



A Machine Learning-Based Analysis On Impact Of Digital Financial Inclusion And Innovative Financial Products Offered By Private Bank Sector Among The Women In Ruralin Thanjavur District”

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ABSTRACT

Financial inclusion fosters equitable economic expansion and has the potential to contribute to several sustainable development objectives. The use of digital technology and the availability of cutting-edge financial services provided by banks may provide opportunities to alleviate some of the barriers faced by women residing in rural areas when it comes to using and accessing digital services. This research utilises a machine learning methodology to examine the degrees of digital financial inclusion and the variety of innovative financial products provided by the private banking industry to women living in rural parts of Thanjavur District. Given the growing importance of financial inclusion in driving economic growth, it is imperative to comprehend the distinct requirements and obstacles encountered by women residing in rural areas. The study uses sophisticated Random Forest (RF) machine-learning algorithms to analyse and understand data collected from many sources, including demographic data, transaction records, and user habits. The main goals of this inquiry are two-fold: Firstly, the objective is to evaluate the present condition of digital financial inclusion among rural women in Thanjavur District. This assessment will consider criteria such as their access to banking services, level of digital literacy, and use of mobile financial apps. Furthermore, the research seeks to assess the array of cutting-edge financial products provided by private banks, scrutinizing their efficacy in meeting the distinct financial needs of women residing in rural regions.

Keywords: Digital Financial Inclusion, Rural, Women, Machine learning, Private Bank.

Introduction

Financial inclusion refers to the provision of financial services to all individuals in society without any discrimination or bias. Financial inclusion refers to the provision of accessible and inexpensive banking products and services that meet the needs of people and enterprises in terms of transactions, payments, savings, loans, and insurance. These services are given sustainably (Chen and Jiang, 2023).

The main objective of financial inclusion is to ensure the provision of fundamental financial and banking services to all individuals, regardless of their income or savings profile (Cheng and Shi, 2010). Financial inclusion primarily aims to provide essential financial support to the economically disadvantaged segments of the nation, ensuring fair treatment for everyone. Financial services should be provided without any concealed transaction fees.

The primary focus of financial inclusion is to ensure that every individual in society actively and wisely participates in financial management. Many impoverished families in India, particularly those in rural regions, lack access to official financial services. These segments of society lack awareness about banks, banking services, and financial plans offered by the government sector. In many instances, while being aware of the existence of the bank, a significant number of individuals cannot avail themselves of the advantages provided by the bank. In some cases, individuals may fail to meet the minimal eligibility requirements set by

the bank, resulting in their inability to access banking services. The bank will only grant a deposit or loan to an applicant if they meet the qualifying conditions. A significant portion of the impoverished individuals in society may experience unemployment. Each bank requires standardised necessary paperwork to be provided when establishing a bank account or applying for a loan. The primary goal of financial services is to empower the economically disadvantaged segment of society to achieve financial autonomy (Jiang and Guo, 2022). Financial inclusion is beneficial for raising knowledge about financial services among community members. The Indian government initiated the National Mission for Financial Inclusion (NMFIs) to offer basic banking services to all individuals who do not have access to banking facilities. This mission is guided by the ideas of extending financial services to those who are now excluded, providing security to those who lack it, extending financing to those who are currently underfunded, and servicing rural areas. The government has implemented many initiatives to promote financial inclusion. These initiatives primarily aimed to aid the underprivileged segment of society and aimed to provide them with social security. To promote financial inclusion, several studies and policymakers have used different protocols.

1.1 Problem Statement

Currently, poverty, inequality, and migration pose substantial global issues. Multiple researches have shown that the availability of financial services has a quantifiable influence on poverty and inequality. The Indian government and banks have prioritised financial inclusion by enhancing financial literacy among disadvantaged individuals and by bolstering the loan delivery system for the intended beneficiaries. Impoverished individuals seek various forms of financial services and goods, which are often offered by banks, microfinance institutions, credit unions, and cooperatives (Liu et al., 2019). However, these conventional institutions are unable to reach the whole population.

The issues may be resolved using a digital framework for financial services. In a nation such as India, the majority of the adult population utilises mobile phones. Financial inclusion may be accomplished by using the digital route known as Digital Financial Inclusion. However, the issues stem from the way the public perceives and behaves towards digital financial goods and services. Inadequate digital financial literacy among individuals poses an additional obstacle to using digital financial services.

1.2 Objective of this research

- To examine and assess the extent of Digital Financial Inclusion among rural women and investigate the correlation between demographic parameters and the amount of Digital Financial Inclusion of the participants.
- To examine the several obstacles hindering the integration of women in rural Thanjavur District in digital financial services.
- To analyse the variables that influence the attitude and behaviour of respondents towards new financial products provided by private sector banks in rural areas.
- To determine the correlation between demographic characteristics and the perception and behavior of respondents towards new financial products provided by a private sector bank in rural areas.

Materials and Methods

2.1 Dataset Collection

Data was collected from women living in rural regions of Thanjavur district via the use of Google Forms and stored in Microsoft Excel in CSV (comma-separated values) format. After examining the data, the missing values in the input file characteristics, as shown in Table 1, were substituted using the Mode method. In the mode approach, all missing numeric attribute values are replaced with the most often occurring value of the corresponding known attribute. A total of 3200 replies were obtained from the individuals. Out of the 2800 replies, 29 characteristics were carefully adjusted for this study.

