, lending, equity, and insurance products. As defined by the World Bank, financial inclusion is "Digital financial inclusion generally involves the deployment of the cost-saving digital means to reach currently financially excluded and underserved populations with a range of formal financial services suited to their needs that are responsibly delivered at a cost affordable to customers and sustainable for providers." (Bank, 2022) In order to achieve the Millennium Development Goals, financial inclusion appears to be a strategy that might reduce global

poverty and improve global living standards. Supported with statement from (Swamy, 2019), financial inclusion has a positive impact on the poverty levels and standards of living of the poor.

Due to income disparities among people, it is implied that financial inclusion in the country is not very effective. According to previous study, one of the causes of financial exclusion in the banking sector is the lack of accessibility to financial transactions. This focuses on a group of people who are poor and a group of unbanked individuals. More research is needed on the relationship between FinTech and financial inclusion that extends beyond the existing focus on certain technologies and locations, as reported by (Ayse Demir, 2020). Technology may play a significant role in lowering the operational costs of providing banking services, especially in rural and unbanked regions, hence contributing to financial inclusion. However, there are less research done on particular topic as recommend by (Ayse Demir, 2020), More research is needed on the FinTech-financial inclusion nexus that goes beyond the current focus on certain technologies and regions. Supported with statement from (Suryono, Purwandari, & Budi, 2020), Research in the field of fintech remains in its infancy. This research gives contribution to the gap exist thus the objective of this study is to analyse previous studies and their conclusions, as well as to provide a summary of fintech research on financial inclusion. This Systematic Literature Review complements previous studies and gives a better understanding about fintech and financial inclusion, as well as their links with individuals and readers. Thus, it provides contributions for authorities bodies such as banks to implement a better approach to improve financial inclusion through fintech development. This research guided by research questions; How is the effect of fintech on financial inclusion?, How is the relationship between fintech and financial inclusion theoretically? and How is the relationship between fintech and financial inclusion empirically?.

METHODOLOGY

For the purpose of addressing the research questions, the SLR process was conducted in line with (B. Kitchenham, 2007) recommendations. A systematic literature review aims to comprehensively locate and synthesize related research, using organized, transparent, and replicable procedures at each step in the process (Higgins JPT, 2011). The present study was guided by PRISMA review protocol. PRISMA or Preferred reporting items for systematic review and meta-analysis protocols is a guideline to help authors prepare protocols for planned systematic reviews and meta-analyses that provides them with a minimum set of items to be included in the protocol (David Moher, 2015). The three processes consist of identification, screening, and eligibility. (refer to Figure 1).

The primary stage for this SLR process was identification where it is a process which is a search of synonym, related terms and variation keywords for the study namely fintech (financial technology) and financial inclusion. The identification process relied on keywords used by past studies, keywords suggested by Scopus and keywords suggested by experts. The developed full search string from the keywords assist in answering the research questions. The existing keywords and developed full search string based on special function such as truncation, wild card and Boolean Operator that were restricted to AND and OR on the two main database namely Scopus and Web of Science (Wos). The search strings in database scopus are TITLE-ABS-KEY((fintech OR "financial technology" OR "Fintech" OR "FinTech"

OR "Financial Technology" OR "Financial Services" OR "Technological Development" OR "Financial Innovation" OR "Digital Technologies" OR "Financial Service" OR "Financial Technologies" OR "Financial Technology (Fintech)" OR "Fin-Tech") AND ("financial inclusi*" OR "Inclusive Finance")) while in database Wos are TS=((fintech OR "financial technology" OR "Fintech" OR "FinTech" OR "Financial Technology" OR "Financial Services" OR "Technological Development" OR "Financial Innovation" OR "Digital Technologies" OR "Financial Service" OR "Financial Technologies" OR "Financial Technology (Fintech) " OR "Fin-Tech") AND ("financial inclusi*" OR "Inclusive Finance")). The searching process in these two main databases have resulted on a total of 1,665 articles.

