

Cluster Analysis of Financial Inclusion under PMJDY: Evidence from Commercial Banks in Maharashtra State, India

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Abstract

Pradhan Mantri Jan-Dhan Yojana (PMJDY) is a pivotal driver of financial inclusion (FI) and economic development. The Hon. Prime Minister introduced PMJDY, a transformative national scheme/mission aimed at providing inclusive financial services. This study examines PMJDY's successful implementation in promoting economic development. By analysing banks' PMJDY implementation and gathering insights from bankers across Maharashtra, this study uses cluster analysis to assess financial inclusion. The findings offer population-level insights into the strategic execution of PMJDY in rural areas, suggest improvements to the lead bank scheme to benefit rural populations, and explore the relationship between PMJDY's effectiveness and economic development.

Keywords: Financial Inclusion (FI), PMJDY, Commercial Banks, Rural Households, living standards, economic growth.

Introduction

FI plays a significant role in an economy's sustainable development. It entails ensuring access to financial services, such as banking, credit, and insurance, at affordable prices for underserved populations (World Bank, 2021). The modern banking system has played a significant role in expanding FI and advancing inclusive growth ambitions in unbanked regions. Its goal is to integrate rural and marginalised communities into the formal financial system. For FI, in areas with populations of fewer than 2000, Business correspondents are employed to cover unbanked villages. They offer Kisan Credit Cards, General Credit Cards, and other products that cater to financially excluded segments (K. Chakrabarty, 2011). The successful execution of this scheme is pivotal to achieving 100% FI as part of the national mission. Therefore, this study's understanding of bankers' perceptions and experiences supports the view that PMJDY is the right scheme to improve the savings habits, standard of living, and economic growth of marginalised communities. The majority of rural populations are not accessing financial services due to low income, poverty, illiteracy, limited infrastructure, and geographic barriers.

Hence, FI is essential to address these problems and direct them toward inclusive development and economic growth. It involves providing financial services to marginalised groups at affordable, equitable, and transparent costs (Sarma, M. 2008). The PMJDY scheme offers credit, accepts deposits and withdrawals, and provides pensions and insurance at affordable costs. On 28th August 2014, at the initiative of the Honourable Prime Minister Narendra Modi, the PMJDY was launched to promote FI and inclusive growth. The significance of this scheme lies in its implementation for economic development. The PMJDY operates on six pillars, expanding banking facilities and fostering inclusive growth. These are accepting deposits, granting loans, offering no-frills accounts, providing insurance facilities, offering pension and welfare schemes, and promoting inclusive economic growth.

In 2005, the financial situation of the Indian banking sector was comparatively weaker than that of advanced countries. The PMJDY aims to provide basic facilities, including no-frills accounts that accept deposits, offer loans and advances of up to Rs. 10,000, and provide insurance and welfare schemes for unbanked rural populations (Gowsya Shaik & P. Raja Babu,

2018). The PMJDY began as a philosophy of collective effort and inclusive growth. All households participate in financial activities, meaning each household has at least one account for savings and economic development. By January 26, 2015, PMJDY covered 21.06 crore households and 1,80,96,130 bank accounts, with deposits exceeding 10,000 crores. Coverage was 40% in urban areas and 100% in rural areas. By the end of 2023, the progress of this scheme was that RuPay cards issued Rs. 32.94 crore, the number of accounts issued was 48.65 crore, and total deposits were Rs. 1.99 crore. These values highlight remarkable progress for the sustainable development of the economy. Currently, about 50 crore individuals are involved, and 56% of women have bank accounts, with total deposits exceeding Rs. 2.03 lakh crore. These figures reflect the financial facilities available to account holders. Insurance coverage increased to Rs 2 lakh, and the overdraft facility rose to Rs 10,000 in their banking operations. Additionally, the bank offers various welfare schemes to account holders, including Pradhan Mantri Jeevan Jyoti Bhima Yojana (PMJJBY), Pradhan Mantri Suraksha Bhima Yojana (PMSBY), Atal Pension Yojana (APY), and the Micro Units Development and Refinance Agency Bank (MUDRA) scheme. The PMJDY scheme is significant for the unbanked, and it also enhances literacy and creates employment opportunities. PMJDY empowers account holders, effectively encouraging savings and wealth accumulation. Moreover, PMJDY provides access to various loans and advances to meet their needs, facilitates secure capital formation, offers risk coverage through life insurance, and permits withdrawals as required. One research study is a descriptive study that focuses on understanding business correspondence as a growing avenue for ensuring FI in rural India (Ministry of Finance, 2023).