2.2 Methods

The research entails gathering extensive datasets from many private banks in the area while performing surveys and interviews with women to provide qualitative insights. The gathered data will be analysed using machine learning algorithms to detect patterns, correlations, and predicted indications of financial inclusion levels (Liu and Li, 2017). The study also examines the influence of these groundbreaking financial products on the economic autonomy and general welfare of women living in rural areas.

The Random Forest (RF) algorithm is a widely used machine learning method for classification applications. The RF algorithm may be employed in the examination of digital financial inclusion levels and innovative financial products supplied by private banks to women in the rural Thanjavur District.

Literature Survey

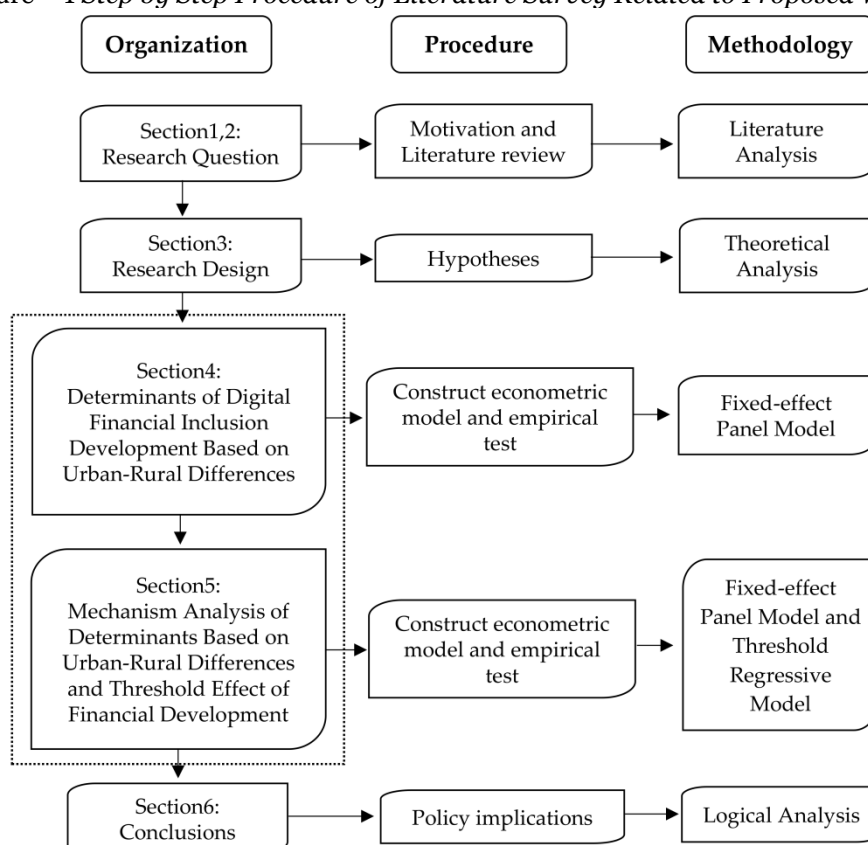
Rao (2013) conducted a comprehensive analysis of growth in the economy theories, the state of Indian Rural Finance, and empirical research on financial inclusion. The federal government of India has implemented

study efforts and commercial tactics to promote financial inclusion. Analyse the financial inclusion score of Andhra Pradesh State and provide suitable methods to achieve complete inclusive development. The current research is based on primary data. The questionnaire gathered data from 12 villages in 6 talukas in 3 districts in Andhra Pradesh. Subsequently, a multi-stage sampling technique was used to choose respondents.

According to Reddy (2016), the Reserve Bank of India (RBI) and the Government of India (GOI) have implemented many initiatives to promote financial inclusion. However, the outcomes of these efforts have been unsatisfactory. The researcher observed that the primary factors contributing to the low level of financial inclusion are a significant number of inactive bank accounts, the limited growth potential of insurance, inadequate pension and insurance programs for disadvantaged individuals, high levels of indebtedness and poor repayment rates, limited consumer protection, and low financial literacy, particularly among women in rural areas. This research is investigative. The researcher gathered secondary data for the study from the websites of many government agencies, the RBI Annual Reports, the APY Brochures, and postal department reports. For data analysis, the researcher uses easy numbers, yearly growth rates that add up to 100%, and linear regression analysis. The research hypothesis is tested using a two-way analysis of variance (ANOVA). The researcher's primary emphasis is on the significance of the 12 pillars in ensuring the achievement of financial inclusion in India.

Sharma and Goyal (2017) examine the implications and efficacy of the Pradhan Mantri Jan Dhan Yojana (PMJDY), assess the present state of PMJDY, and evaluate the knowledge of the plan among individuals based on their socio-economic background. In this study, the investigator gathered data from both primary and secondary sources. Initial data was gathered from 200 participants in the Jaipur district via a questionnaire, while supplementary data was obtained from academic journal websites. The provided data is examined using diverse graphs and tables.

