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Assessing the Impact of Digital Transformation on Banking in India

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Abstract

This study explores the deep influence of digital transformation on the Indian banking industry, an area marked by rapid technological innovation and changing customer expectations. Using a mixed-methods research strategy, this study examines digital payment adoption patterns—namely UPI, mobile banking, and internet banking—to identify changing consumer trends and develop strategic recommendations for improving UPI and mobile-based financial solutions. Quantitative analysis measures the performance of various groups of banks, such as public, private, foreign, regional rural, and small finance banks, by analyzing growth in account count, credit limits, and outstanding loan balances, as well as understanding customer behavior across different credit segments. The research discussed above further examines the effectiveness of government schemes like "Digital India" and the Pradhan Mantri Jan Dhan Yojana (PMJDY), and incentive schemes for digital payments, in inducing widespread adoption of digital banking. Emphasizing the core role of digital transformation in enabling financial inclusion, operational effectiveness, and customer satisfaction, while meeting key challenges such as cybersecurity risks, infrastructural constraints, and digital literacy shortfalls, this study integrates an extensive literature review. Initial evidence indicates a high correlation between government efforts and growing digital payment use, as well as a marked divergence in the performance of digital banking among different groups of banks. In addition, customer behavior insights show a rising demand for mobile-first financial products, highlighting the imperative for banks to focus on user-centric design and strong security features. This research yields useful recommendations for banking professionals, policymakers, and stakeholders alike, highlighting the imperative for strategic investment in technology, improved digital literacy initiatives, and regulatory measures that facilitate sustainable and inclusive digital financial growth in India.

Keywords: Digital Transformation, Indian Banking, UPI (Unified Payments Interface), Mobile Banking, Financial Inclusion, Digital Payments, Consumer Behavior, Bank Performance, Pradhan Mantri Jan Dhan Yojana (PMJDY), Digital India, Fintech, Financial Technology, Digital Literacy, Regulatory Framework.

Introduction

The Indian banking sector is in the midst of a revolutionary phase, with the sudden spread of digital technologies transforming the delivery and consumption of financial services at its core. The growth in digital payment platforms, mobile banking penetration, and the expanding use of digital financial services have remade the landscape, generating both unprecedented opportunities and great challenges. Programs such as the "Digital India" initiative and the Pradhan Mantri Jan Dhan Yojana (PMJDY) have played a pivotal role in creating an enabling ecosystem for digital uptake. PMJDY, specifically, has triggered

financial inclusion by bringing millions of unbanked people into the organized banking system, leading to a substantial boost in account ownership. Along with the exponential rise in smartphone penetration and internet access, these initiatives have driven a wave of digital payment adoption, with systems such as the Unified Payments Interface (UPI) witnessing stellar growth. Yet, this revolution is not without its intricacies. While digital banking has several advantages, such as increased efficiency, convenience, and accessibility, it also has some serious challenges. Cyber threats, infrastructural constraints, and the ever-widening digital divide are still serious issues that need to be addressed urgently. Further, the diverse nature of the Indian banking sector, with its public, private, foreign, regional rural, and small finance banks, requires a deeper understanding of how digital transformation affects each segment. This research will explore the trends in adoption of digital payments such as UPI, mobile banking, and internet banking to discern changing consumer behaviour and create strategic suggestions for mobile-based financial products. It will measure the effect of digital transformation by assessing bank group performance on major metrics, including accounts, credit limits, and outstanding balances, and by looking at customer behavior in different credit segments. The study will also measure the success of government programs such as "Digital India" and PMJDY, as well as digital payment incentive schemes, in driving universal digital banking adoption. It will provide useful insights for banking practitioners, policymakers, and stakeholders to make informed choices and develop strategies ensuring sustainable and inclusive digital financial development. The research will also focus on the need to balance technological innovation with the necessity of resolving cybersecurity, infrastructural constraints, and digital illiteracy challenges so that digital transformation benefits reach all sections of society. Through the literature review, the nature of digital transformation has been shown to be ongoing; this study will evaluate its advancement and propose ways to further enhance it.