The scheme aims to provide universal access to banking facilities, ensure the availability of basic savings accounts, facilitate direct benefit transfers, and promote financial literacy. It was significantly expanded to reach millions of unbanked individuals and help them open zero-balance accounts. Currently, 500 million bank accounts are part of the FI landscape in rural and semi-urban areas (Gowsya Shaik & P. Raja Babu, 2019). According to World Bank records, India will achieve 100% FI by the end of 2020. This study focused on Andhra Pradesh, which has a lower FI than Meghalaya (95.5%). To this end, basic facilities such as deposits, loans, advances, insurance policies, and FI are provided. This study focuses on the relationship between FI strategies and economic development (Government of India, 2023). Based on this concept, the PMJDY was launched on a large scale to promote inclusive development. However, limitations include the dominance of certain accounts, low digital literacy, and disparities across the country. These deficiencies highlight not only the need for outreach measures but also the need for efficiency, reliability, and performance in India's FI system. The study examines the demographic profile of bank respondents; the reasons for implementing PMJDY in rural areas; the significance of PMJDY; factors influencing its effective implementation; and the issues and challenges associated with the PMJDY scheme. The study adopts a qualitative research design, allowing an in-depth exploration of bankers' experiences and insights. The study uses qualitative methods to examine bankers' perceptions of PMJDY implementation.

Background of the Study

The study explores FI and serves people, specifically the unbanked and disadvantaged, at an affordable cost. Through a nationwide mission for inclusive growth, the RBI and the Government of India uplift unbanked individuals and improve their living standards. The scheme provides benefits through six pillars: deposits, credit, overdrafts, insurance, small interest, and welfare schemes. To this end, the present study examines indicators of bankers' perceptions of PMJDY and its position in inclusive economic growth. The study provides insights into bankers' perceptions of the PMJDY scheme for effective implementation, focusing on underprivileged people and the need for inclusive radiation to achieve sustainable economic

growth. The launch of PMJDY in 2014 marked a significant milestone in FI, driving inclusive growth and equitable access for the unbanked population, particularly in rural and semi-urban areas, by providing access to the formal banking system.

Disparities in access for rural populations and in financial literacy remain major challenges. The need for a comprehensive FI strategy became more urgent as India's economy expanded and digital transformation accelerated. Traditional banking models often failed to reach remote and underserved populations because of high operational costs, low awareness, and socioeconomic barriers. Recognising these challenges, the Government of India initiated PMJDY as a mission-mode programme to ensure universal access to banking facilities, including basic savings accounts, credit, insurance, and pension services. The scheme also emphasised technology, such as biometric identification and mobile banking, to streamline service delivery and reduce transaction costs. The successful implementation of PMJDY depends on its integration with other initiatives, including the Direct Benefit Transfer mechanism, Aadhaar linkage, and initiatives by Business Correspondents and mobile banking units. As a result, FI was particularly pronounced in states with large rural populations, such as Maharashtra. Maharashtra is the most economically significant state in terms of urban development and industrialisation, but FI remains uneven in rural areas. This study bridges the gap by providing a deeper analytical approach to understanding regional disparities. To do so, the study applied cluster analysis to categorise districts based on FI indicators, banking penetration, and socio-economic variables. This study aims to inform policymakers and financial institutions about high-performing regions and where targeted interventions are needed. Based on this study, it provides decisions for grassroots bankers and practical perspectives on operational challenges and customer behaviours. Accordingly, policymakers need to make effective decisions to improve overall policy effectiveness.

Evolution of FI and PMJDY

The FI concept has developed considerably over the years, evolving into a technology-driven, policy-oriented framework. Evidence shows that efforts to support marginalised and rural communities benefit the formal system and an economy's inclusive growth. The first phase began after independence, with the nationalisation of commercial banks in 1969, and the government concentrated on expanding banking facilities in rural and semi-urban areas. Later, regional rural banks emerged, providing credit facilities exclusively to marginalised rural people, such as farmers, small-scale artisans, and disadvantaged sections of society, at low interest rates. In this phase, in 1980, the nationalisation of commercial banks was implemented again to provide credit facilities for underserved people. Despite these advantages, financial services remain constrained by operational inefficiencies, low financial literacy, and geographic barriers. The second phase started in the 1990s and early 2000s with the introduction of liberalisation, and financial sector reforms emerged in the Indian economy. For this period, the aim was to enhance efficiency, intensify competition, and accelerate technology adoption within the banking sector. During this phase, Self-Help Groups, Microfinance Institutions, and the Self-Help Bank Linkage programme were given priority and played a vital role in providing financial services to rural women and low-income households. This aimed to bridge the gap between formal financial institutions and rural populations by providing financial assistance for group-based and community participation as part of inclusive economic development. In the third phase of FI, after 2005, the Reserve Bank of India introduced "no-frills accounts" to encourage banks to offer low-cost financial services. This period also saw Business Correspondents deliver services to remote areas through intermediaries. In this phase, technologies, core banking solutions, and mobile banking further expanded financial services. However, progress is still not up to the mark, as many people remain excluded from formal banking.

