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Original Research Article

## Bibliometric Analysis on Mobile based Financial Technology and Financial Inclusion

Neelam

Symbiosis International (Deemed University), Pune 412115, Maharashtra, India.

neelam\_spcji2008@rediffmail.com

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**Abstract: Purpose-**The purpose of this study is to review the extant literature on mobile based financial technology and Financial Inclusion (FI) and their interrelationship in management domain. In this study, researchers sought to guide policymakers to advance financial inclusion initiatives. The study explains the research themes and findings in this emerging field. Further, it identifies the limitations and provides directions for further research.

**Design/Methodology/Approach-**The analysis was conducted from Scopus and Web of Science database for the period 2010-2023. The author retrieved research articles on Fintech and Financial Inclusion and presented the data using VOS viewer software. At the same time, the study describes the bibliometric analysis as citation analysis, co-citation analysis, mapping of co-cited journals, co-cited authors and co-occurrence of all keywords and others.

**Findings-**This study reveals the overall nature and direction of future research in the area of mobile based financial technology and financial inclusion. There are two major themes that emerge out through extant literature as use of mobile phones in context of mobile based technology and Financial Inclusion, summarizing of theories/construct used in previous literature. Mobile-based technology is becoming more important in the recent era. Mobile-based banking is naturally non face to face. It is not restricted only to physical attendance to banks, but the consumers can make a payment from anywhere as he wants. However, there is some gap on which future studies can focus in.

**Practical Implications-**The paper explains lessons that could be proven as an important tool for FinTech users, entrepreneurs and bankers and for policy makers and researchers to work upon the issues like barriers or factors affecting in usage of financial services. This paper also helps to practitioners in understanding deeply the role of mobile technology and financial inclusion.

**Originality/Value-**The mobile technology and FI study is unique, particularly in the context of emerging economies.

**Keywords:** Mobile technology, Financial inclusion, Mobile money, Bibliometric analysis, Vos viewer.

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## 1. Introduction

In recent era, business environment is tremendously growing with the introduction of new technologies and innovations. Mobile technology is related to various streams such as commerce, banking, healthcare and others. Mobile money has become an important tool for enhancing opportunities and challenges for business and individuals. Mobile money services can be considered as an effective way for financial inclusion as mobile technology has a greater effect on economic growth and financial inclusion and helps in removal of poverty (Komlan et al., 2019). Mobile payments are not only limited to consumer to seller payments, there are other types, such as peer to peer payments or business to business payments, even to public administrations (Srivastava et

al.,2010). Approximately 2.5 billion people do not have bank account facilities. Lack of account hinders the use of financial services. Digital financial services make enable customers for active participation in financial services system (Finau et al.,2016). In many countries of the world, the problem regarding unbanked population is prevalent today (Alberto Chaia,2009). Mobile banking can be considered as a tool of financial inclusion goals achievement. Mobile money also generates employment opportunities. In 2012, approximately there are 500,000 mobile money agents and having bank branches in 28 countries (Penicaud,2012). The previous researchers have found that mobile money has given contribution to economy as well. Banking services and payment system can be considered as a key pillar for any economy. A report by Mckinsey and Company (Alberto Chaia,2009), indicates that approximately 2.5 billion adults are not using financial services for the purpose of saving, borrowing and transferring money. In sub-Saharan Africa ,80% of the people do not have account access. Customers are known as the primary users of the mobile money platform. The customer's information is registered and an account is created, commonly known as an "e-wallet". The study (Victor, 2014) have significantly described the actors playing an immense role in mobile money ecosystem as customers, processing servers, distribution agents, merchants, banks, regulatory authorities, among others. The studies (Asongu et al ,2020) identified that the factors and variables such as, mobile accounts, sending money, receiving money and demand and supply factors by using co-relation Matrix.

### 1.1 Definition and Concept of Financial Inclusion

According to Rangarajan Committee financial inclusion can be defined as, "The process of ensuring access to financial services providing timely and adequate credit required by vulnerable groups such as weaker sections and low-income groups at an affordable group" (Vijaya Bhaskar,2013). The rangarajan committee's report was considered as eye opener for the banking system. The habit of saving helps in proper fund management, as it has been identified by Dasgupta, Paul and Fuloria (2011).