Research Objectives

1. Analyze the Effect of Digital Transformation on Banking Services: Examine how digital innovations like mobile banking, internet banking, and fintech solutions have influenced core banking services like deposits, loans, and customer interactions.
2. Examine the Role of Government Initiatives (e.g., Digital India) in Accelerating Digital Transformation in the Banking Sector: Investigate how government policies and initiatives have contributed to the digital shift within traditional banks.
3. Examine the Environmental Impact of Digital Transformation in the Banking Sector: Evaluate how the shift to digital banking has reduced the need for physical branches, paperwork, and logistics, contributing to sustainability.

Review of Literature

Digital Transformation in Banking

Mobile Banking: Availability of banking services on mobile apps, allows customers to manage accounts, transfer money, and access banking services remotely. Mobile banking has led to Convenience, speed, reduced physical banking dependency. It is important to address customer concerns regarding security, reliability, and ease of use to promote mobile banking adoption. Trust and subjective norms are also critical factors influencing adoption. Singh (2014) found that customer perception of mobile banking is influenced by demographic factors and prioritizes security, reliability, and ease of use. Banks need to address these factors to promote wider adoption. Adding to that Kumar, Dhingra, Batra and Purohit (2020) found trust

to be the most critical determinant, followed by subjective norms. Aithal, and Varambally (2015) security, convenience, and independence are crucial for satisfaction, while prior experience, education, and incentives influence adoption. Mavhiki and Nyamwanza (2015) opined mobile banking has increased transactions but not replaced traditional banking due to security concerns and network failures. Banks need to address these challenges and focus on mobile banking strategies.

Internet Banking: Web-based banking allows users to perform financial transactions through a secure website. It has led to simplified access to account management, digital customer onboarding, and reduced branch visits. While internet banks demonstrate superior performance, security concerns and operational challenges remain significant barriers to wider adoption. Despite these challenges, electronic banking offers benefits such as ease, speed, and enhanced efficiency. Banks that invest in technology and address customer concerns can gain a competitive advantage and improve profitability in the long run. Malhotra and Singh (2009) finds internet banks are larger, more profitable, and efficient. It negatively affects new private sector bank profitability due to higher costs, but doesn't increase risk. Further, Chawla (2024) finds that while adoption of internet banking is increasing, security concerns remain a barrier. The study highlights the need for improved security and government support to promote wider adoption. However, Govindharaj (2023) mentions the benefits of electronic banking, such as ease, speed, and security, but also emphasizes the importance of addressing potential challenges and ensuring customer satisfaction. Adding to that Singh (2023) highlights the importance of IT and communication in modern banking. Electronic banking has made transactions faster and more convenient, giving banks that adopt new technologies a competitive advantage and increased profitability.

Fintech Solutions: Fintech has a significant role in enhancing financial inclusion and improving banking operations. While Fintech offers numerous benefits, it also presents challenges related to data protection, regulation, security, and training. To fully leverage the potential of Fintech, banks must address these challenges and adopt innovative approaches to customer management and service delivery. Chouhan, Ali, Sharma and Sharma (2023) finds that FinTech is crucial for banks to manage risks and improve customer experience. However, it also highlights the need for comprehensive data protection and further research to address challenges and opportunities presented by FinTech. Further Mittal, Tayal, Singhal and Gupta (2024) identifies challenges and opportunities, emphasizing the need for adaptation and innovation. Ultimately, the study concludes that Fintech offers significant potential to improve financial inclusion, efficiency, and the overall financial system. Adding to that Lakshmi and Yashwanth (2024) finds positive changes but also challenges related to regulation, security, and training. The study recommends addressing these challenges and leveraging Fintech to enhance customer satisfaction, improve service quality, and maintain a competitive position. Again Asif, Khan, Tiwari, Wani and Alam (2023) finds that fintech is a valuable tool for promoting financial inclusion in rural India. Factors such as behavioral intention, service trust, usability, and social influence significantly impact the adoption of fintech services.

