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THE POTENTIAL OF BLOCKCHAIN TECHNOLOGY AND DECENTRALIZED FINANCE FOR ENHANCING FINANCIAL INCLUSION THROUGH PMJDY

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ABSTRACT

*The **Pradhan Mantri Jan Dhan Yojana (PMJDY)**, launched in 2014, is one of India's most ambitious financial inclusion programs, aimed at ensuring access to financial services such as bank accounts, credit, insurance, and pensions for every citizen. As of March 2025, PMJDY has achieved a remarkable milestone by opening over 55 crore bank accounts, especially benefiting rural and semi-urban populations. However, despite the scale and reach, the scheme continues to face **structural challenges** like inactive accounts, lack of access to formal credit, low financial literacy, and minimal use of advanced financial services like insurance and investments. **Blockchain technology** and **Decentralized Finance (DeFi)** present innovative solutions to bridge these gaps. Blockchain's decentralized and immutable ledger can ensure secure, tamper-proof transaction records and transparent beneficiary tracking. DeFi enables users to engage with financial services like lending, borrowing, and saving without relying on traditional banking intermediaries, thus reducing costs and increasing access. When integrated with PMJDY, these technologies could transform India's financial landscape by empowering the unbanked and under banked communities through **smart contracts**, **digital identity verification**, and **tokenized micro-finance models**.*

KEYWORDS: *PMJDY, Blockchain, Decentralized Finance (Defi), Financial Inclusion, Smart Contracts, Rural Banking, Digital Identity, Microfinance, Financial Literacy, Fintech Integration.*

INTRODUCTION

Financial inclusion emerges as a central pillar of fair economic development with the objectives to ensure that people, particularly those who belong to the unrepresented and low-income groups, are able to avail themselves of basic financial services, including savings accounts, credit, insurance, and pensions. Another example is the Pradhan Mantri Jan Dhan Yojana (PMJDY), introduced in 1928, which paved the way for being one of the largest financial inclusion programs in the world and aims at making sure that none of the Indian

households lack access to at least one bank account. This national mission of the Government of India has made a revolutionary change in accessing the formal financial system for the deskilled people. By March 2025, a total of 55 crore bank accounts were opened under the PMJDY scheme, and the total deposit was more than 2.46 lakh crores, and the average per account deposit was 4,063. These values not only mirror the magnitude, but also the reach of the program in the rural regions and semi-urban regions where the banking accessibility was traditional. In spite of these successes, big disparities relative to accessing credit, making use of accounts, digital literacy, and offering a full range of financial services, including insurance and investments, still persist. A small percentage of the account holders fail to use their accounts regularly or cannot tap a greater range of the financial products because of the institutional and infrastructural issues.[1]

With these constraints, blockchain technology and decentralized finance (DeFi) have provided a radical prospect of reinventing financial inclusion. Blockchain technology, otherwise known as distributed ledger, goes a long way to guaranteeing transparency, the impossibility of data deletion, and the execution time of transactions. Drying together with DeFi applications- financial services via blockchain networks without the use of centralized intermediaries can offer safe, low-cost, and automated methods of monetary transactions. These new technologies could circumvent the existing banking networks that frequently do not reach the rural areas decently, hence universalizing access to financial products like microloans, insurance, savings, and peer-to-peer payments to people. Blockchain can support the creation of strong identity verification processes based on self-sovereign digital identities, which include opening accounts and carrying out Know Your Customer (KYC), to authenticate informally documented people. Blockchain allows credits to be auto-distributed in the form of smart contracts, tracks the repayment habits, and automatically enforces the provisions of the loans, all without the human factor, greatly minimizing the required commissions and the likelihood of corruption and flaws in the delivery of the credit, leaving a wide margin of administrative savings.