Figure – 1 Step by Step Procedure of Literature Survey Related to Proposed Work



Maity and Sahu (2018) found that there is a significant difference in the mean values of financial inclusion factors between private and public sector banks, with unequal variation. When it comes to financial inclusion in India, public and private sector banks vary significantly. However, positive developments in the form of expanded bank branches and ATMs, as well as deposit mobilisation and credit dissemination, all contribute to financial inclusion. According to the study, public sector banks have a more effective role in promoting financial inclusion compared to private sector banks. The researchers focused on the comparative placement of public and private sector banks in the context of financial inclusion in India. They assessed the effectiveness of Indian banks in terms of promoting financial inclusion. This analysis is conducted using data from the 20 most prominent Indian banks. The data was gathered from the annual reports of the Reserve Bank of India (RBI) spanning from April 2001 to March 2016. The researcher evaluates eight factors to measure financial inclusion, namely: the average population served by each branch, the average population

served by each ATM, the ratio of deposits to GDP, the ratio of credit to GDP, the number of deposits per capita, the amount of credit per capita, the credit deposit ratio, and the assets per office.

Jayasawal (2018) said that the SWABHIMAAN Scheme specifically targets villages with a population of more than 2000, while PMJDY encompasses both rural and urban populations. The SWBHIMMAN program has a narrow emphasis on geography, but the PMJDY scheme encompasses the households of every nation. The Pradhan Mantri Jan Dhan Yojana (PMJDY) mandates the submission of just one document, the Aadhar Card, to establish a bank account. Additionally, a savings account opened under PMJDY offers online and mobile banking services. The Pradhan Mantri Jan Dhan Yojana (PMJDY) has provided advantages to three key entities: the Government of India, financial institutions, and individuals. The Pradhan Mantri Jan Dhan Yojana (PMJDY) is crucial in mitigating financial exclusion. However, precise and targeted efforts must be made, particularly by banks operating in distant areas. The PMJDY initiative is founded on a well-thought-out strategy for achieving financial inclusion. However, the issue lies only in the execution phase. The researcher focused on comparing the SWABHIMAAN scheme with PMJDY, analyzing the value of PMJDY to the general population, banks, and government, and establishing if PMJDY removes financial exclusion. In this study, the researcher used both primary and secondary data. Data was collected directly from respondents through a survey using a questionnaire. Data was acquired from two districts, namely Juanpur and Mirzapur, in Uttar Pradesh. The data was obtained via unstructured interviews done with a group of individuals, focusing on the Pradhan Mantri Jan Dhan Yojana (PMJDY).

Ruqaiya and Gayathri (2019) found a strong and positive correlation between the establishment of new bank branches and the Gross Domestic Product (GDP). The credit deposit ratio and increase of banking outlets in the Village have a negligible adverse effect on the GDP. The financial inclusion metrics have little impact on India's GDP. Researchers are investigating the correlation between financial inclusion metrics and India's GDP. Researchers assess the measures used by the Reserve Bank of India (RBI) to promote financial inclusion and analyse the influence of financial inclusion indicators on India's GDP. The current investigation relies on secondary data obtained from many quarterly publications issued by the Reserve Bank of India (RBI) and the Government of India. The researchers employed a multiple regression model to analyse the data. In Regression analysis, GDP is considered the dependent variable. On the other hand, the credit deposit ratio, the number of newly opened bank branches, and the expansion of banking locations inside the village are regarded as independent factors. For this study, researchers used data from the period spanning 2011-12 to 2016-17.

Khandare (2019) found that financial inclusion in BRICS nations, except China, was not particularly spectacular throughout the specified time. This research paper is founded upon the examination and assessment of secondary data obtained from the World Bank's 2014 report by Global Financial Development and the IMF's 2015 Financial Access Survey. To find the financial inclusion score for all BRICS countries, researchers look at two factors: the amount of money people have access to and how they use it. India was placed fourth out of five countries in the Financial Inclusion Index.

Barikand Sharma (2019) examined the advancement and prospective trajectory of financial inclusion in India. The contents of this study are organised into four distinct sections. The first part of the discussion focuses on recent initiatives and the current state of financial inclusion. The second part delves into the recent advancements in digital finance and the inclusion of various demographic groups. The third part explores the future trajectory of financial inclusion. Finally, the fourth part presents the conclusion. Researchers contend that India has introduced several innovative technologies in the banking industry to facilitate convenient and seamless financial transactions. The primary factors that hinder rural families from using digital technology for financial transactions include inadequate digital infrastructure, limited financial knowledge, and low-income levels.

Survase and Inumula (2019) found that four elements contribute to the framework of financial inclusion and its effect. These dimensions include socio-economic circumstances, access to vital facilities, financial competence, and social well-being. The researchers concentrated on investigating novel metrics for measuring financial inclusion. The current research relies on primary data. Data was gathered via a survey conducted with 320 participants using a questionnaire. Respondents' feedback on factors is gathered using a seven-point Likert scale. The researchers used Cronbach's alpha to assess the reliability of the test.