A significant milestone in the expansion of FI was the launch of PMJDY in 2014. This scheme aims to give weaker sections of society access to financial services, including zero-balance RuPay debit cards, overdraft facilities, insurance, and direct benefits. This scheme ensures higher account penetration, lower costs, and universal access. During this phase, the digital era began with the introduction of Aadhaar-based authentication, the Unified Payments Interface (UPI), and mobile banking, which have transformed the delivery of financial services, especially in rural areas. Digital platforms offer lower transaction costs, greater accessibility, and more efficient financial systems.

Review of Literature

Most researchers have examined the PMJDY scheme's impact on economic growth and its various dynamics. Kunt and Klapper (2013) provided valuable insights into the PMJDY scheme, which aims to improve living standards and elevate economic status. Burgstaller (2013) argues that input-output variables measure the scheme's effectiveness. However, others highlight that bank staff are not responding promptly, and that the diffusion of the banking system, the digitisation of bank accounts, and the beneficiary ratio also influence the effective implementation of this scheme (Shafi & Medabesh, 2012; Chakravarty & Pal, 2013; Kumar, 2013; and Fungacova and Weill, 2015). A current study (Maity & Sahu, 2018) expressed that an inclusive financial system influences and fosters economic growth. Other studies examine public and private banks' responsibility toward underprivileged groups and the effectiveness of PMJDY (Balasubramanian, 2015). Kainth (2011) examined district-level and region-based FI indicators and rural households' savings habits. Additionally, a few researchers examined factors influencing FI, namely demand and supply indicators and regional banking habits, as observed in Jammu and Kashmir (Laha & Kuri, 2014; Kaur & Abrol, 2018). Several other studies explored the PMJDY scheme as an inspiring factor, as the role and efficiency of public sector banks (PSBs) pre- and post-era of PMJDY explored the execution of this scheme in an inspiring manner (Deb and Das, 2016; Tripura South and Dutta and Mehta, 2021); Maity and Sahu (2018). Other factors include the distance to the bank and the front office's use of this scheme (Gunther, 2017). Empirical studies suggest that PMJDY has a favourable impact on economic development factors that influence inclusive growth.

Statement of the Problem

Despite extensive efforts to implement mass banking in India, notably through the PMJDY, rural households lack access to formal banking services. Identifying the right solution, reducing procedural delays, and addressing non-supportive attitudes are crucial steps toward achieving overall development goals through inclusive growth. The success of the PMJDY mission requires not only opening new accounts but also maintaining and actively using them. This study examines bankers' perceptions of the effective implementation of PMJDY for inclusive economic growth. The persistent challenge lies not in the non-implementation of well-conceived FI policies, such as PMJDY, by commercial banks, particularly for rural households. This analysis addresses this gap by providing a comprehensive analysis of the strategic implementation of PMJDY to achieve successful FI in Maharashtra State.

Research Gap

This study examines the strategic implementation of the PMJDY scheme as a crucial tool for achieving FI for the unbanked, unfunded, and unsecured population, and explores the specific dynamics and challenges within rural households in Maharashtra State. In India, FI is imperative for Maharashtra's unbanked population. The findings will inform policymakers' new schemes by categorising routine savings and addressing the number of branches and accounts opened. A gap remains, but we will determine how to bridge it by conducting an in-depth study of PMJDY's effectiveness in rural areas and proposing initiatives to further improve the scheme. The study proposes conducting a bank-to-bank employee perception survey on the PMJDY. Moreover, the scheme identifies operative and non-operative modes of

opened accounts, highlighting the need for active strategies among rural households. Most studies focus on PMJDY, FI, and the role of commercial banks. The research gap lies in the lack of studies specifically addressing operating and non-operating problems, as well as the performance of this scheme in Maharashtra State. This study focuses on prevailing knowledge, offering context-specific insights and recommendations for policymakers and stakeholders promoting FI.

Evaluation Framework

The theoretical foundation underpinning the association between FI and economic development is rooted in seminal works by Schumpeter (1912), Shaw (1973), and McKinnon (1973). This scholarly effort is pivotal to the financial sector and shapes economic patterns. The theoretical framework supports the significant role of financial-sector resource distribution and the provision of affordable financial services to the unbanked (Graff, 2003). In the context of growth models, both exogenous and endogenous frameworks help explain the dynamics of the financial sector's impact on economic growth (Domar, 1946; Solow, 1956; Odhiambo, 2018; Chirwa & Odhiambo, 2018; Hamori, 2019).