Financial inclusion can be defined as the process of providing access and use of financial services to especially poor people in the formal financial sector (Allen et al, 2016; Ozili, 2018). The studies (Siano et al ,2020) has found the three major factors such as ease of use, security and social exclusion emerged as drivers of mobile banking in Nigeria. Poor banking facilities, less money deposit in bank branches and higher cost of products and services and distance are the barriers in financial inclusion agenda (World Bank, 2013). Poverty can be considered as another barrier in way of financial inclusion. Furthermore, people are not able to save money for financial transactions (Triki and Faye,2013).

Defining Financial Inclusion," It is a state, where every individual can use financial services at a convenient environment at affordable cost" (Beck et al.,2007). Aker and Mbiti (2010) highlights five reasons for benefits in Africa for mobile phone usage. The reasons are first is mobile phones improve access of information, thereby minimise the search costs, improves coordination among agents, and increases market efficiency. second is mobile phones build proper communication between customer and suppliers. Third is a mobile phone helps in employment generation based on services related to mobile phones. Fourth is a mobile phones fullfils the purpose of sending credit as required by the friends or relatives. Fifth is mobile phones are also used to provides financial services.

The attempts to answer the following research questions.

**RQ1.** Which are the most cited journals and authors and growth rate of number of publications from the year 2010 to 2023?

**RQ2.** Which are the emerging themes in area of mobile technology and financial Inclusion in previous literature?

## 2. Data collection Method and Research Methodology

The data has been collected through the Scopus database. The reason of choosing this database is that it provides relevant data and to maintain a consistency. The articles have been selected through following search strings as (“Mobile financial technology” and “Financial Inclusion”: A review”) OR (Mobile Financial Technology solution and Financial Inclusion: A review”) OR (“Mobile based Financial Technology and Financial Inclusion”) OR (“Financial Technology and Financial Inclusion”). The year is decided from 2010-2021 for review of literature. A total of 216 articles were found in first phase of search. Further 55 articles were chosen for the study based on article title, abstract and introduction search. The articles written in English and in full text were only considered and chosen for review. The literature study was limited to peer-reviewed review articles and limited to the following keywords: “Mobile technology”, “financial inclusion”, “financial literacy”, “awareness”, “education”, “trust”, “poverty”, “Illiteracy, “mobile payment”. “mobile-based financial technology-related review articles are scattered across different fields like management, engineering, marketing, information technology, or finance.

A rigorous analysis for bibliometric study was discussed to fulfill the agenda of the research. There are several techniques of bibliometric study as citation analysis, co-citation analysis and co-occurrence of all keywords have been adopted for research. The first technique is citation analysis, the network of co-cited authors and network of co-cited journals have been displayed through mapping. The second analysis is co-occurrence of all keyword used in this study. To carry out the bibliometric analysis, the software “VOS viewer” have been used.” VOSviewer”is a bibliometric visualization tool used for displaying maps that are clearly and easily interpretable. The study Victor et al.,2019 have adopted the bibliometric analysis and have used two software for visualization of networks namely “HISTCITE”and” VOSviewer”. Sonia (2020) have also used “VOSviewer” in carrying the bibliometric analysis in context of mobile learning in higher education.

**Table 1** Search Syntax based on Scopus Database

Data Source	Search Syntax
Search Syntax on Scopus Database	(TITLE- (“Mobile financial technology and Financial Inclusion: A review”) OR (Mobile Financial Technology solution and Financial Inclusion: A review”) OR (“Mobile based Financial Technology and Financial Inclusion”) OR (“Financial Technology and Financial Inclusion”). (Custom Year Range-2010-2021) (Search field-(“Title, Abstract, Keywords”))

*Source: (Victor et al.,2019)*

## 3. Results and Discussion

The bibliometric technique has been discussed in this section as citation and co-citation analysis, No. of publication per year, No. of influential authors by total document-occurrence of all keywords.