Raichoudhury (2019) conducted a study examining the correlation between educational attainment, perception, and financial inclusion. The researcher gathered data from both primary and secondary sources. Data was obtained directly from the survey. Multi-stage sampling is used to choose samples. The researcher conducted interviews with a total of 348 participants. Data was gathered using a questionnaire that focused on financial inclusion, demographic information, and education level. The data was analysed using cross-tabulation and frequency distribution analysis. Respondents with elementary education have a higher level of awareness about financial transactions.

Azeez and Banu (2019) assessed the comprehensive financial literacy score of rural families by considering three key factors: financial knowledge, behaviour, and behaviours. According to this survey, 7.5 per cent of families exhibit a lower level of financial literacy. The majority, accounting for 74 per cent, have a moderate level of financial literacy, while 18.5 per cent of respondents have the greatest level of financial literacy. Financial literacy exhibits an inter-dependency with demographic characteristics such as gender, number of dependent family members, education level, married status, income level, social group, religion, and family income. The researcher used cross-tabulation analysis, Spearman's rank correlation, and multivariate linear regression analysis to establish a link between socio-demographic characteristics and financial literacy.

Kumar et al. (2019) conducted a study that examined the connection between financial literacy and financial inclusion. They studied the factors that influence financial literacy and assessed how these factors are associated with the important demographic profile. Data collection included the use of a structured schedule as a data collecting tool to conduct face-to-face interviews with 600 adult respondents, therefore obtaining primary data. The researcher discovered a noteworthy correlation between the general level of financial knowledge and the demographic characteristics of the individuals assessed, including their geographical location, educational background, monthly income, and age.

Mondal (2020) conducted a study to investigate the current state of digital financial inclusion in India. A descriptive and analytical approach characterises the present work. The researcher gathered data from many secondary sources, such as scholarly papers, reports, and periodicals. Recent technology advancements may effectively be used to include those who are now excluded from financial services. Digital financial services provide significant potential to facilitate financial inclusion to foster inclusive economic growth.

Jagani and Patra (2017) found that financial inclusion with PMJDY has many significant obstacles, including an unorganised workforce, low financial literacy, lack of confidence in financial agencies, fear of technology, and poverty. The study proposed implementing regulations for an unstructured labour force and prioritising financial literacy as key components of a successful financial inclusion initiative. The article employs the archival review process.

Ziyao and Nuoxin (2021) aims to investigate the adoption behaviour of rural and unbanked households regarding digital financial services. It also aims to identify the hurdles to digital finance and examine the role of digital financial services in accomplishing the objective of digital financial inclusion. The researchers discovered that digital financial services have effectively alleviated and closed the disparity in physical accessibility to banking services. However, the use of these banking services has been hindered by insufficient internet connection, a limited degree of financial literacy, and inadequate social awareness. This research utilises a qualitative methodology to comprehend the social, cultural, and economic factors that motivate financial inclusion.

Ismael and Ali (2021) exhibit a comparatively low level of digital financial inclusion. The use of digital finance is playing a substantial and beneficial role in the pursuit of promoting financial inclusion. The researcher in this study used principal component analysis to create two different indices: standard financial indices and digital financial indices. These indices were made using access, usage, and hurdles factors to create a multidimensional financial inclusion index.

The OECD (2020) proposed that financial inclusion plays a crucial role in promoting equitable development and serves as a fundamental catalyst for achieving various sustainable development objectives. Despite some improvement, half of the world's young still face financial exclusion. The present paper highlights the higher likelihood of financial exclusion among young individuals and the contributing reasons for their financial exclusion. Providing financial education at opportune periods, considering significant life events, is recommended as it may enhance the willingness to learn and result in timely and favourable financial choices, ultimately improving financial well-being.

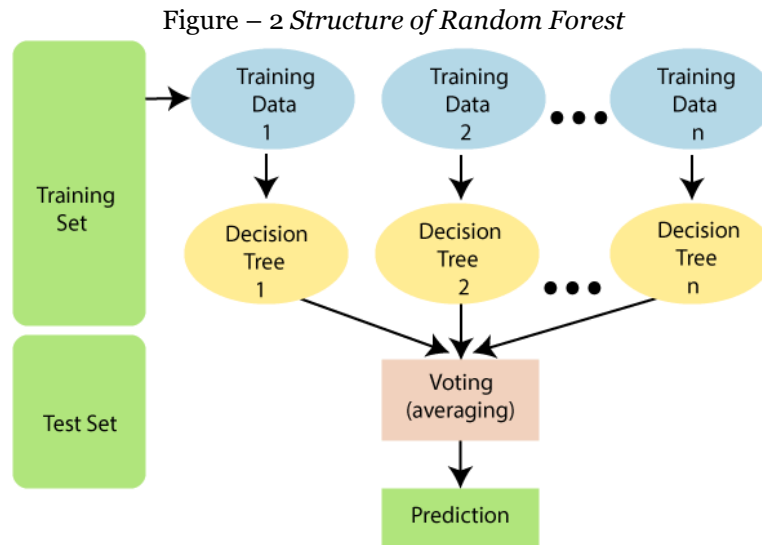
Proposed Method

4.1 Data Pre-Processing

Data pre-processing activities, including data cleaning and transformation, are performed on the main data in the study "The impact of digital finance on women in Thanjavur with real-time data".