This study screened all the 1,665 selected articles by choosing the criteria for articles selection which is done automatically based on the sorting function available in the database. Studies to be included in this SLR must report empirical findings and theoretical information of financial inclusion changes through fintech development. Since it is impossible for researchers to read all the articles, the selection criteria applied in the screening process are important to help narrow the scope of the article search to be more specific. Therefore, to ensure the quality of review only article and journal document types selected and excluded other than that criteria such as books, book chapter, review and proceeding papers. Meanwhile for better understanding, articles and journal with English language are selected in this study. Other criteria applied in this screening process is the area of study which is Economics, Business, econometric and finance, social science, development studies which help filtering articles related to the area of this study. Year of publication for articles and journals selected are from all range of years which suitable for systematic literature review to be done. Only articles at final publication stage are accepted and excluded article in press. This process has excluded 630 articles as they did not fit the inclusion criteria and removed 247 duplicated articles.

After the process of screening which is selection of studies under the inclusion and exclusion criteria, the number of paper remaining for the next step was 1,035 articles. Total 405 articles was reduced from screening process. 1,035 articles reduced to 788 articles after removing 247 duplicate articles. The 788 articles then going through eligibility process where the reading of abstract and title with the inclusion and exclusion criteria in order to find answers for research questions. 766 articles excluded from this process and there were 22 articles.[1] Final articles accepted for this research. In ensuring the quality of the articles content, the remaining articles were going through the quality appraisal process. Critical appraisal is the process of carefully and systematically examining research to judge its trustworthiness, and its value and relevance in a particular context. The need of quality appraisal in systematic review types of research to ensure the quality of papers ranking such as moderate and high. According to (Hayrol Azril Mohamed Shaffril, 2020), the experts were focused on the methodology of selected articles before mutually agreed the ranking at least at moderate level. [2]

[1] Table of details of articles for selected articles are openly available request from author in Appendix A

[2] Table of assessment for selected articles are openly available request from author in Appendix B

Figure 1: SLR Chart. (Formulation Of Research Questions)