The Theoretical Framework

The theory of technological advancement underpins this study. The study leads to affordable, low-cost financial services for underprivileged people, thereby supporting societal development (Nanda & Kaur, 2016; Adedokun & Aga, 2021). This model falls within the exogenous growth model and drives technological advancement, such as online banking, ATMs, and multiple branches, thereby advancing the economy. The second model underscores the endogenous growth model. This model indicates that unbanked people's access to banking services leads to banking habits that encourage productive investment, increased productivity, income generation, and poverty reduction, thereby contributing to economic growth. These outcomes resonate with the endogenous growth model as a contribution to sustainable economics (Claessens & Perotti, 2007; Ramkumar, 2017).

The study aims are:

1. Examine the overall role of commercial banks in PMJDY:
This involves analysing how they implement the scheme and contribute to its success.
2. To estimate the pivotal role of commercial banks in fostering economic growth through PMJDY:
This objective focuses on understanding how commercial bankers' involvement in PMJDY impacts economic development.
3. To evaluate this scheme and assess bankers' perceptions of overall economic growth.
4. To evaluate bankers' perceptions of the impact of FI and overall economic growth.

Hypotheses

H1: The significant impact of commercial banks on economic growth.

H2: The perception of bankers on FI and economic development.

Limitations of the study include sampling and respondent biases, as well as limitations inherent in the research design, which should be acknowledged and addressed in the analysis and interpretation of findings.

The Methodology of the Study

Research Design: This study adopts a mixed-methods approach, combining quantitative and qualitative methods to comprehensively understand bankers' perceptions of PMJDY implementation. The quantitative data focuses on survey-based data (i.e., statistical analysis), while the qualitative data involves in-depth interaction with respondents. This design is appropriate for measuring and interpreting the effectiveness of financial inclusion initiatives.

Total Population and Sampling: The study population comprises bank employees involved in the PMJDY scheme, totalling 13,499 as of 2024. For this study, the researchers used cluster and purposive sampling techniques. Cluster sampling was used to identify districts with high and low financial inclusion; i.e., Pune (high financial inclusion) and Nandurbar (Low financial inclusion) were selected. In each district, four villages were selected based on levels of financial inclusion (high and low). This study used purposive sampling, involving respondents directly involved in PMJDY implementation.

Participants and respondents: The final sample comprises 147 bank employees from eight rural villages in the selected districts. The selected respondents are branch managers, officers, and staff actively engaged in financial inclusion programs.

Variables: This study has two variables: the independent and the dependent. The independent variables include the role of commercial banks in PMJDY implementation, Accessibility, financial literacy awareness, and Operational strategies such as branch expansion, ATM access, and account-opening drives. The dependent variables include perceptions of economic growth, FI effectiveness, and the success of PMJDY implementation. For independent variables, the operationalisation of variables includes the role of banks measured through a Likert-scale measuring outreach, service delivery and participation in PMJDY; FI effectiveness, including number of accounts, usage frequency and accessibility; economic growth perception, including respondents' agreement on improvement in income, savings and financial stability; and awareness and literacy measured to conduct training programs and customer awareness initiatives.

Instruments: The primary instruments are structured questionnaires with 1-5 Likert-scale items, multiple-choice questions, and demographic questions. The reliability of the data used in the Cronbach's Alpha test is 0.70, indicating acceptable internal consistency. Content validity is based on expert review and the FI literature. To establish construct validity, the theoretical framework identified a linking variable.

Data Collection Procedure: The data were collected through a step-by-step identification of districts based on FI levels, selection of villages based on cluster sampling, identification of branches based on purposive sampling, identification of bankers actively involved in PMJDY, Direct distribution and interaction based on respondents' follow-up and finally based on verification and coding of collected data. The data were collected from September 2023 to January, 2024.

Ethical considerations: Before collecting the data, the data collectors formally informed the respective respondents and obtained their consent. The respondent may withdraw their participation at any time. The researcher maintained discipline and ensured respondents' anonymity and confidentiality. This data was used solely for academic and research purposes.

Data analysis: For this study, the researcher used statistical techniques, including descriptive statistics (mean, standard deviation), cluster analysis, t-tests/ANOVA, regression, and factor analysis. SPSS (Statistical Package for the Social Sciences) was used, and the significance level for hypothesis testing was set at 5% ($p < 0.05$).

Variables Examined

For this study, the variables include (i) Demographic Profile of Banker Respondents: Investigating the diverse backgrounds and experiences of bankers involved in JDY implementation. (ii) Reasons for JDY Implementation in Rural Areas: Exploring the motivations and objectives behind the targeted implementation of JDY in rural settings. (iii) Importance of JDY: Assessing how bankers perceive the overall significance and influence of JDY in the context of national FI. (iv) Effective implementation of the PMJDY scheme: Determining essential factors for effective implementation through factor analysis. The study identified key factors to bridge the gap and ensure effective implementation. The findings also

inform policy decisions on strategies to achieve the scheme's overall success in inclusive growth.