4.2 Machine Learning Algorithm-Random Forest

This study utilises the Random Forest (RF) machine-learning technique to rank the attributes. Feature ranking is a procedure in machine learning that involves assessing and prioritising the significance of various characteristics within a dataset. It is essential for a range of activities, including feature selection, model interpretation, and determining the most significant aspects of generating predictions (Weiming et al., 2020). The structure of the proposed ML algorithm is shown in Figure 2.



Ranking the characteristics is crucial to examine the strongest and weakest connections between bank account ownership and the available variables. We used a random forest classifier approach, using the feature importance attribute, to determine the ranking of these characteristics. Table 1 displays the ranking of the characteristics using the Random Forest algorithm. The characteristics are arranged in a decreasing manner, with the highest rating listed first and the lowest rank listed last. The data shows that the Education level achieved the highest score. The Educational level is the most influential component, exerting a significant influence on the forecast compared to other factors (Cai, 2018). Marital status obtained the lowest score; however, it remains a significant characteristic. It is generally advisable to use all the available data, irrespective of its ranking.

Table – 1 Feature Ranking

Feature	Score
Education level	0.812
Cell phone access	0.763
Age of Respondent	0.732
Job type	0.612
Household size	0.541
Marital Status	0.532
Level of Income	0.567
Access to financial Schemes	0.467
Financial inclusion	0.431
Type of financial services have access	0.312

The Random Forest method entails the creation of several decision trees and the aggregation of their forecasts. Feature significance is often calculated by assessing the extent to which each feature contributes to the reduction of impurity, such as Gini impurity or entropy, across all the trees. For each tree in the forest,

Algorithm 1: feature score ranking using Random Forest

Step 1: Impurity Decrease

At each split in a tree, the algorithm calculates the impurity decrease, which represents how much the split reduces impurity. The impurity decrease for a feature j at a split is denoted as I_j and can be defined based on Gini impurity or entropy.

$$I_j = \text{impurity before split} - \text{impurity after split} \quad (1)$$

Step 2: Weighted Average

The impurity decrease is then multiplied by the number of samples in the node and averaged over all the nodes where the feature is used for splitting. This accounts for both the frequency and the magnitude of impurity reduction.

$$\text{Weighted impurity Decrease}_j = \frac{I_j \times \text{sample count in node } i}{\text{Total sample count}} \quad (2)$$

Step 3: Feature Importance

The final step involves averaging the weighted impurity decreases across all trees in the forest to obtain the feature importance scores.

$$\text{Feature Importance}_j = \frac{\text{weighted impurity Decrease}_{j,k}}{\text{Number of trees}} \quad (3)$$

These feature importance scores represent the contribution of each feature to the predictive performance of the Random Forest. Higher scores indicate features that are more influential in making predictions.

Result and Discussion

Statistically, after pre-processing, it was shown that cash payments accounted for more than 80%, whilst bank payments constituted less than 1%. In terms of bank use, the findings revealed that 47.5% of individuals had utilised commercial banks, 66.4% have utilised mobile money services, 7.2% have utilised cooperative societies, 10% have utilised insurance services, 4.9% have utilised pension funds, and 0.9% have utilised microfinance institutions. The majority of families in local areas lack bank accounts, necessitating the government to devise a policy that promotes a cashless society. This policy would also facilitate credit accessibility and encourage the usage of financial institutions (Yang and Wen, 2020).

It is important to incentivise individuals with low incomes and small businesses to use banking services. This will enable them to obtain credit facilities, which in turn will facilitate the expansion of financial inclusion and ensure that all low-income earners are included.

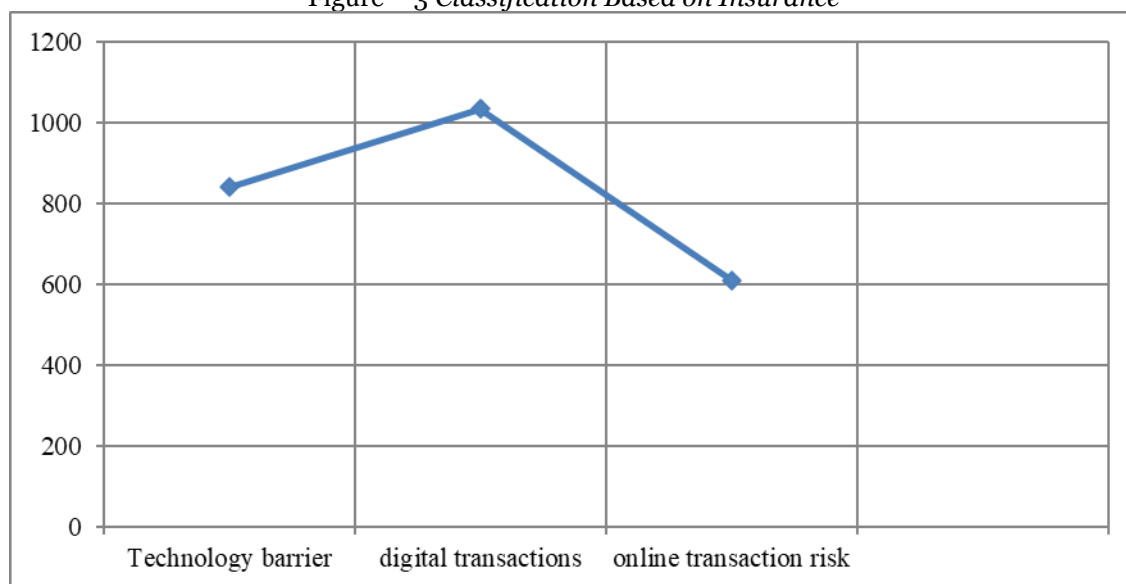
It is advisable to implement financial empowerment programs to provide women in different homes with training in investing and financial management. These programs facilitate access to credit in financial institutions such as banks, microfinance institutions, micro-insurance providers, and financial cooperatives. They aim to make these possibilities available to low-income earners, particularly women residing in rural areas.