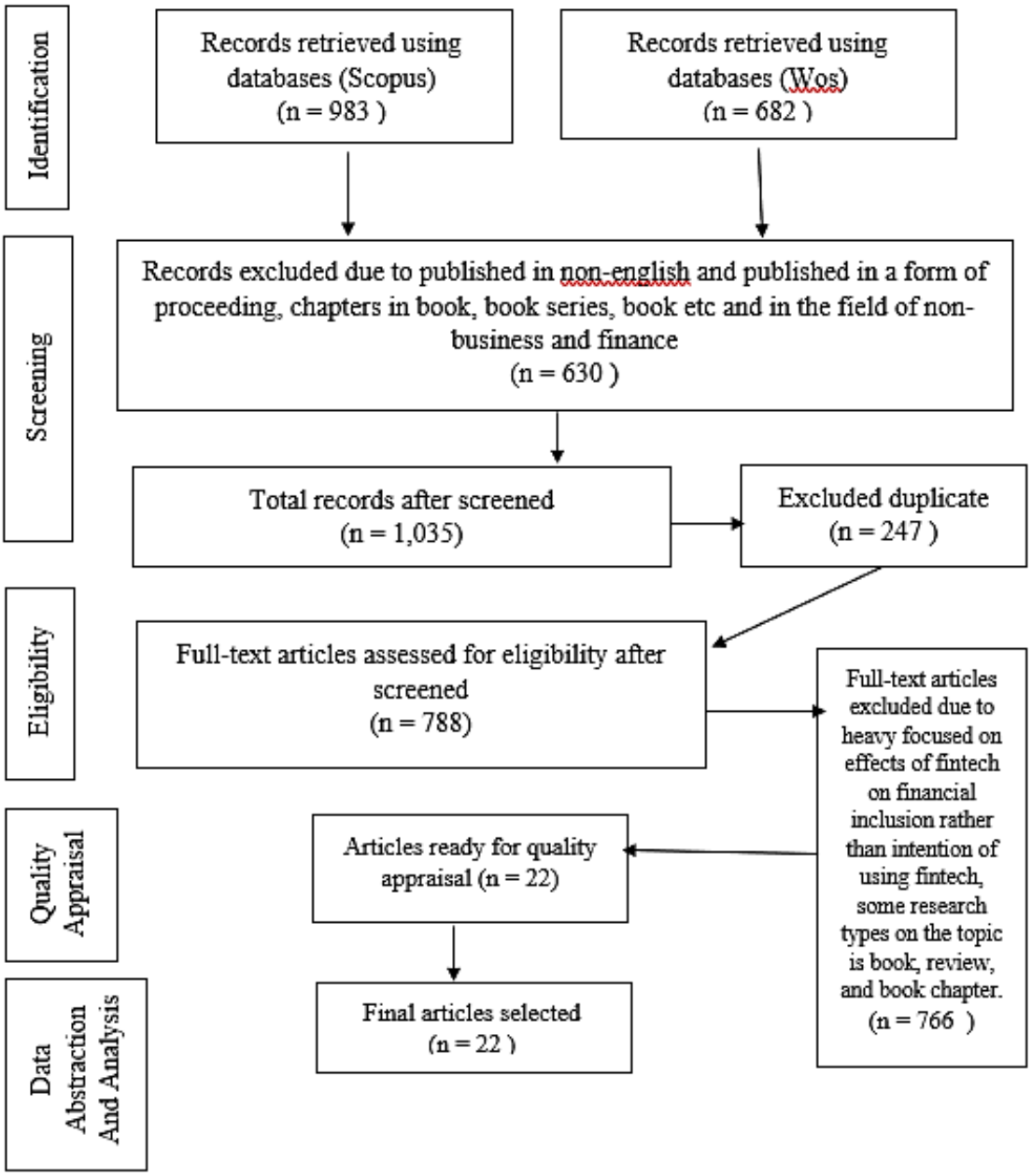

Table 1

Papers classified by publication years. This table shows the number of papers (among the sample of the 22 papers that summarized in this systematic review).

Publication	Record Count	% of
2022	11	4.5
2021	12,13,15,16,17,18	27.4
2020	1,2,3,4,10,19,20	31.8
2019	6,7,8,14,21	22.7
2018	9,22	9.1
2014	5	4.5

Sources: Scopus and Wos

In the list of references, the 22 are indicated with their respective codes, from 1 to 22 presented in alphabetical order. **Table 1** shows the number of papers classified by publication years. This research look into all the Wos and Scopus categories and articles. This review consider papers published in every years and result of researched articles was started from 2014 until 2022. There are 31.8% of articles which has the most publications in year 2020 while the least publication in years was in 2014 and 2022 which is 4.5%. **Table 2** shows the number of papers classified by the published journal, where the selected articles for systematic review are of recognized prestige and are situated in high positions within their rankings.

The number of papers by country sample from **Table 3** shows that 72.7 % of papers (16/22) analyse one-single country study. Among them, 68.75 % (11/16) are from the Africa, followed by India (12.5%), United State (6.25%), Tajikistan (6.25%) and Indonesia (6.25%). The remaining 27.27% (6/22) of papers use a multinational sample that allows comparisons to be made on the effect of fintech mechanism on different financial inclusion settings as they comparing both conventional and Islamic bank where the need of multiple countries in research. However three of paper from multinational sample mentioned number of countries instead of the name of countries. Based on the observation of the countries sample, there is a general pattern in a group of countries where most of them are from developing countries such as Africa. Coincides with the problem of the study which involves income inequalities and underserved people where mostly from less and developing countries. **Table 4** shows the number of papers by analysing the theory and model used in their research and some of paper used different theory and model 86.3 % (19/22) while there are three papers 13.6 % (3/22) which does not mention the model or theory used in their paper.