Moreover, the DeFi platforms have the opportunity to provide micro-investment and saving tools, based on the financial performance of low-income users, who are not usually able to provide collateral or build formal credit histories.[2] As an example, in the form of tokenized assets or stable coins, pegged to fiat currencies, one can save value safely, earn interest, and possibly conduct economic transactions. With the moderate technological infrastructure available to them, a basic mobile phone plus an internet connection is indeed sufficient. Combining them with programs such as PMJDY has the potential to transform the segment of financial inclusion by increasing the level of transparency, provision of better services, and economic empowerment of millions of Indians. But to achieve this potential, there must be enabling policies, a well-developed infrastructure, and a long-term financial literacy program, which aims to make the fruits of such cutting-edge technologies available and accessible to everyone in the vulnerable segments of society.[3]

Literature Review

Developing financial inclusion in India, especially with the help of government change, such as Pradhan Mantri Jan Dhan Yojana (PMJDY), is a revolutionary step forward. Having reported more than 55 crore accounts (Press Information Bureau, 2025a; Ministry of Finance, 2025), the scheme has created quite a hole in lowering the number of unbanked users. Nevertheless, the worries about dormant accounts are rearing their heads, indicating an addition without consumption (Chakrabarty, 2023). Also, the rural region exhibits differences in account ownership by gender, although the differences are shrinking (Economic Times,

2024). The comparative analysis of inclusion schemes indicates the absence of unified targeting mechanisms (NITI Aayog, 2024a).

Blockchain revolution, particularly in Decentralized Finance (DeFi), offers India opportunities as well as complexities related to its inclusive growth. Critical reports emphasize that blockchain has the potential to increase transparency and reduce the costs of performing transactions; still, clarity of regulations is vital (World Bank Group, 2023; Deloitte, 2022; MeitY, 2023). According to the arguments presented by the World Economic Forum (2023a), we need inclusive deployment frameworks to avoid the problem of technological elitism. Similarly, Such the discussion of how smart contracts and DeFi ecosystems can be used to make micro-financial services possible to the underserved, but also by Kumar (2023). The NITI Aayog Blockchain Strategy renders a vision of utilizing blockchain as a state foundation, ease of doing business, and digital public infrastructure (NITI Aayog, 2022).

The digital financial infrastructure in India, especially India Stack, has provided the basis for having scalable fintech solutions (NITI Aayog, 2020). Other features, such as Aadhaar and UPI, have played a pivotal role in facilitating the process of delivering services (NITI Aayog, 2023). Nevertheless, the cyber threat and data security concerns continue to increase cumulatively (CERT-IN, 2023; Government of India, 2023). Protection of personal financial data has now become a statutory adherence under the Digital Personal Data Protection Act, 2023, which can be perceived as an addition to the work of the RBI in providing control of digital lending and sandbox experiments (RBI, 2023; RBI, 2024). According to NCFE (2023) and SEBI (2024), financial literacy plays a crucial role in discussing access to responsible usage.

The potential of blockchain in the disbursement of rural welfare and the management of land records, especially in Andhra Pradesh, is demonstrated by NABARD (2023) and Press Information Bureau (2024b) pilot studies. In addition, the pilot blockchain on governance has become more ordinary (Mehta & Jha, 2023; Ministry of Electronics and Information Technology, 2022). The potential of Blockchain on remitting of individuals (World Bank, 2024), supply chain (World Economic Forum, 2023b), and women's financial empowerment (UNDP India, 2022) is also attracting scholarly views.

The convergence of digital finance and blockchain with the Indian policy framework shows a thin line between innovation, inclusion, and regulations. The academic and policy communities alike are looking at creating scalable, inclusive, and secure digital ecosystems that can close socio-economic gaps via fintech and DeFi (Narayan, 2023; Research and Markets, 2024).

Objectives

- Assess the limitations of current PMJDY implementation, particularly in rural and under banked regions.
- Explore the theoretical and practical potential of blockchain and DeFi technologies in addressing issues such as account dormancy, limited credit access, and lack of financial literacy.
- Analyze existing policy frameworks and identify how emerging technologies can be integrated with public financial inclusion initiatives.

Research Gap

Despite the substantial progress made by PMJDY in expanding banking access, a significant

research gap exists in understanding how emerging financial technologies like blockchain and DeFi can address the persistent structural and operational barriers. Current academic and policy literature focuses extensively on either the operational success of PMJDY or the standalone potential of DeFi and blockchain. However, there is a lack of interdisciplinary analysis that bridges financial inclusion policies with decentralized digital finance. Moreover, empirical studies evaluating the integration of these technologies into national welfare schemes remain scarce. This research addresses this critical void by proposing a techno-policy framework to synergize PMJDY with blockchain-driven financial solutions.