5.1 Classification based on insurance products

The insurance sector is very dynamic, with regular changes in goods, advancements in marketing channels and approaches, online product sales, and the use of artificial intelligence for claims screening. Digitisation enables the insurance sector to use big data and artificial intelligence to forecast future events and proactively mitigate risks. The growth of the insurance business is heavily reliant on government and regulatory backing at the policy level (Zhang and Li, 2022). Figure 3 shows the classification result on insurance.

According to the categorisation result, 60% of individuals get insurance for their cattle and animals, specifically for agricultural purposes. 49% of individuals are availing themselves of government programs to access crop protection schemes provided by the government throughout both wet and sunny seasons. Half of the individuals get their automobile insurance from their financiers. Approximately 30% of individuals are unaware of their health insurance, personal insurance, and house insurance.

Figure – 3 Classification Based on Insurance



5.2 Classification Report Based on Government Schemes

The effect of financial inclusion programs namely Pradhan Mantri Jan Dhan Yojana (PMJDY), Pradhan Mantri Jivan Jyoti Bima Yojana (PMJJBY), Pradhan Mantri Suraksha Bima Yojana (PMSBY), and Atal Pension Yojana (APY) on women living in urban slums inside the Thanjavur District. The results indicate that

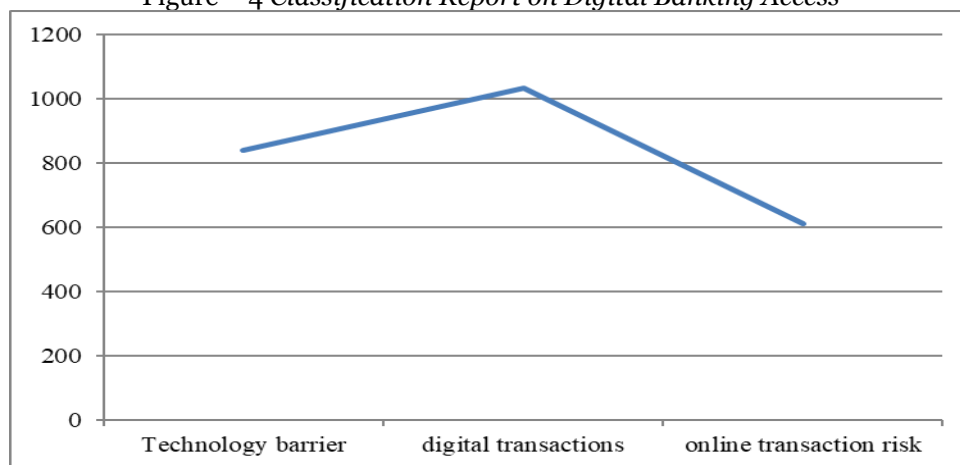
the PMJDY initiative has achieved considerable triumph, especially among women living in impoverished areas, and has a beneficial influence on the social, political, and economic dimensions of women's empowerment. This study contributes to the existing research by advancing the discourse on women living in urban slums and emphasising the crucial need for the construction of a formal financial system to enhance the level of financial inclusion.

5.3 Classification report based on lack of Digital Banking Access

A thorough examination was conducted to explore the accessibility of digital banking, with particular emphasis on comprehending the obstacles encountered by women living in rural regions. The dataset, including a representative sample of women from various rural origins, illuminates the specific obstacles impeding access to digital banking.

A significant proportion of women residing in rural regions, namely 60%, indicated a deficiency in their ability to use digital banking services. A significant obstacle to accessing digital banking is the lack of sufficient technical infrastructure in rural areas, as reported by 27% of the participants, as shown in Figure 4. Twenty per cent of women without access to digital banking expressed constraints in making financial transactions online, which adversely affects their financial independence. The results emphasise the need for specific policies that target the distinct difficulties experienced by women in rural regions. These policies should focus on improving digital infrastructure and promoting digital literacy.