Table 2

Papers classified by source titles. This table shows the number of papers (from among the sample of 22 papers that summarize in this systematic review) classified by the published journal. In addition, the JCR-2018 and SJR-2019 impact ratings Q1, Q2, Q3 and Q4 indicate the respective quartiles in which the journal is ranked with respect to the total number of journals belonging to the same category

	Source Titles	Record Count	% Of	2021 JCR Index	2021 SJR Index
1	Applied Economics	1	4.55	1.103 (Q3)	0.468 (Q2)

2	International Journal Of Social Economics	1	4.55	-	0.29 (Q2)
3	Academy Of Entrepreneurship Journal	1	4.55	-	0.21 (Q3)
4	European Journal Of Finance	2	9.1	1.217 (Q3)	0.54 (Q1)
5	Mediterranean Journal Of Social Sciences	1	4.55	-	NA[1]*
6	International Journal Of Scientific And Technology Research	1	4.55	-	NA[2]*
7	Indian Journal Of Economics & Business	1	4.55	-	0.41 (Q2)
8	Cogent Economics & Finance	2	9.1	-	0.39 (Q2)
9	Financial Innovation	1	4.55	-	0.54 (Q2)
10	Journal Of Social And Economic Development	1	4.55	-	0.14 (Q4)
11	Journal Of Risk And Financial Management	1	4.55	-	NA
12	Technology Analysis & Strategic Management	1	4.55	3.745 (Q3)	0.73 (Q2)
13	Technological And Economic Development Of Economy	1	4.55	5.656 (Q1)	0.8 (Q1)
14	African Review Of Economics And Finance	1	4.55	-	NA
15	Journal Of Gender Studies	1	4.55	2.011 (Q3)	0.64 (Q1)
16	Financial Management	1	4.55	3.391 (Q2)	2.18 (Q1)
17	Digital Policy, Regulation And Governance	1	4.55	-	0.49 (Q2)
18	Journal Of Telecommunications And The Digital Economy	1	4.55	-	0.23 (Q3)
19	Advances In Business Related Scientific Research Journal	1	4.55	-	0.17 (Q3)
20	Journal Of African Business	1	4.55	-	0.61 (Q1)

NA[1]*Discontinued in Scopus as of 2016
NA[2]*Not yet assigned quartile

The results can be obtain by analysing two fintech mechanism which is innovative digital and traditional digital. Each fintech mechanism was further grouped into broader categories which is bank and non-bank such as company or enterprise which offers fintech's products and services. The innovative digital of fintech is related to financial transaction which more on online applications rather than traditional digital which has both physical and digital transaction such as Automated Teller Machine (ATM) and Point of Sales Machine (POS).

Table 3

Both empirical and theoretical papers on the relationship between fintech and financial inclusion by country. This table shows the number of paper (among the sample of the selected 22 papers from systematic literature review) by country sample. The papers listed by numerical codes from 1 to 22, following the list indicated in the index list as references.

Country	**Papers**			**No of Papers**
	Conventional Bank	Islamic Bank	Non-Bank	
Single-Country Sample				**16**
Africa	1,2,3,5,8,12,14,16,18,22		19	11
Indonesia	20			1
India	7		6	2
United States			17	1
Tajikistan	21			1
Multi-Country Sample				**6**
140 Countries	4	4		1
Maldives, Bangladesh, India, Pakistan, Afghanistan, Nepal, Buthan, Sri Lanka	9			1
Russia, Brazil, China, South Africa, India South Asia	10			1
Kenya, Brazil, Philippines, Pakistan	11	11		1
11 Post-Communist Countries Of The European Union	13			1
137 Countries	15			1

In the following sections shows the relationship between the two fintech mechanism and financial inclusion. In **Table 5** present the number of papers that analyse every mechanism or products of fintech where then separated to qualitative and quantitative table to see their relationship. Qualitative papers explains more on textual data and has no numerical research while quantitative papers provides data and information which can converted into numbers as describe in the table of the numbers of people that has account bank which explained the indicator of financial inclusion. All of the selected paper used innovative digital such as internet banking, mobile banking, mobile money and others compared to traditional digital such as automated teller machine (ATM) and Point of sales machine (POS).