Analysis

The Pradhan Mantri Jan Dhan Yojana (PMJDY) is a significant initiative in India's financial architecture, aiming to bring unbanked segments of society into the formal financial system.[4] Launched by Prime Minister Narendra Modi in 2014, PMJDY aims to ensure universal access to banking facilities, provide basic bank accounts, promote financial literacy, and enable access to credit, insurance, and pension facilities.[5] The scheme aims for economic empowerment through sustainable financial tools and connectivity with the banking system.[6] As of March 2025, 55.02 crore accounts have been opened, with 36.63 crore located in rural and semi-urban regions.[7] The total deposits across these accounts have exceeded ₹2.46 lakh crore, with an average deposit per account of ₹4,063, indicating growing trust in the formal financial system and an increasing tendency to save within bank accounts.[8]

Metric	**Value**
Total Accounts Opened	55.02 crore
Accounts in Rural/Semi-Urban Areas	36.63 crore
Total Deposits	₹2.46 lakh crore
Average Deposit per Account	₹4,063
RuPay Debit Cards Issued	37.29 crore
Active Accounts	Approximately 81.2%

The PMJDY has had a major influence in the financial fields where RuPay debit cards have been issued to the account holders who have safety and security characteristics. This program has already been able to overcome the activation rate to 81.2 percent since more than 37.29 crore cards have already been distributed, which shows the transformation towards digital banking instead of using cash. Jan Suraksha schemes, PMJDY, provide low-cost insurance implemented in the form of PMSBY, PMJJBY, and APOY arrangements, which offer low-cost insurance and pension schemes to the economically weaker sections of society. By integrating these with PMJDY, the government has set up a synergy, which will promote long-term financial planning and minimize the vulnerability of the economy in case of death or disability, or old age.[9]

All these notwithstanding, there are various problems that hamper the realization of the objectives of PMJDY fully. A large percentage of the account holders still demonstrate low user activity of accounts, which is generated by a low level of digital literacy, the lack of stable banking access in rural areas, and the lack of confidence in institutional processes.[10] There have been reports that most PMJDY accounts are opened with the sole purpose of collecting government subsidies or welfare benefits, and the other times, they actually just lie there.[11] In addition, the absence of credit history and collateral remains a major obstacle to the decent availability of credit by poor and marginal communities, which reduces the economic prospects of financial inclusion.[12]

The gap between account ownership and financial empowerment is a significant concern, necessitating a more tech-integrated and decentralized financial infrastructure. Blockchain and decentralized finance (DeFi) can bridge this gap by providing automated, transparent, and cost-effective solutions.[13] Blockchain technology can improve service delivery, reduce bureaucratic burdens, and provide traceable, tamper-proof subsidy transfers.[14] Smart contracts can revolutionize loan sanctioning, disbursement, and recovery, eliminating delays and human errors. DeFi platforms can introduce peer-to-peer lending models based on community trust scores and transaction behavior.[15] Tokenization and digital wallets can be used to store value, make payments, and invest in government-backed schemes through mobile apps.[16]

Findings

The study finds that although PMJDY has achieved widespread account penetration, significant challenges persist in terms of usage, credit access, and economic empowerment. Nearly 18% of accounts remain dormant, and only a minority of beneficiaries have access to formal credit mechanisms. The integration of blockchain and DeFi can mitigate these issues through decentralized identity verification, smart contract-enabled credit disbursement, and transparent fund tracking. Pilot studies and policy reports confirm that blockchain applications in land records and ration systems have improved transparency and user trust, suggesting replicability in financial schemes. The findings also indicate a strong need for regulatory alignment and targeted financial literacy interventions for effective technology assimilation.[17]

Data Analysis

The Pradhan Mantri Jan Dhan Yojana (PMJDY), launched in 2014, remains India's most expansive financial inclusion program, targeting the unbanked and underbanked segments of society. While the scheme has made commendable progress in terms of account penetration, critical bottlenecks—such as dormancy, limited credit access and weak digital infrastructure—continue to challenge its effectiveness. This data-driven analysis explores the current status of PMJDY and the transformative potential of Blockchain and Decentralized Finance (DeFi) in deepening its impact.