Figure – 4 Classification Report on Digital Banking Access

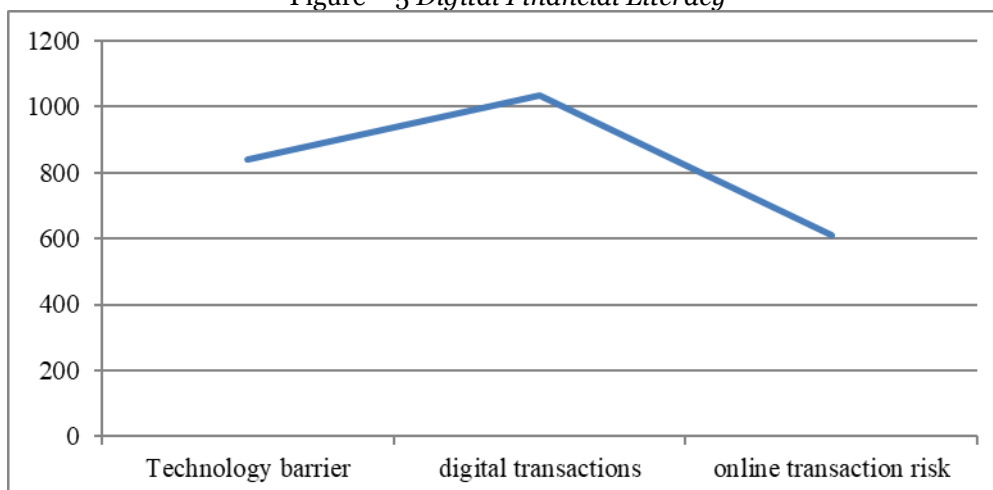


5.4 Classification Report on Digital Financial Literacy

Recent research examined digital financial literacy, with a specific emphasis on understanding the difficulties experienced by women living in rural locations.

The categorisation study reveals that 43% of women residing in rural regions had a deficient level of digital financial literacy, indicating a substantial disparity in comprehending digital financial instruments and ideas. 40% of participants said that insufficient availability of high-quality education in rural regions was a contributing factor to reduced levels of digital financial literacy, as shown in Figure 5. 20% of women who have poor digital financial literacy have difficulties in making well-informed financial choices, which might adversely impact their financial welfare.

Figure – 5 Digital Financial Literacy



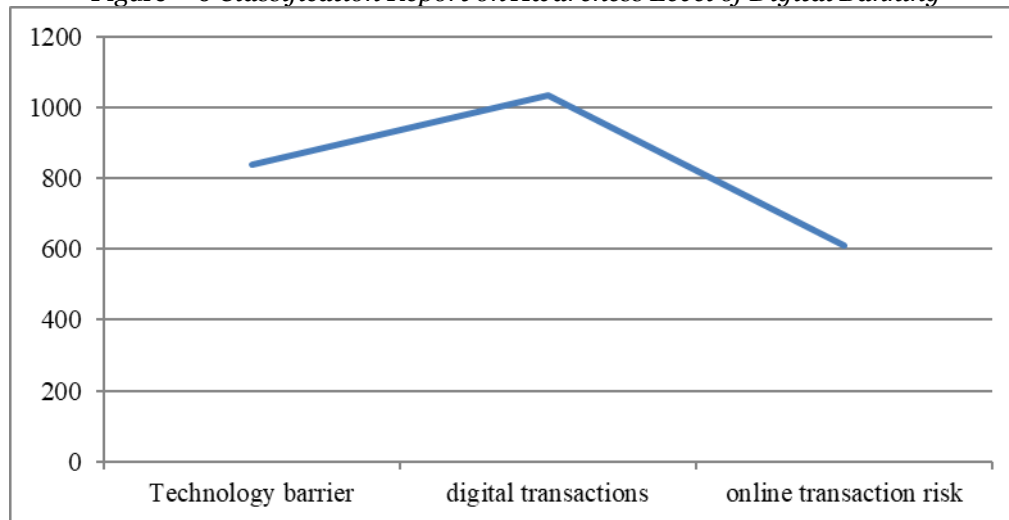
5.5 Classification Report on Awareness Levels of Digital Banking

This study specifically examined the levels of knowledge about digital banking among women living in rural locations.

A substantial chunk of 30% of individuals cited technical obstacles, such as restricted availability of smartphones and internet access, as significant hindrances to fostering awareness. Figure 6 shows the cited classification result.

Increased knowledge was linked to a higher propensity to do digital financial transactions, which may help rural women become more economically empowered. According to 20% of respondents, one of the factors preventing financial inclusion is a lack of financial transactions. 10% of individuals lack an understanding of the risks associated with internet transactions owing to inferior educational qualifications.