Table 6 shows the effects of fintech on financial inclusion, where the positive sign represent positive effect on financial inclusion and negative sign shows low effect on financial inclusion. Each panel from both qualitative and quantitative papers then divided into two table for conventional and Islamic bank for better understanding. The fintech mechanism are distributed in two panels to which they belong; Panel A for innovative digital and Panel B for traditional digital.

Table 4

This table shows the theory or model used in every selected articles that fits the fintech and financial inclusion research. The results then classified into conventional bank, Islamic bank and non-bank (company).

Theory/Model	**Papers**			**No of papers**
	Conventional bank	Islamic bank	Non-bank	
Autoregressive Distributed Lag (ARDL) model	1			1
Multilevel mixed model	2			1
Binary logistic model	3			1
Information asymmetries theory and the transaction cost innovative theory	4,	4,		1
Static panel model and dynamic panel model	8			1
Pearson correlation	11	11		1
Probit model	10,20,22			3
Fixed Effect Model and Random Effect Model	9			1
Panel cointegration and causality analyses	13			1
Structural equation modelling	14,18			2
Error correction model	15			1
Questionnaire survey	16,21		19	3
Logit model			17	1
The Gompertz model	12			1
Not mentioned	5,7		6	3

Innovative digital and financial inclusion

We find in table 5, Panel A that innovative digital structure for both either qualitative or quantitative is by far the fintech mechanism that has most analysed. In the following sections, in depth analysis of each mechanism in relation to their effect on financial inclusion carried out which presented in table 6.

There are four papers under qualitative paper while there are 18 papers under quantitative paper classified in innovative digital. In **Table 6**, the effect of mobile banking (Stephen Mago(PhD), 2014), (Daya Dhar Raj Srivastava, 2019) on financial inclusion explained by authors in textual data for qualitative paper. The result shows the benefit and disadvantage of using mobile banking which explain positive and negative effect on financial inclusion (Stephen Mago(PhD), 2014). While result from (Daya Dhar Raj Srivastava, 2019) shows mobile banking positively affect the financial inclusion based on the increase in amount of transaction.

However, other research done on Nubank,is a type of neobank by (Velazquez, Bobek, Vide, & Horvat, 2022), shows non-significant correlation between customers and the credit

operations. This may due because of unfamiliar and less acknowledged of neobank to the public. P2P lending, invoice funding or supply chain finance, crowdfunding, payday loan, merchant cash advance, pay later finance, online seller finance, franchise loan, M-Pesa and GCASH also done on non-bank where both shows positive effect because both (Ravikumar, 2019), (Velazquez, Bobek, Vide, & Horvat, 2022) shows increase in access to bank account (account ownership), high financial access due to factors of speed, convenience and indiscriminative approach.

Table 5

Papers that consider fintech mechanisms as variables of financial inclusion. These tables shows the number of papers (among the sample of the selected 22 papers from systematic literature review) that analyse each mechanism, distributed in two panels which are innovative digital (panel A) and traditional digital (panel B). The mechanism of fintech under each panel then distributed under qualitative and quantitative tables and according to the group of bank and non-bank

Qualitative Table

Fintech Mechanism	**Paper**	**No of Paper**
Panel A: *Innovative Digital*	**5,6,7,11**	**4**
Bank		
Mobile Banking	5,7	2
Nubank	11	1
Non-bank		
P2P Lending, Invoice Funding Or Supply Chain Finance, Crowdfunding, Payday Loan, Merchant Cash Advance, Pay Later Finance, Online Seller Finance, Franchise Loan	6	1
M-Pesa, GCASH	11	1
Panel B: *Traditional Digital*	**7**	**1**
Bank		
ATM, POS	7	1