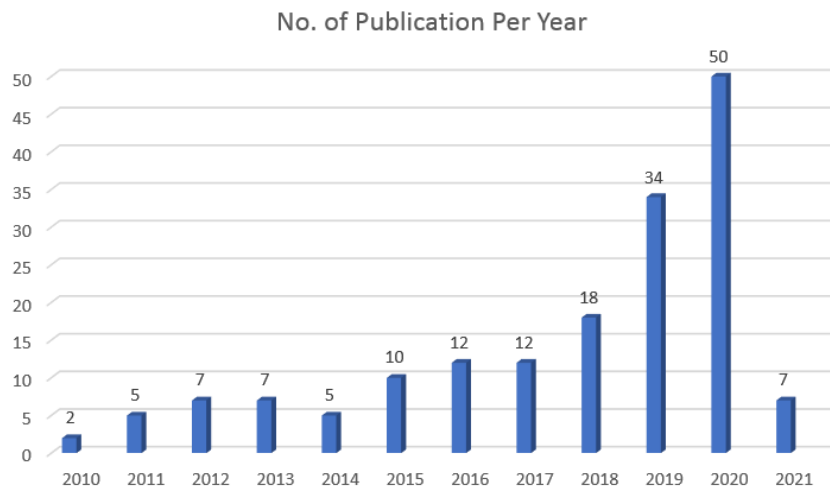
### 3.1 Citation Analysis

Under this analysis, top ten journals citation wise, most influential authors and number of publication year wise have been considered.

#### 3.1.1 Number of publications per year

The number of publications from the year 2010-2021 has been displayed by bar chart. From the year 2010 to 2013 year, the publication rate was gradually increasing, but in the year 2014 the growth rate declined. Further, from the year 2015 to 2020 growth rate in publication increased and year 2020 was the peak year of publication. Mobile technology was greater in use at the time period of pandemic covid 19 and later also as the people was not allowed to go outside and make transacations. They were using online payment apps mostly in covid period.

The publication growth rate shows that researchers are continuously working in field of mobile technology and Financial Inclusion.



**Figure 1** Graphical Representation of number of publications per year based on 2010-2021

Source: (Victor et al.,2019)

### 3.1.2 Most Influential Journals

Co-citation analysis was done to find out the relevant journals in mobile technology and financial inclusion field. In below table top ten journals have been discussed found from Scopus database and subject area has been well defined also. The journals in scope are: New Political Economy, PLOS ONE, Science, Sustainability, World Development, Journal of African Business, MIS Quarterly have been co-cited in area of mobile technology and financial inclusion. The New Political Economy, Journal of Economic Survey and International Journal of Equity in Health are the top cited journal while doing literature analysis.

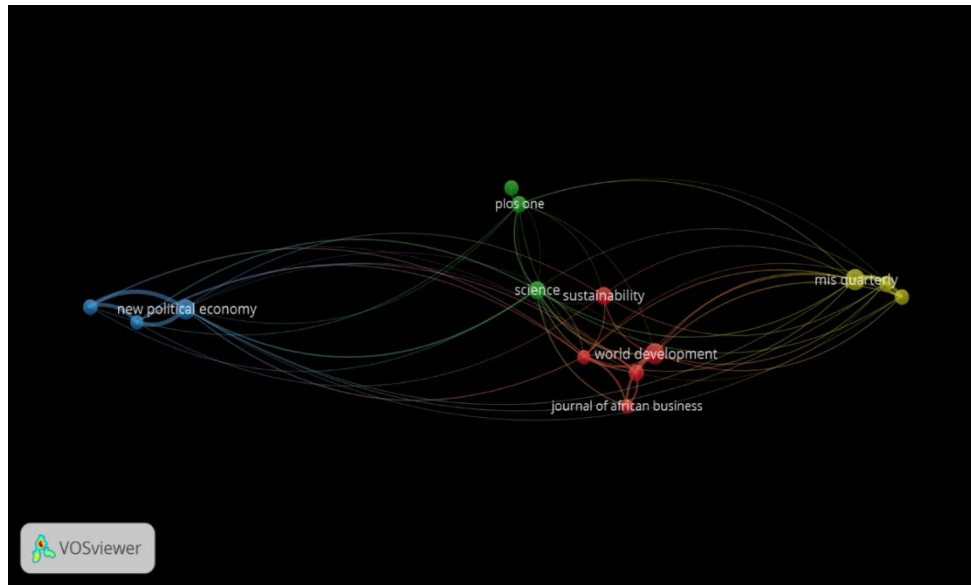
**Table 2** Information of Top ten Journal and Citations including more than ten citation in Scopus