Table 1 presents bank staff responses, including private-sector employees (65 respondents, 44.2%) and those with less than 5 years of experience (95 respondents, 64.6%). Most respondents held postgraduate qualifications (79, 53.7%), underscoring the importance of JDY (77, 52.4%). Regarding effective JDY implementation, respondents highlighted the importance of conducting awareness camps, maintaining transaction consistency, and recognising the neutral roles of MFIs, SHGs, NGOs, and BCs. Bankers who were satisfied or very satisfied underscored the PMJDY scheme's significance. Regarding factors affecting pastoral households, the effective implementation of the FI concept has evolved considerably over the years into a technology-driven, policy-oriented framework. Evidence shows that efforts to support marginalised and rural communities benefit the formal system and an economy's inclusive growth. The first phase began after independence, with the nationalisation of commercial banks in 1969, and the government concentrated on expanding banking facilities in rural and semi-urban areas.

Later, regional rural banks emerged, providing credit facilities exclusively to marginalised rural people, such as farmers, small-scale artisans, and disadvantaged sections of society, at low interest rates. In this phase, in 1980, the government again nationalised commercial banks to provide credit facilities to underserved people. Despite these advantages, financial services remain constrained by operational inefficiencies, low financial literacy, and geographic barriers. The second phase started in the 1990s and early 2000s with the introduction of liberalisation, and financial sector reforms emerged in the Indian economy. For this period, the aim was to enhance efficiency, intensify competition, and accelerate technology adoption within the banking sector. During this phase, Self-Help Groups, Microfinance Institutions, and the Self-Help Bank Linkage programme were given priority and played a vital role in providing financial services to rural women and low-income households. This aimed to bridge the gap between formal financial institutions and rural populations by providing financial assistance for group-based and community participation as part of inclusive economic development. In the third phase of FI, after 2005, the Reserve Bank of India introduced “no-frills accounts” to encourage banks to offer low-cost financial services. This period also saw Business Correspondents deliver services to remote areas through intermediaries. In this phase, technologies, core banking solutions, and mobile banking further expanded financial services.

However, progress is not up to the mark, as many people remain excluded from formal banking. Bankers expressed a somewhat satisfactory sentiment. Bankers face challenges in implementing JDY, including the performance evaluation of bank staff monitored by the RBI, instances where JDY account holders already possess another bank account, concerns about increased unnecessary expenditure on maintenance, the potential defeat of the purposes of FI, and the effectiveness of the MITRA model and JAM policy in building JDY from the ground up. A data variability test using Cronbach's alpha (0.953444) indicates high reliability. Consequently, the researcher conducted a further study based on the reliability tests. Most respondents (Qn. 11-14) (50.3%) reported that the scheme provides financial assistance to rural people at an affordable rate to meet their needs. 51.7% of respondents indicated that the PMJDY scheme offers more benefits and helps minimise losses. 46.9% of respondents indicated that the scheme meets financial needs at an affordable cost and contributes to overall economic development and improved savings habits among rural people. Finally, the correlation between the variables and PMJDY's objectives was 72%, thereby supporting the relationship.

According to Table 2, the average response regarding the type of bank is around 2.20, indicating that respondents, on average, perceive the bank type involved in PMJDY as falling between the public and private sectors. The average work experience of respondents is

approximately 1.56 years, indicating less than 5 years. The average designation level is approximately 3.32, suggesting that respondents hold relatively higher positions within their respective organisations. Std. Deviation (0.9214): It implies a limited spread of responses. The average qualification of the banker is 3.5. It indicates the respondents hold postgraduate credentials. Regarding the PMJDY scheme, the respondents are neutral to positive, with an average rating of 2.5374.

Table 3 shows that the average values are above 3.5. The banker is promoting this scheme by providing the utmost support. Conducting camps, creating awareness, and implementing various initiatives are crucial for the effective implementation of the PMJDY scheme. From the analysis, the average values are above 3.7551. As per their suggestions, intermediaries such as Micro Financial Institutions, Self Help Groups, and Business Correspondents are important, and NGOs are needed for effective implementation of this scheme.