Quantitative Table

Fintech Mechanism	**Paper**	**No of Paper**
Panel A: ***Innovative Digital***	**1,2,3,4,8,9,10,12,13,14,15,16,17,18,19,20,21,22**	**18**
Bank		
Internet Banking	1,3,21	3
Mobile Banking	1,8	2
E-Money	1	1
Mobile Money	2,4,8,14,16,19	6
Mobile Phone and Internet	9,10,12,13,15,18,20,22	8
Non-Bank		
P2P Lending	17	1
Panel B: ***Traditional Digital***	**1,12,15,21**	**4**

Bank		
ATM, POS,	1,12,15	3
Electronic Funds Transfers	1,21	2
Domestic Remittances, Cross-Border Remittances, Direct Debits	1	1

In table 6, the effect of innovative digital; internet banking, mobile banking, e-money, mobile money and mobile phone with internet (telephony) under quantitative paper mostly shows positive relationship on financial inclusion. The usage of internet banking also contribute to the financial access which shows in (Abiola Ayopo Babajide, 2020), (Makhkam & Saidmurod, 2019) where positive results and significant to bank account ownership. The results explained that those who accessing to internet banking must have an account with bank. Other than that, two research done with mobile banking where positive result and significant based on the frequency of usage (access to financial services) (Senou , Ouattara, & Houensou, 2019) , meanwhile non-significant result of mobile banking shows in (Carla Fernandes, 2020) measuring on account ownership.

The result of e money shows positive effect on account ownership because explained the same reasons as the need to have bank account for accessing to e money (Carla Fernandes, 2020). The effect of mobile money is clearly related with accessing to financial services since it is measure on the frequency of usage and bank account ownership. The authors explained the increase usage of mobile money increase the flow of money in the market where contribute for the inclusion of finance. In addition, the results shows only two paper discussed on mobile money under Islamic bank where need more attention. All result shows positive relationship and significant to the test (Myeni, Makate, & Mahonve, 2020), (Ayse Demir, 2020), (Senou , Ouattara, & Houensou, 2019), (Dube & Chummun, 2019), (Kim, 2021) (Candiya & Ntayi, 2020).

Table 6

This table shows the effect on financial inclusion of each fintech mechanism analysed in the literature, as well as the total number of papers from both qualitative and quantitative (from among the sample of the 22 papers) that find each effect +, - and NS indicates an increase, decrease, and non-significant effect on the financial inclusion, respectively. The different fintech mechanism are distributed in two panels depending on innovative digital (Panel A) and traditional digital (Panel B). Each panel then distributed under bank and non-bank. The papers are identified by numerical codes from 1 to 22, indicated in the list of references.

Qualitative

Fintech Mechanism		**Effect**	**Papers**		**No of Papers**
			Conv.	Islamic	
Panel A: *Innovative Digital*		**5,6,7,11**			**4**
Bank					
Mobile banking	Benefits	Easily accessible, Easy to use, Secure to use, Comparative cost, Convenient, Financial deepening	5		

	Disadvantage	Charges are high, Long waiting period, risky, Lack of access to credit, No interest earned on credit balances, Anomalies on remittances are difficult	5		
	Frequently Usage	Increase in amount of transaction	7	7	
Nubank	Non-significant correlation between customers and the credit operations		11		
Non-bank					
P2P Lending, Invoice Funding Or Supply Chain Finance, Crowdfunding, Payday Loan, Merchant Cash Advance, Pay Later Finance, Online Seller Finance, Franchise Loan	Increase in access to bank account, speed, convenience, and indiscriminative approach.		6		
M-Pesa, GCASH	High percentage of account ownership and high financial access		11		
Panel B: *Traditional Digital*	**7**				**1**
Bank					
ATM, POS	Frequently usage	Increase in amount of transaction	7	7	

Quantitative

Fintech Mechanism	**Effect**	**Papers**		**No of Papers**
Panel A: *Innovative Digital*	**1,2,3,4,8,9,10,12,13,14,15,16,17,18,19,20,21,22**			**18**
Bank				
		Conv.	Islamic	
Internet Banking	+	3,21		3
	NS	1		
	-			
Mobile Banking	+	8	8	2
	NS	1		
	-			
E Money	+	1		1
	NS			
	-			
Mobile Money	+	2,4,8,14,16,19	4,8	6
	NS			
	-			
Mobile Phone And Internet	+	9,10,12,13,15,18,20,21,22	9,20	9
	NS			
	-			
Non-Bank				