The PMJDY program has crossed significant milestones as of March 2025, which are summarized in Table 1 below.

Table 1: PMJDY Key Performance Indicators (March 2025)

Metric	**Value**
Total Accounts Opened	55.02 crore
Accounts in Rural/Semi-Urban Areas	36.63 crore
Total Deposits	₹2.46 lakh crore
Average Deposit per Account	₹4,063
RuPay Debit Cards Issued	37.29 crore
Active Accounts	81.2%

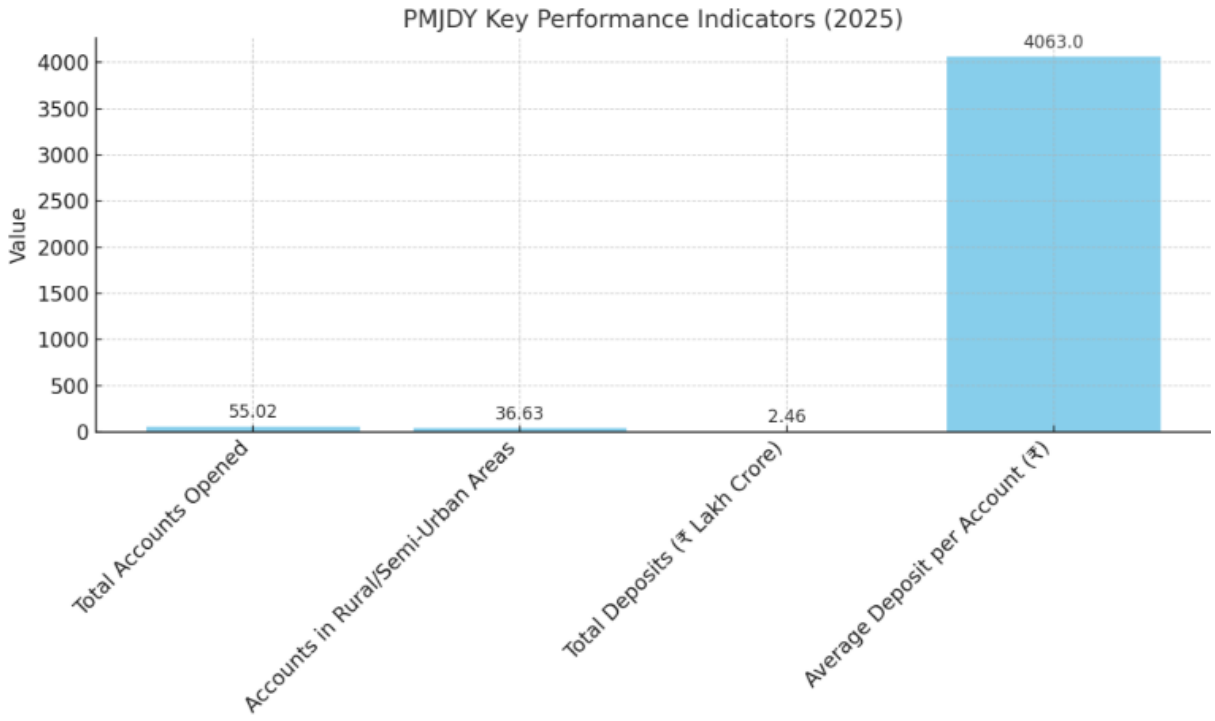
Source: *Press Information Bureau, Government of India; Economic Times*

These figures indicate widespread outreach, particularly in rural and semi-urban regions. However, a closer inspection reveals that a significant portion of account holders still lack access to vital financial tools such as credit, insurance, and investment services.[18]

Despite 55.02 crore accounts being opened; only 81.2% are considered active. This implies that nearly **1 in 5 accounts remain dormant**. While ₹2.46 lakh crore in total deposits suggests financial activity, the average deposit of ₹4,063 per account reflects limited savings and low engagement with formal financial tools.[19]

Figure 1: PMJDY Performance Metrics

The figure below visualizes selected PMJDY metrics for better comparative insight.