Table 4: The first response from all respondents to the PMJDY scheme was that cooperation and effective service are being delivered to rural people. Financial transactions are transparent (mean: 3.9), including the disclosure of hidden costs. This suggests a positive perception of openness and clarity in financial dealings. The level of financial awareness among account holders in overdraft regarding need-based credit, remittances, insurance, pensions, etc., is low for the excluded section (mean: 3.38). Respondents generally agree that account holders have a reasonable level of financial awareness regarding need-based credit, remittances, insurance, pensions, etc. This indicates a perceived understanding of various financial products and services. There is a high level of understanding that FI indicators (deposits, credits, ATMs, branches, credit cards, and debit cards) positively impact the development of the Indian economy (mean: 3.9), indicating consensus on FI's role in economic growth. The performance of the PMJDY scheme in enhancing the living standards of low-income people in Maharashtra State (mean: 3.80): Respondents agree that the PMJDY scheme has positively contributed to improving the living standards of low-income groups in Maharashtra State. This reflects a positive perception of the scheme's impact on socio-economic conditions. Household awareness of PMJDY influences the scheme's effective implementation across the state (mean: 3.74). Respondents perceive a relationship between household awareness of PMJDY and its effective implementation. This highlights the importance of awareness campaigns and outreach efforts for successful implementation. The reorganisation of the lead bank scheme for reaching rural people and the scheme's effectiveness for economic development (mean: 3.82). Respondents agree that reorganisation of the lead bank scheme is essential to reach rural populations. This underscores the importance of strategic planning to extend financial services to rural areas. In the last decade, PMJDY has played a pivotal role in building the financial potential of poor people and enhancing their security. This scheme aligns with an inclusive development philosophy; respondents rated it 3.76 (mean), indicating that this philosophy is central to its development for rural people. Another reason for bankers' positive response is that this scheme is instrumental to social transformation and inclusive economic growth. The mean value of 3.74 indicates a positive perception among respondents. Another aspect of effective implementation is expanding branch coverage, ATM availability, deposit options, and loan offerings. In particular, the scheme aims to convert the region's unbanked population into a banking population. In this regard, respondents reported a mean of 3.82 on the Likert scale. The next step in this scheme is to provide no-frills facilities, business correspondence, and branch expansion, and to simplify authorisation in unbanked rural areas. For this, the respondents expressed positive feelings, with a mean value of 3.81. For other aspects, such as the scheme covering large populations, the core development of rural people, and its role in social transformation and inclusive growth,

respondents from the banking sector reported mean values of 3.75, 3.70, and 3.89, respectively. All mean values are greater than 3 on a 5-point Likert scale.

Table 5 highlights various issues and challenges in implementing this scheme (PMJDY). These include the need for a high level of commitment from the bankers to implement this scheme effectively. For this, bankers gave a mean value of 3.88. The second challenge is that the RBI will be closely monitored to ensure that regulatory work is reframed to enable the effective implementation of this scheme (mean: 3.84). Another issue affecting the effective implementation of this scheme is that some beneficiaries open multiple accounts, but the bankers record no operations, resulting in account duplication (mean: 3.74). In this view, many inactive accounts result from unnecessary bank maintenance costs (mean: 3.68). Another FI concern is that many beneficiaries open multiple Aadhaar-seeded bank accounts. This conflicts with achieving the FI objective. Mitra Model's assertion that the main objective of FI is for excluded account holders only (3.55), and the Jan-Dhan-Aadhaar-Mobile (JAM) policy (3.734) as an effective ecosystem that builds JDY from the ground up. Both models underscore the perceived importance of achieving inclusive economic growth. The chi-square test (χ^2) compares observed and expected results. The impact analysis indicates a significant result ($p < 0.05$), rejecting the null hypothesis. It was a linear-by-linear relationship for different factors (0.009, 0.256, 0.186 and 0.301). The study assumes a relationship between bankers' demographics and their consent to the JDY scheme in rural Maharashtra. These results indicate bankers' support for the JDY scheme in rural Maharashtra. These findings contribute to a deeper understanding of commercial banks' role in implementing FI initiatives to promote inclusive economic growth.

Overall, policymakers are addressing PMJDY appropriately, thereby fostering FI. This scheme clearly includes economic growth. This study primarily examines PMJDY's contribution to rural people, specifically in Maharashtra. The study considered opinions from respondents' bankers on this scheme. According to them, PMJDY lies in its capacity to facilitate financial services, including zero-balance accounts, deposits, loans, withdrawable OD facilities, insurance, and, through this scheme, welfare facilities. Hence, this scheme is already being developed by rural people, particularly disadvantaged groups, as noted by Aduda and Kalunda (2012), Dutta Tulika and Ashish Das (2017), Chaudhary Alka (2017), and Sharma Neha and Goyal Ruch (2017).

This study aims to analyse aspects influencing inclusive economic growth. The study employs the Chi-Square test to examine the demographics of bankers supporting the JDY scheme in rural areas of Maharashtra.