P2P Lending	+ NS -	17	1
Panel B: *Traditional Digital*	**1,12,15,21**		**4**
Bank			
ATM, POS	+ NS -	1,12,15	3
Electronic Funds Transfers	+ NS -	21 1	2
Domestic Remittances, Cross-Border Remittances, Direct Debits	+ NS -	1	1

There are nine papers and the most component analysed on this particular topic. The effect of mobile phone penetration (mobile phone and internet) on financial inclusion clearly related to the importance of convenience in accessing to financial services via the internet. The result of mobile phone penetration shows positive effect on financial inclusion. The work from (b, Oughton, Harris, & Murindea, 2021), (Chinoda & Mashamba, 2021), (Makhkam & Saidmurod, 2019), (Abor, Amidu, & Issahaku, 2018) shows the most important condition measure for positive effect on financial inclusion which is bank account ownership. It is explained, those who has bank account has the literacy on fintech and acknowledge about financial services. Positive effect of mobile phone penetration because the frequency of access to financial services also increase as mentioned in the (Aduba & Asgari, 2021), (Bayar, Gavrilete, & Paun, 2021). Saving and borrowing at formal institutions also is one of the key contributor for financial inclusion as it is proven in the econometric test done by (Nagpal, Jain, & Jain, 2020), (Esquivias, Sugiharti, Purwono, & Sethi, 2020). Only one paper measuring the effect of mobile penetration on financial inclusion using geographic, demographic and banking penetration and also have positive result (Barik, 2018). One research done by (Maskara, Kuvvet, & Chen, 2021) under innovative digital from non-bank which is P2P lending shows negative results on financial inclusion measure using loan request.

Traditional digital and financial inclusion

Traditional digital can be classified to different mechanism. Research under qualitative paper by (Daya Dhar Raj Srivastava, 2019) explained in textual data the effect of ATM, POS shows positive result because increase in amount of transaction where describe the ability of people to access to the financial services even there are factor of distance compared to innovative digital. We can see that some people are still comfortable and don't mind using ATM and POS as long as they able to access to financial services.

Table 7

The table show the number of papers (from among of the 22 selected articles in systematic review) according to their bank types. There are conventional, Islamic, both and non-bank which is company. The table categorized each mechanism under the types of bank identified by numerical numbers according to the list of index reference.

Number of Papers By Bank Type		
Type of Bank	**Papers**	**No of Papers**
Conventional	1,2,3,5,10,12,13,14,15,16,18,19,21,22	14
Islamic	-	-
Both	4,7,8,9,20	5
Non-bank	6,11,17	3
Fintech and financial inclusion: conventional bank versus islamic bank versus non-bank		

Research under quantitative paper shows the effect of ATM, POS on financial inclusion is positive results as mentioned in (Carla Fernandes, 2020), (Aduba & Asgari, 2021), (b, Oughton, Harris, & Murindea, 2021). The measurement for the result is from the increase of bank account ownership and increase in the frequency of usage to the financial services. As mentioned earlier, when people have bank account, they are able to use ATM and POS for other financial purposes. In addition, domestic remittances, cross-border remittances, direct debits also shows positive effect on financial inclusion measure by bank account ownership (Carla Fernandes, 2020). However, non-significant result from (Carla Fernandes, 2020), the effect of Electronic Funds Transfers (EFT) on financial inclusion also measure by account ownership. Non-significant result because maybe less people make EFT even though they have bank account.

Table 8

This table shows the number of papers (from among the sample of the 22 papers that summarized in the systematic review) by financial inclusion measure used. The papers are identified by numerical codes from 1 to 22.