Journal Name	Cite 2019	SJR 2019	SNIP 2019	Subject area	Cite score 2019	Citation
New political economy	5.4	1.748	2.337	Social sciences	5.4	89
Journal of economic surveys	5.5	1.806	2.851	Economics, Econometrics and Finance	5.5	62
Review of International Political Economy	4.3	1.823	2.340	Social sciences, Economics, Econometrics and Finance	4.3	14
Development Southern Africa	1.3	0.384	0.986	Social sciences	1.3	16
Sage Open	1.5	0.324	0.888	Arts and Humanities	1.5	18
Information Development	3.5	0.546	1.328	Social sciences	3.5	20
International Journal for equity in health	4.2	1.393	1.600	Medicine	4.2	44
Women’s studies international forum	1.6	0.432	1.047	Social sciences	1.6	15
African finance Journal	0.7	0.219	0.204	Economics, Econometrics and Finance	0.7	29
Cyberpsychology	2.9	0.675	0.855	Social sciences, Psychology	2.9	21

Source: Author’s Calculation

After analysis, it was found that in a above table the Journal as New Political Economy has a highest citations(89) and the two Journals achieved also good citations as Journal of Economic Survey ( 62), International

Journal for equity in health(44).Further, The two Journals such as Journal of New Political Economy and Journal of Economic Surveys has got good Cite score(5.4,5.5)compare to other Journals.



**Figure 2** Network of co-cited Journals

*Source: Sobral (2020)*

### 3.1.3 Most Influential Author

This part includes the most cited authors on cumulative basis in the area of mobile technology and financial inclusion. The measurement is done on the basis of total number of published articles and citations received.

**Table 3** Most Influential Authors (In terms of cumulative citations received)

S.no.	Authors	Documents	Total Citations
1	Bernards	3	33
2	Cassimon	2	124
3	Gabor	1	89
4	Brown	1	39
5	Bracewell	1	34
6	Sirois	1	27
7	Jekel	1	213
8	Tchamyou	1	122
9	Gregori	1	108
10	Davis	1	71
11	Abedifar	1	62
12	Faust	1	49
13	Chiang	1	48
14	Elaish	1	29
15	Sirois	1	27
16	Nakamura	1	27
17	Santiago	1	25

*Source: Author's Calculation*

The above table no.3 showed that Cassimon, Jekel, Tchamyou, Gregori are the top cited authors having more than 100 citations in total. The citations received from the year 2010-2021.The figure no.2 displayed the mapping of co-cited authors in area of financial technology.