The analysis shows a significant relationship between the variables. The FA identifies correlations among bankers' perspectives, who are crucial stakeholders in the successful execution of the JDY scheme, which aims to enhance rural households' savings habits. To analyse this data, the researcher has gathered responses from bankers actively involved in implementing the JDY scheme. The selected bank policies are expected to play a significant role in driving positive changes in rural households' saving habits (Md. M. Anwar, 2022). Factor analysis is a statistical tool for identifying relationships among independent factors, specifically utilising Principal Component Analysis (PCA). This technique will involve more variables than just a few major ones. The study used 16 factors for the effective implementation of the PMJDY scheme. These variables were identified as key through a factor analysis. The bank policies influence the effective implementation of the PMJDY scheme. The study seeks valuable insights from policymakers on how to improve saving habits and living standards. The KMO test measures sampling adequacy. Bartlett's Test was employed to assess the suitability of the data for factor analysis (FA). Both values have a KMO significance of 0.946, and Bartlett's Test is 0.000, which is less than 0.05. Both tests are statistically fit for further

factor analysis. Factor analysis indicates strong correlations among the variables, with the sum of the loadings for a single factor totalling 62.42%. Based on the above value, assess the impact of the effective implementation of the JDY scheme on economic development. Additionally, the regression analysis examined the independent and dependent variables associated with potential economic growth through the effective implementation of the JDY scheme.

The Findings of the Study

The effective performance of the PMJDY scheme requires awareness camps, uniform practices, and the involvement of micro-finance institutions, SHGs, NGOs, and BCs. Some respondents explored ways to reduce unnecessary operational and maintenance costs for RBI staff evaluation. The study found that private-sector bank staff have positive sentiments toward the PMJDY scheme. Generally, private sector bank staff are qualified and experienced. PSB staff involvement also motivates private-sector bank staff to implement the PMJDY scheme. Overall, bank staff expressed positive sentiment toward the PMJDY scheme. Hence, the scheme, FI, economic growth, and societal development are related. Bankers perceived a relationship between demographic factors and the PMJDY scheme, particularly in rural Maharashtra. The overall factor analysis indicates a strong correlation between the variables and economic development, as shown by regression analysis. The Jan Dhan Yojana (JDY) scheme has significantly benefited low-income people. The number of beneficiaries has been increasing; bankers' role is pivotal to its success. Based on the respondents' (bankers') opinions about this scheme, the overall view is positive, particularly among those from rural communities. To enhance this scheme, regular awareness campaigns and addressing the major issues identified in this survey are needed. Multiple accounts are a major constraint on inclusive growth. Because multiple accounts operate at the branch, operational costs will be higher. Hence, the government should frame policy reforms to enable it to control inactive accounts. In that regard, the government needs to engage various intermediaries, such as MFIs, SHGs, NGOs, and educational institutions, to promote this scheme effectively. Key findings from the study on FI with reference to PMJDY in rural India highlight access, usage, regional disparities, and system performance. The study's traditional concept integrated with functional verification from VLSI provides valuable insights into the effective implementation of FI in rural India.

The study's primary finding highlights improved financial access across rural India. Currently, the unbanked population is opening bank accounts at scale within the formal financial system. This reflects the mission's expansion of banking outreach and near-universal account penetration in many regions. Despite the study's significance, many accounts remain dormant or underutilised in many regions. This shows that many beneficiaries have access to banking services but do not use them actively. The main reasons are low financial literacy, lack of awareness, and socioeconomic constraints, which lead to account dormancy. The study also focused on regional disparities. The cluster analysis highlighted that some regions are highly inclusive, with higher deposits, more active transactions, and greater digital adoption. However, other regions perform worse in FI. This indicates regional disparities among the states, and the government will take the initiative to formulate strategies for states with low inclusion. Hence, the uneven distribution highlights the need for region-specific strategies rather than a uniform national approach. Another key finding is that digital financial services enhance FI. Comparison of regions based on digital financial services: Some regions have higher FI, such as mobile banking adoption, Aadhaar access, and Direct Benefit Transfer, than other regions.

In contrast, regions with low FI have lower digital literacy and weaker performance. The study also finds that a key aspect of functional verification in VLSI is validating reliability and performance in FI. High-performing states demonstrate consistent service delivery, low errors, efficient transaction processing, and system reliability.

In contrast, low-performing states/regions delay transactions, suffer from system inefficiencies, and lack monitoring mechanisms. This clearly indicates the need for continuous evaluation to assess the system's validity. The coordination of institutional mechanisms also influences high- and low-FI outcomes. Regions with strong institutional coordination among banks, government institutions, and beneficiaries have higher FI. Conversely, poor coordination leads to poor service delivery and limited outreach to rural areas. Further, the study found that a positive socio-economic impact in regions was evident in high levels of FI. However, these account holders exhibit saving habits, better access to credit and good financial literacy.

In contrast, with low usage levels, the socio-economic benefits remain limited. Finally, this study focuses on in-depth, data-driven insights for evaluating FI. While traditional methods focus on quantitative indicators, they cannot capture the complexity of the financial system. Integrating technology-related functional verification in VLSI provides valuable insights into system performance and policy effectiveness.