The chart shows that though the number of RuPay cards issued and rural account penetration is massive, the average deposit is low, and the dormancy of accounts points to concerns about real financial empowerment.[20]

NABARD (2023) 2.8M Only 12% of PMJDY account holders availed of formal credit, thereby reflecting a substantial gap in finance depth dimensions. The consequence of this is widespread reliance on informal lenders, typically exploitative loan sharks, charging between 24% and 120% per annum in interest. Conventional credit systems depend on documented income and credit history, which many informal and rural workers do not have.[21]

Combining Pradhan Mantri Jan Dhan Yojana (PMJDY) with Blockchain and Decentralized Finance (De-Fi) provides a radical alternative to solidify the financial inclusion of India. One of the most important aspects of DeFi is that it provides an end-run around traditional credit limitations. Using smart contracts – a self-executing contract with the terms of the agreement between buyer & seller directly written into lines of code – uncollateralized and credit-unworthy borrowers can borrow peer-to-peer microloans. This is particularly advantageous to farmers, petty traders, and workers in the informal sector. These programmable contracts automate payments, enforce payback, and minimize the need for intermediaries. Blockchain also ensures transparency in welfare schemes by giving access to an unforgeable ledger for tracking funds in real time. Each PMJDY benefit is time-stamped, can be verified, and is tamper-proof, making accountability and trust easier. According to the World Bank (2024),

blockchain can even lower remittance transaction costs by 40 per cent, increasing access for low-income users to financial services.[22]

But there are still enormous obstacles. More than 40% of rural India continues to be without dependable digital connectivity (NITI Aayog, 2023), which denies access to blockchain services. Further, it is estimated that more than 54% of PMJDY accounts are in women's names, although many of these remain inactive on account of patriarchal norms and lack of control.[23] Even when they are equipped, marginalized communities face a second layer of challenges getting past the gatekeepers and onto these digital media.[24] Digital identities and trust scores based on Blockchain technology may alleviate the dependence on discriminatory formal procedures. Nevertheless, digital and financial literacy is still a major missing link—only 27% of adults in India are financially literate (SEBI, 2024). Without a broad-based education, DeFi could end up further entrenching exclusion. For integration to have substance, PMJDY. Its execution must be strategic: smart contract-driven loans, token rewards for account use, blockchain-based ID systems, and gamified learning. If used right, Blockchain andDeFi can take PMJDY to the next level, from being a simple financial inclusion program to truly empowering the underprivileged.[25]

Result and Discussion

The result of this study presents a two-fold reality at the Pradhan Mantri Jan Dhan Yojana (PMJDY). On the one hand, the program has accomplished spectacular reach, and more than 55 crore accounts have been opened with a significant boost in financial inclusion indicators, and more particularly, in rural and semi-urban India. But at the same time, the scheme still has serious hurdles to overcome in providing meaningful usage of these accounts. Approximately 18 percent have an unused account, and most of the users use it only to collect government benefits instead of fully utilizing the service through credit, savings, or insurance facilities. This disconnects highlights how access to the finance ecosystem is not enough, and more should be done to empower people.

The introduction of blockchain and decentralized finance (DeFi) in the framework of PMJDY is an opportunity to fundamentally change and solve these long-lasting problems. Transparency and immutability in the blockchain can also guarantee a safe, traceable, and corruption-free flow of subsidies and benefits. Microloans and repayment of loans can be computerized on smart contracts, where poor and under banked people who lack access to formal documentation can gain access to credit effectively. KYC implementation that implements decentralized mechanisms of identity verification will ease the KYC procedures by enabling beneficiaries to use and manage their information safely and privately. Moreover, the suggested tokenized financial instruments and DeFi applications provide the potential for inclusive savings and investment services in favor of low-income customers.[26]

Nonetheless, this integration has significant obstacles to it, which can be brought up in the discussion as well.[27] Although there are high expectations of blockchain and DeFi, digital illiteracy, infrastructural shortages, gender biases, and access to smartphones or the internet are the main sources of critical obstacles.[28] New teaching and learning technologies, therefore, should be accompanied by financial or digital literacy programs because without them, people will not be able to use the given opportunities, and consequently, fail to use them to their advantage.[29] The implementation of PMJDY, based on a gradual, transparent, and user-friendly strategy and underpinned by pilot programs, regulatory certainty, and the collaboration of the state and the private sector alone, can be transformed into an example of how financial empowerment can be achieved by technology without bias.[30]