Financial Inclusion Measure	**Papers**			**No of Papers**
	CB	IB	Non-Bank	
Bank account ownership	1,2,3,4,15,18,21,22	4	11	9
Frequency of usage (access to financial services)	3,7,8,12,13,14,16,18,19	7,8		9
Saving and borrowing at a formal financial institution	4,10,16,20,22	4,20		5
Benefits of fintech	5		6	2
Geographic, demographic and banking penetration	9	9		1
Loan request			17	1

We can see in **Table 7** the selected articles are distributed according to their bank types. There are distributed under conventional, Islamic, both or non-bank. 63.6% (14/22) of the articles study conventional banks, 22.7% (5/22) of articles study both conventional and Islamic banks and 13.6% (3/22) of articles study non-bank. There is no study on Islamic bank alone gives gap to the future studies. In the section shows in **Table 8** provide a brief review of the measurement of financial inclusion used in the papers included in the systematic review. It is

explained, the difference in results shows in the study may also because of different method used to approximate financial inclusion. Bank account ownership and frequency of usage to financial access are the most of the measure used (18/22) in this study. While, Geographic, demographic and banking penetration and loan request are least measure used (2/22) in this study.

Table 9

The table shows the papers (among the sample of the 22 papers that summarized in the systematic review) grouped by the type of methodology approach (econometric technique) they consider in the analysis which focusing on solving the problem. The papers are identified by numerical numbers from 1 to 22 referring to the list of index reference.

Econometric technique	**Papers**			**No of Papers**
	CB	IB	Non-Bank	
Standard least squares techniques.	1			1
PSM technique	2,14			2
Logistic regression analysis	3,12			2
Pooled OLS and quantile regressions	4,22	4		2
Dynamic panel regression	8	8		1
Principal component analysis (PCA) method	9	9		1
Probit model	10,20,22	20		3
The Gompertz model	12			1
Causality analyses	13			1
Cross section and panel techniques	15			1
Pearson's chi-square test	16			1
Logit model			17	1
Stepwise regression model	18			1
PLS structural model	19			1
Not mentioned (from database qualitative)	5,6,7,11,21			5

In **Table 9**, the use of instrumental variables is Probit model, used by 13.63% (3/22). In addition, many papers employ PSM technique, logistic regression analysis, pooled OLS and quantile regressions for their econometric technique used 9.1% (2/2) for each of the technique. 10 papers used 4.5% (1/22) of the papers in this systematic review. However, 22.7% (5/22) papers does not mentioned in the study their econometric technique used due to qualitative research design and database are collected from secondary sources. Based on the summary of the conclusion of the effect of fintech mechanism on financial inclusion and the future lines research shows most of the studies in the Africa and positive relationship which suggest to have more research on Islamic banks to make sure more comprehensive and suitable with systematic literature research. There are limited sources in Islamic bank under context of the topic.

CONCLUSIONS

The increase in financial innovation has contributed to the increase in financial access among people as well as increase in effort to deliver the services to unbanked group. There are less study on the topic of relationship between fintech and financial inclusion. Financial access is the important key to maintaining the financial inclusion and growth of country. Studies have indicated that mobile money adoption (fintech) and usage has resulted in increased access to financial services to banks and for investments among microenterprises. However, some study finds a rather low use of financial services for remittances, sending/receiving money, bill payments, mobile banking, ATMs, and other banking services empowered by technology due to factors such as gender, location, literacy and etc. Meanwhile, the result shows how account ownership and frequency usage of accessing to the financial services describe the positive relationship between fintech and financial inclusion.

The use of FinTech has created more opportunities for rural life not only for savings. by owned bank account and access to financial services, it helps lower inequalities and change the standard of living. The contribution of fintech to financial inclusion helps all business through improve payment systems, increase economic activities and create economic growth. This study fill the gap by contribute to the summarize of research related to the topic for other researchers reference. More research and innovation are needed to maintaining and improving the understanding on the potential contribution of fintech on financial inclusion in the future. Finally, more study should be done with Islamic bank sample on the fintech mechanism which more comprehensive.

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