The Recommendations of the Study

The study recommends that bankers conduct regular awareness camps to improve understanding of the scheme. This supports social well-being and economic development. It also suggests that bankers identify and remove duplicate accounts to reduce operational and maintenance costs. Additionally, bankers should focus on interconnected elements to benefit the beneficiaries. Finally, policymakers should use factor analysis to identify key variables and ensure an attentive, efficient approach to rural people at the lower levels. Based on the study's findings, this mission will focus on a few of the researcher's recommendations, including policies and operational activities, to improve the effectiveness, reliability, and sustainability of FI initiatives. The study's basic recommendations focus on the account holder's use of access. Under the PMJDY scheme, several accounts are opened, but they are not operating at the desired level. Hence, policymakers and financial institutions should conduct awareness programmes to encourage regular account access, build savings habits, and link accounts to credit, insurance, and pension services. Regular account use will ensure meaningful inclusion rather than mere ownership. It may also recommend strengthening financial literacy and awareness programmes in rural regions. Currently, many contests offer bank accounts, but people do not use them. Hence, financial institutions should collaborate with local educational institutions and conduct training programmes to build financial literacy and digital skills, and to build account holders' confidence in the security and safety of operating their accounts digitally. The study also recommends improving digital infrastructure, as better connectivity will enhance FI through mobile payments, UPI, and Direct Benefit Transfers (DBT), which are vital to efficient financial transactions. Inactive internet connections and limited access to digital services have an adverse impact. Hence, policymakers will decide to install infrastructure specifically in medium- and low-income regions with high FI. It is also recommended that functional verification from VLSI be applied in the financial system to improve accuracy, reliability, and consistency in service delivery. Hence, a continuous monitoring financial system is used for anomaly detection and validation of financial data. Implementing such a framework definitely builds user confidence and improves FIs' overall efficiency in rural areas. Further, it may recommend that policymakers intervene to ensure effective monitoring of institutional mechanisms, such as the Lead Bank Scheme. Effective monitoring of this scheme also helps improve FI. Those regions that coordinate effectively can enhance and ensure better services in rural areas. The study also suggests that disparities between regions stem from some regions or states being low- or medium-income.

In contrast, others perform effectively in terms of account and deposit usage. Therefore, the government or policyholders should make region-specific decisions to improve, rather than

adopting a uniform policy. Consequently, efforts should focus on meeting regional needs in infrastructure, literacy, and customised financial products for low-performing areas.

Additionally, advanced AI & ML technologies are integrated with VLSI to enhance decision-making. Techniques such as cluster analysis, predictive analytics, and ML will help identify trends and patterns, verify functionality, and enable data-driven decision-making to develop strategies for improving FI in India. Finally, it is also recommended to promote user-friendly, tailor-made products to meet the needs of rural populations. It also ensures that active participation in the security and reliability of digital financial systems is crucial for building user trust. It may be concluded that to achieve sustainable FI, policy reforms, technological innovation, institutional support, and continuous system verification are essential to advance PMJDY beyond access expansion and achieve deeper, more effective, and inclusive development.

Conclusion

The study concludes that, since the evaluation of PMJDY began in 2014, progress has been remarkable. This mission has made notable progress, faces challenges, and is charting a path toward an inclusive financial system. The study focuses on integrating VLSI functional verification technology, offering a novel interdisciplinary framework for assessing large-scale, data-driven decision-making to improve FI in rural India. The findings strongly confirmed PMJDY, with the digital mode initiative expanding financial access across India. Through mobile banking, UPI transfers, Aadhaar access, and DBT payments to beneficiaries, it enhances transparency and reduces leakages in welfare distribution. The study also concludes that PMJDY is not just for access to accounts. Beyond that, active account usage drives strong regional performance. Therefore, policymakers need to develop campaign-related programs and partner with educational institutions to raise public awareness. Another significant conclusion concerns regional disparities in FI performance. The study uses cluster-based analysis to identify regional disparities. Policymakers can then invest in infrastructure and address developmental challenges to encourage FI in low-performing regions. The study is also significant for further aspects, such as digital transformation, which drives high-performing FI, as mobile banking, UPI, and internet banking increase efficiency in high-performing regions. Therefore, policymakers who bridge this gap are vital to realising comprehensive FI. An important contribution of the study is the functional verification of the FI system using VLSI principles. This system highlights the validation, reliability and accuracy of the data. It continuously monitors and identifies inefficiencies, minimises errors, and has robust verification frameworks to improve service quality. This interdisciplinary study will help improve the efficiency of India's financial system. Policymakers will focus on institutional support to improve FI efficiency. Hence, effective stakeholder support, continuous monitoring systems, and an accountable framework support effective implementation of the financial system.

Finally, the study may conclude that PMJDY has achieved remarkable progress but faces challenges in digital infrastructure, financial literacy, and the verification system. To address these challenges and ensure the reliability and efficiency of FI systems. By adopting these strategies, policymakers can progress towards the goal of equitable and inclusive economic growth, thereby supporting the overall development of rural India.

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