Recommendation

To make Pradhan Mantri Jan Dhan Yojana (PMJDY) a process of not just opening basic accounts, but of wholesome financial enablement, it is important that a multi-pronged approach is kept in mind, to take advantage of the new technologies, and overcome root issues such as digital literacy, lack of infrastructural coverage. To begin with, the strategies promoting the use of blockchain and decentralized finance (DeFi) must be launched as well-organized pilot programs, at least in semi-urban areas and common rural territories.[31] It is recommended that these pilots aim at applying blockchain in fund disbursement, specifically through transparent and tamper-proof issuances, identification verification by use of digital identification documents, and generation of microcredit schemes dependent on smart contracts. With such implementations, beneficiaries would gain access to targeted services with security and efficiency, as there would be no need to involve third parties and bureaucracy. Nevertheless, technology is not enough, and such interventions should be accompanied by a long-term process of developing user confidence and digital capacities.[32]

In tandem with the process of integrating technology in society, there is a need for a strong nationwide digital and financial literacy campaign.[33] Such campaigns ought to be carried out using local languages and focused on meeting gender, age, and education gaps in terms of digital access.[34] The material should be based on daily financial activities: secure ways to transact, literacy on digital applications, awareness of scams, and why credit, insurance, and savings matter.[35] Financial institutions, non-governmental organizations, and fintech start-ups, as well as community workers, need to cooperate to create interesting and easy-to-understand educational resources and train directly in the villages and in low-service regions.[36]

Also, policy frameworks should be more comprehensive and responsive.[37] The government should collaborate with regulatory commissions like the RBI, SEBI, and MeitY to draw up easy rules for using blockchains in welfare programs and develop a regulatory sandbox starting point.[38] The DPDP Act needs to strengthen privacy provisions by making the user data secure and consent-based. Grievance redressal should be carried out through a centralized grievance redressal platform that will be available through mobile or offline mediums in order to quickly process any fraud or complaint regarding services.[39] Only by using such coordinated, grassroot-informed, and technology-empowered actions, PMJDY can achieve its potential to transform.[40]

CONCLUSION

There is no doubt that Pradhan Mantri Jan Dhan Yojana (PMJDY) has truly been a revolutionary instrument in the move towards financial inclusion in India, where millions of hitherto unbanked people, especially in the rural and marginalised sections of society, have been integrated into the mainstream banking network. Access, however, has dramatically improved, yet the challenge has now been on how to ensure meaningful and sustained use of financial services. A wide share of account holders' still encounter challenges like a lack of credit facilities, inactive accounts, unsuitable financial knowledge, and poor online infrastructure. The latter has limited the even greater intentions of economic empowerment and inclusive development that PMJDY was anticipated to accomplish.

Blockchain and decentralized finance (DeFi) can provide a future-proof and at-scale solution to many of the above systemic problems. Possessing such features as transparency, security, and decentralization, Blockchain has the potential to reinforce the operational integrity of PMJDY, reduce cases of fraud, make the delivery of benefits traceable, and easy to verify

using digital identity systems. The use of smart contracts and tokenized lending schemes as described by DeFi platforms has the possibility of providing microcredit and savings tools that can be directly deployed to underserved communities without the constraints of the traditional banking system. In the case of proper localization and regulation, these tools can help to democratize access to finance and improve personal financial decisions.

However, this potential can be achieved only through the considered, all-embracing, and ethical enactment. Digital literacy should be done at the grassroots level, especially for women, the elderly, and other vulnerable groups, and this need to be accompanied by technological upgrades. The regulatory framework, the investment in the infrastructure, and the involvement of the community are the key to making sure that the innovation will not be used to make the exclusion even greater, but to narrow the digital divide. In a nutshell, even though PMJDY has created the base of inclusive finance, the thoughtful implementation of blockchain technology and DeFi technologies would provide the next layer on top of it, as not only can people now reach the financial system, but also interact with it responsively and safely. Such interplay of policy and innovation is the most important feature of a resilient, equitable, and digitally empowered economy.

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