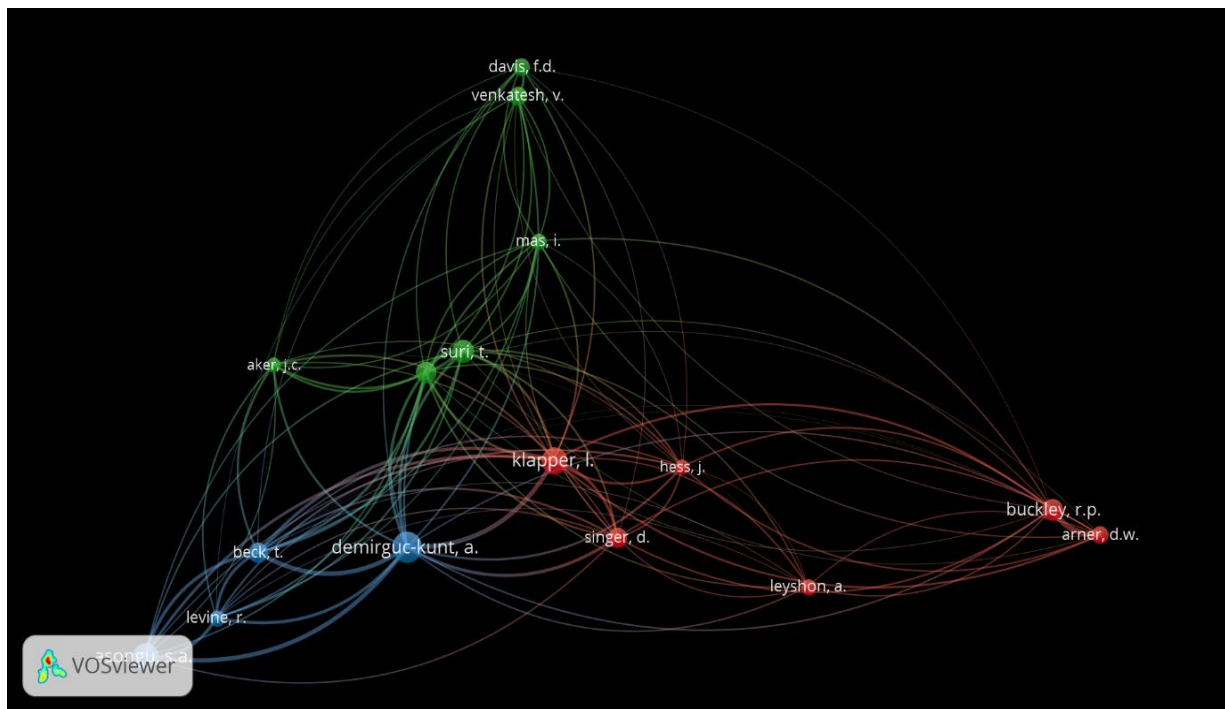


Figure 3 Network of co-cited authors

### 3.2 Co-occurrences of all keyword

This analysis includes the all keywords used in relevant studies. The keywords like ‘Financial Inclusion’, ‘Technology’, ‘FinancialManagement’, ‘Human’, ‘Sustanibility’, ‘Economics’, ‘Mobile Money’, ‘Developing Countries’ are the most prominent keywords found in existing literature over the time span of 2010-2021 in the field of Technology and Financial Inclusion. Some other important keywords are ‘Decision Making’, ‘Information and Communication’, ‘Micro fiancée’, ‘Livelihood’, ‘Innovation’, ‘Mobile banking’, ‘Social Inclusion’, ‘Financial Services’, ‘Article’, ‘Economics’ and others have been found in extant literature in shaping the future research in mobile technology and financial inclusivity.