Role of Government Initiatives

Digital India Initiative: It is a government program aimed at ensuring access to digital services and fostering digital literacy. Sharma and Piplani (2017) emphasized that while digitization and the Digital India Program have improved customer service and operational efficiency in banking, challenges remain in adapting legacy systems, managing cybersecurity, and promoting financial inclusion. Azmi, Akhtar, and Nazeem (2020) highlighted that digitalization has shifted Indian banking from branch-based to automated, bank-wide services, enhancing profitability and customer satisfaction, driven by government

initiatives like Digital India and UPI. Kaur, Ali, Hassan and Emran (2021) emphasizes the significance of in-branch customer experience and its influence on digital banking adoption, highlighting the importance of personalization, effective communication, and branch service quality in fostering customer trust and encouraging the use of digital channels. Sagar (2024) highlights Digital India's pivotal role in driving India's economic growth through enhanced productivity, reshaped business models, and improved financial inclusion. Bhoi (2021) emphasizes the need for careful consideration of macroeconomic implications and a well-thought-out approach to ensure successful implementation. Gupta (2017) highlights demonetization's role in accelerating the shift. It emphasizes the need for training, data protection, and legal frameworks to ensure successful adoption among the uneducated masses.

Unified Payments Interface (UPI): It is a real-time payment system that facilitates inter-bank transactions via mobile. It increased digital transactions, reduced reliance on cash, and led to smoother payment processes. A and Bhat (2021) highlights the advantages of UPI in driving digital payments in India, emphasizing its features, ease of use, and growing adoption despite challenges like cyber threats and limited accessibility to unbanked populations. Ramachandran (2018) underscores UPI's transformative impact on India's financial landscape, highlighting its role in enhancing digital inclusion and driving economic and social improvements through a robust, inclusive digital payments environment. Chandak and Shukla (2024) opined UPI leveraging mobile phones and simplifying the payment process, has revolutionized digital payments in India, offering unique features, enhanced security, and potential for financial inclusion. Sagar (2024) opined that UPI has been a key enabler of India's digital transformation, promoting inclusive growth and contributing significantly to higher GDP, job creation, and improved financial inclusion.

Aadhaar and e-KYC (Know Your Customer): It is a simplified digital identification through biometric and demographic data. It has reduced paperwork, faster customer onboarding, and enhanced security. Sahoo (2024) highlights the need for the banking industry to adopt a customer-centric, technology-driven approach and partner with fintech firms to address credit gaps and promote financial inclusion. D'Silva, Filková, Packer and Tiwari (2019) highlights that Aadhaar-based e-KYC has significantly streamlined the customer onboarding process in traditional banking, reducing costs and enhancing efficiency by making KYC paperless and faster, while maintaining regulatory compliance. This has accelerated digitalization in the banking sector, making financial services more accessible.

Pradhan Mantri Jan Dhan Yojana (PMJDY): A financial inclusion program aiming to provide bank accounts to all households. It has led to increased customer base, financial literacy, and participation in formal banking systems. Patnaik, Satpathy and Supkar (2015) highlights that PMJDY has been instrumental in promoting financial inclusion in India by increasing access to formal banking services, particularly among marginalized populations, leading to a potential shift away from informal sources of credit and contributing positively to the country's economic development. Gupta and Thakur (2020) aligns with existing literature on financial inclusion in India, highlighting the challenges of achieving full inclusion despite government efforts, and emphasizing the importance of technology, literacy, and accessible services. Agarwal, Yadav and Pandey(2016) highlights the importance of innovative strategies like zero-balance accounts and expanded outreach to promote financial inclusion among marginalized populations, while also identifying regional disparities and the need for targeted efforts. More and Mancharkar (2023) highlights the success of PMJDY and the need for banks to adapt to changing customer preferences and collaborate with fintechs.

Research Methodology

Research Design

This research adopts a mixed-methods approach, combining quantitative data analysis with descriptive and analytical methods to evaluate the impact of digital transformation on the Indian banking sector. The study is divided into three main objectives, each focusing on a specific aspect of digital transformation: the effect on banking services, the role of government initiatives, and the environmental impact. Data for each objective is sourced from reliable government and banking portals, and statistical tools are employed to analyze trends, patterns, and correlations.