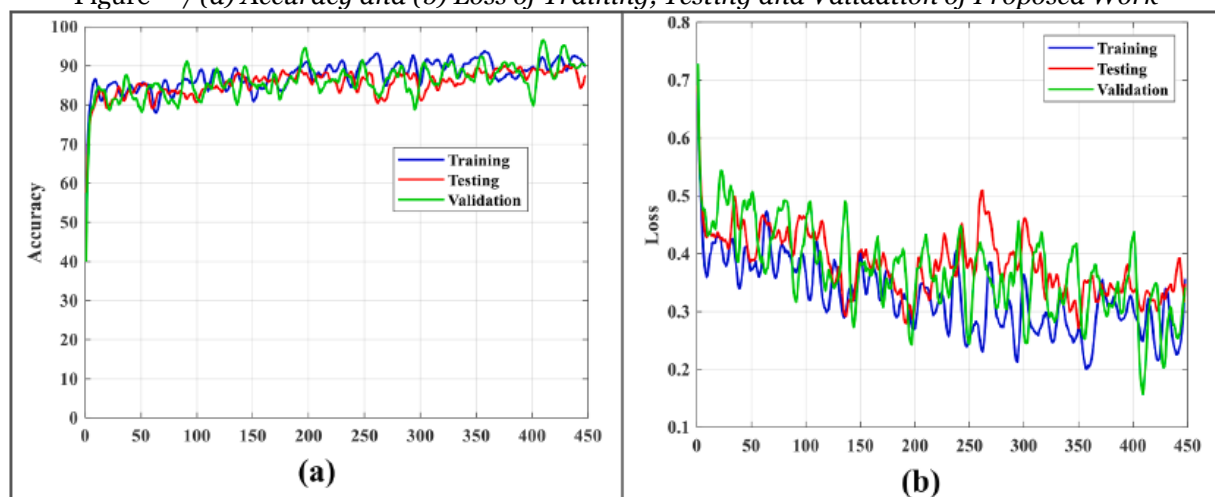
Figure – 6 *Classification Report on Awareness Level of Digital Banking*



5.6 Accuracy

To demonstrate the accuracy of a model that predicts digital financial inclusion among women in rural regions, it is customary to use metrics obtained from a confusion matrix. Applying the random forest algorithm yields an accuracy of 91.3% and a minimum loss of 42.1%, as seen in Figure 7 (a) and (b).

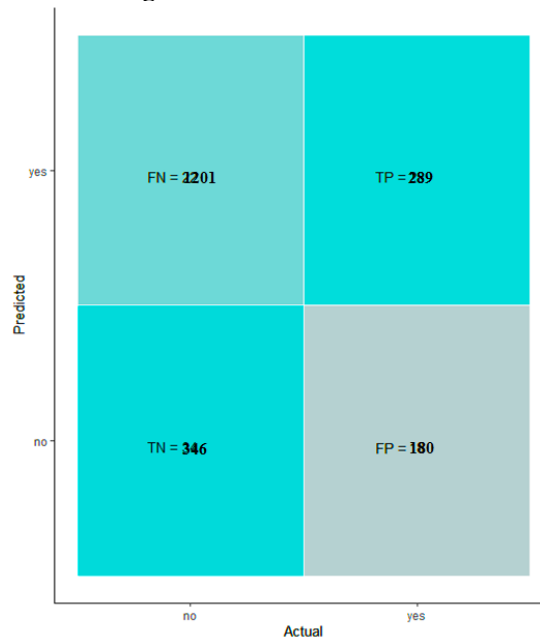
Figure – 7 (a) *Accuracy and (b) Loss of Training, Testing and Validation of Proposed Work*



5.7 Confusion Matrix

The confusion matrix is a tabular representation often used to assess the efficacy of a classification model. It offers a comprehensive analysis of the model's predictions about the actual results. The matrix is quite valuable for comprehending the specific faults made by the model. Regarding the prediction of digital financial inclusion among women in rural regions, the confusion matrix might be understood in the following manner, as shown in Figure 8.

Figure – 8 Confusion Matrix



True Negative (TN): Instances where the model correctly predicts that a woman is not digitally financially included.

TN = Number of instances predicted as not included and are actually not included
... (4)

False Positive (FP): Instances where the model incorrectly predicts that a woman is digitally financially included when, in reality, she is not.

FP = Number of instances predicted as included but are actually not included
... (5)

False Negative (FN): Instances where the model incorrectly predicts that a woman is not digitally financially included when, in reality, she is.

FN = Number of instances predicted as not included but are actually included
... (6)

True Positive (TP): Instances where the model correctly predicts that a woman is digitally financially included. *TP = Number of instances predicted as included and are actually included*

... (7)

Accuracy = $\frac{TP+TN}{TP+TN+FP+FN}$... (8)

Conclusion and Future Work

Ultimately, the influence of digital financial inclusion on women in rural Thanjavur is a complex and ever-changing situation. The results indicate an intricate interaction of several elements that impact the acceptance and efficacy of digital financial services among women living in rural areas. The inquiry into the influence of digital financial inclusion on women in rural Thanjavur has shown specific obstacles and adverse outcomes. While recognising the potential advantages of technological progress in the financial industry, it is essential to identify and tackle the adverse consequences that have emerged from this investigation.

An obstacle of great importance that has been recognised is the existing low levels of computer literacy among women in rural Thanjavur. The unfamiliarity with digital financial instruments has resulted in uncertainty and resistance, hence restricting the use of digital banking services. The research found that a lack of adequate digital infrastructure, along with unreliable internet connection, has hindered women's ability to use digital financial services. This constraint limits their capacity to participate in online transactions and impedes the overall efficacy of digital financial inclusion programs.

6.1 Future Work

Creating and executing customised digital literacy initiatives explicitly targeted at women residing in remote regions. The programs should prioritise the clarification of digital financial instruments, highlight their advantages, and provide practical training. Allocation of more resources towards digital infrastructure to enhance internet connection and accessibility, to guarantee that women residing in rural regions possess the essential means to engage with digital financial services.

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