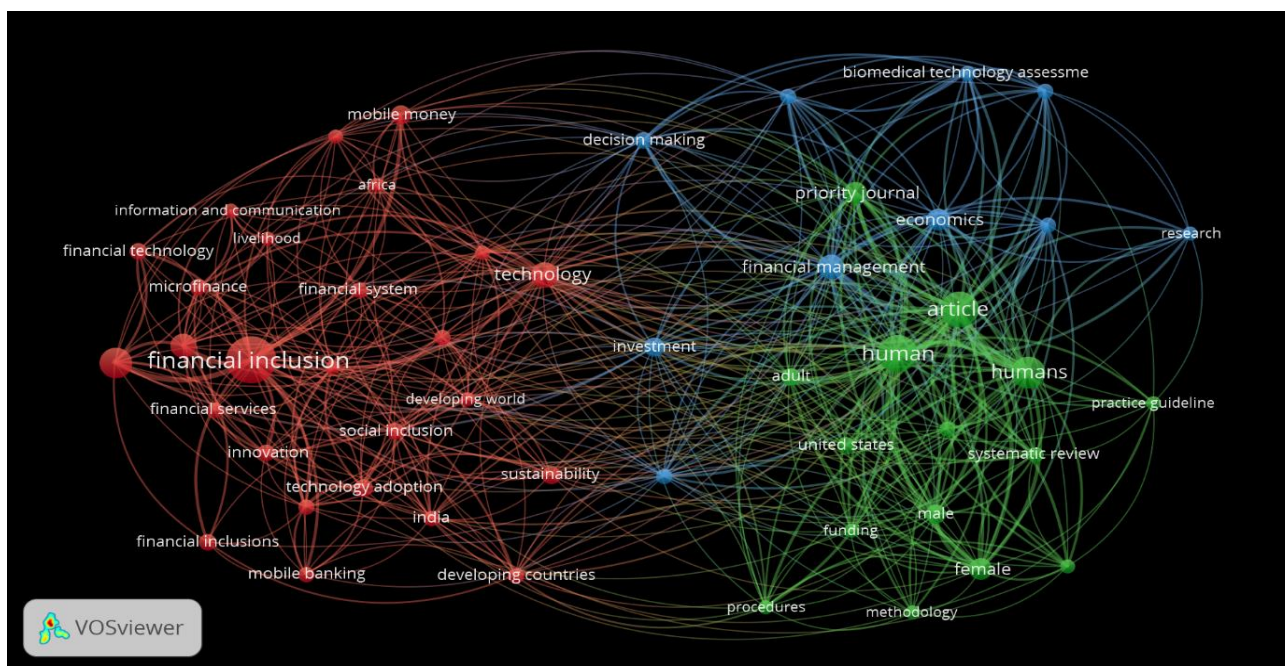


Figure 4 Co-occurrence of all keyword

## 4. Emerging trends in the field of Mobile based technology and Financial Inclusion

The literature showed that mobile based technology is tremendously growing and contributing to economy as well. Mobile technology solutions are helping individuals in day-to-day transactions and to businessman, entrepreneurs, investors and so on. There are following themes have emerged after the review of literature. These themes have been discussed in the following sections.

### 4.1 Use of mobile phones in context of mobile based technology and Financial Inclusion

In today world, mobile phones usage is broadly increasing through the low-income households for the use of financial services (Aker et al.,2016, Mishra and Bisht,2013; warren,2007). Mobile banking can be considered as a key factor of financial inclusion in a country like sub-saharan Africa (Baptista and oliveira,2015). Mobile banking is a broader term includes transfer of money and deposits and payments (Fall et al.,2015 and Suri,2016). This paper (Fall et al.,2020) discussed the mobile banking term in form of mobile payment, deposits, withdrawals of funds and so on. This study (Fall,2020) explored the determinants of adoption of mobile banking in Senegal.Njoku and Odumeru (2013) highlights the factors affect the mobile banking in Nigerian country as Norms, belief, past values, past experiences, Perceived ease, Customer age, Educational Qualification and others. With the use of mobile phone, Nigerian changed their life style and way of doing transactions as suggested by Agou and Carter (2014). Agu et al., (2016) conclude that mobile banking can be considered as an important tool for the financial transactions in banking system. It enables users to make easy transactions from anywhere as he wants. The study (Siano et al.,2020) has used qualitative Meta synthesis for analysis. The key term as micro finance, digital financial services, mobile banking and Nigerian bank were chosen for screening the quality-based articles for the study. The electronic database such as Elsevier, Scopus, Emerald and Springer were chosen for the study. This study (Ahmad,2020) has discussed the scenario on mobile technology and way of removal of financial exclusion. Approximately 38% of male population and 27% of female population use banking services and they have bank accounts also in sub-saharan Africa (Demirguc-Kunt et al.,2018). There is a difference between mobile money and mobile banking is that at the time of using mobile money, people make transactions using MNO (Mobile network operator) and there is not a requirement to have an account (Aker and Mbiti,2010). A huge access of banking services enables poverty removal, on the contrary microfinance does not (Donou-Adonsou and Sylvester,2016).

#### Development path in mobile banking

- Smart money/G-cash mobile money transfer services (Wishart,2006).
- M-Pesa(Vodafone and Saficom).
- Mobile based drumnet application (Qiang et al.,2011).
- Telecom companies and banks tied to offer mobile saving accounts to financially excluded up to 43%.

### 4.2 Summarization of Theories/Construct used in Previous Literature

Siano (2020) has clearly described the Acceptance model/theories in mobile banking as Tam (Technology Acceptance Models), Tam2, TRA (Theory of Reasoned Action), UTAUT

(Unified theory of acceptance and use of technology), TPB (Theory of perceived behaviour) and so on. Further Bankole et al. (2011) summarized that effort expectancy and utility expectancy are the two influential factors affecting behavioural intention with the agenda of mobile banking in Nigeria. Balogun et al. (2013) discussed that some factors that affect customer satisfaction with e-banking as a mobile banking, smart cards, telephone and television banking in Nigeria. Theory of reasoned action (TRA) was introduced by Fishbein and Ajzen (1975). TRA were known as “Theory of planned behaviour” (TPB). Further it was known as “Decomposed theory of planned behaviour” (DTPB). Variables were considered for TRA as Behavioural Intension (BI), Attitude and subjective norm, whereas DTPB were related to relative advantage and risk variables. Variables were related to Diffusion of Innovation (DOI). It was known as IDT (Innovation Diffusion Theory). After that



TRA were implemented to TAM by Davis, 1986. The factors were perceived ease of use and perceived usefulness. TAM was formed to TAM2 by Davis and Venkatesh, Morris, Davis and Davis, 2003. Goodhue, 2007 suggested UTAUT as a powerful tool of measuring the user technology acceptance. Instead of it, there are lack of studies based on UTAUT (Samudra and Phadfare, 2012).

The study (Bhuvana and Vasantha, 2019) has assumed that perceived ease of use is the significant factor of mobile banking. The factors such as Perceived usefulness, Perceived Credibility, Perceived ease of use, Attitude, Actual usage, Behavioural Intention has been discussed in context of rural people by the (Bhuvana and Vasantha, 2019). The study (Kishore and Sequeira, 2016) has discussed the relationship of variables as Performance expectancy (PE), Effort expectancy (EE), Social Influence (SI), Attitude and Perceived risk (PR) are the independent variables, whereas dependent variables are behavioural Intension (BI), Moderators like age, gender are the parts of the study.

## 5. Research Gap/Limitations and Future Scope of research

India is considered as the second highest financially excluded country in the world (Khan. Commission Report, 2004). Beck et al. (2007, 2208) suggested the barriers such as Know Your Customer (KYC) requirement, balance requirements, account fees etc. Akudugu (2013) explained the reasons behind not having accounts in banks by the customers as lack of trust, low level of income and improper documents and so on. The study (Kandpal and Mehrotra, 2019) highlights that the fact that most of the small businesses are operating without existence of financial institutions. Approximately, more than half of the population does not have bank accounts. Low internet penetration, Bank accounts, absence of hardware and lack of funds are the issues emerged while using technology solutions. Recently found that 87% payment are operated in cash form and 40% of the population is not using bank facilities. A report by McKinsey and company (Alberto Chiao, 2009), Approximately 2.5 billion adults are not using financial services for the purpose of saving, borrowing, transferring money. In sub-Saharan Africa, 80% of the people do not have bank account access.

Simultaneously, 90% of small level business do not have tie up with formal financial institutions. To respond the various challenges into the market, HDFC, Axis bank have given open forum for mobile apps for digital transactions. The RBI has taken various steps to help financially the rural areas through Business correspondents (BC), Business facilitators (BF) and Micro finance Institutions (MFI). RBI has target new customers in banking and IT sector by 600 million (Ketkar et al., 2012). The digital India, Make in India, Demonetization are the important initiatives for being a cashless economy. Social advertisement, public service announcement can be initiated through policy makers to the public that Financial inclusion helps not only to economic growth but also to society. Important issues can be explored that moderating impact of culture can be taken into account to build a relationship between financial technology and financial inclusion in context of developing nations. Overall, the findings are this study is unique in context of use of technology and financial inclusion as there are studies found separately on technology and inclusion based but not focusses on their relationship. After extensive review of literature, It is identified that there are several theories like Tam, Tam2, Tra, UTAUT have been discussed in exploring technology adoption phenomenon in terms of acceptance. Thus, it is an urge for future researchers to focus on such studies and to work on another model or framework that can better help in explaining and analysis of technology adoption and to find the financial inclusivity.

There are some areas for recommendation for future researchers, academicians, policymakers, and experts in the financial segment.

- (1) Financial Technology companies: Pre and Post Covid Impact analysis.
- (2) Comparative analysis between Insurance companies and financial technology companies in terms of efficiency and profitability.
- (3) A review on other areas of Fintech as Crowdfunding and Artificial Intelligence: Trend and Direction
- (4) Artificial Intelligence: Does it change the future of Banking



- (5) Digital transformation in Cooperative banks in India
- (6) Financial technology in the countries
- (7) financial inclusion policies and strategies.

## 6. Conclusion

The overall literature shows that mobile phones usage and mobile technology innovations can be considered as an innovative option for financial inclusion and growth. The researcher can make recommendation for the government, policy makers, financial service providers and regulatory authorities in order to achieve financial inclusion agenda through the maximum and optimal use of mobile based technology. Abiola (2020) discussed the mobile banking, fintech solutions in context of Nigerian countries. thus, it is an urge to future researchers to take consideration other countries also in order to find out the possible research gaps.

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