Data Collection Method

Data for this research is collected from the following sources:

- Digidhan Dashboard: Data on digital payment modes (UPI, mobile banking, internet banking, etc.) for the past five years is used to analyze the adoption patterns of digital payment methods.
- RBI Data Source: Bank group-wise outstanding credit data of Scheduled Commercial Banks (SCBs) according to the size of credit limits is used to examine the role of government initiatives in accelerating digital transformation.
- PMJDY Portal: Data on account ownership and financial inclusion over the past ten years is used to evaluate the environmental impact of digital transformation.

Measurement of Variables

The study employs the following variables:

- Digital Payment Adoption: Measured through the percentage share of various payment modes (UPI, mobile banking, internet banking, etc.) over five years.
- Bank Group Performance: Measured through outstanding credit limits and trends in credit distribution across different bank groups (public, private, foreign, regional rural, and small finance banks).
- Environmental Impact: Measured through the reduction in physical branches, paperwork, and logistics, as reflected in the growth of digital accounts under the PMJDY scheme over ten years.

Statistical Tools and Techniques

The study uses the following statistical tools and techniques:

- Pie Chart Analysis: To visualize the adoption patterns of various digital payment modes over five years (Objective 1).
- Comparative and Trend Analysis: Using SPSS software, the study performs comparative analysis and trend analysis on bank group-wise outstanding credit data (Objective 2).
- Bar Chart Analysis: To analyze the growth of digital accounts under the PMJDY scheme over ten years (Objective 3).

Hypotheses Testing

The study tests the following hypotheses:

H1: Digital transformation has significantly influenced the adoption of digital payment modes in India.

H2: Government initiatives like Digital India have accelerated the digital transformation of traditional banks.

H3: The shift to digital banking has reduced the need for physical branches, paperwork, and logistics, contributing to environmental sustainability.

Ethical Considerations

The study adheres to ethical research standards, ensuring that all data used is publicly available and properly cited. The research does not involve any personal or sensitive data, and all sources are acknowl-

edged.

Limitations of the Study

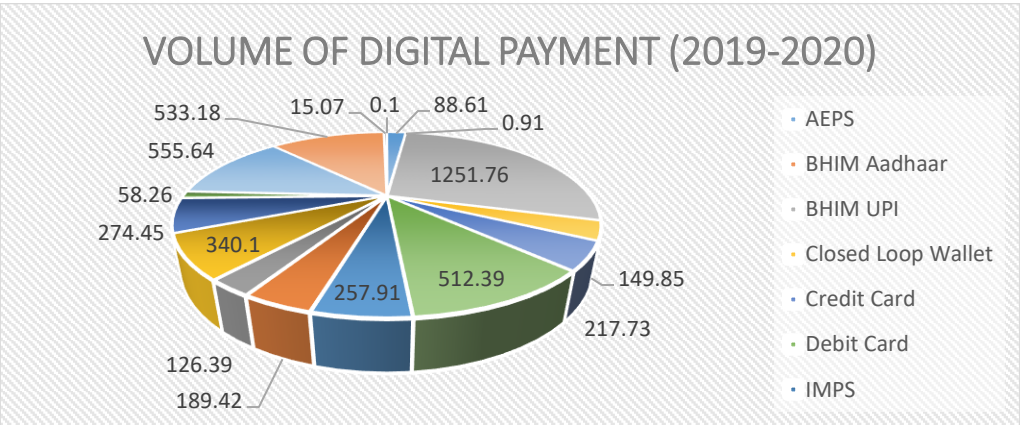
- Data Availability: The study relies on secondary data, which may have limitations in terms of granularity and timeliness.
- Scope: The study focuses on the Indian banking sector, and the findings may not be generalizable to other countries or regions.
- Cross-Sectional Nature: The study captures data at specific points in time, limiting the ability to make causal inferences.

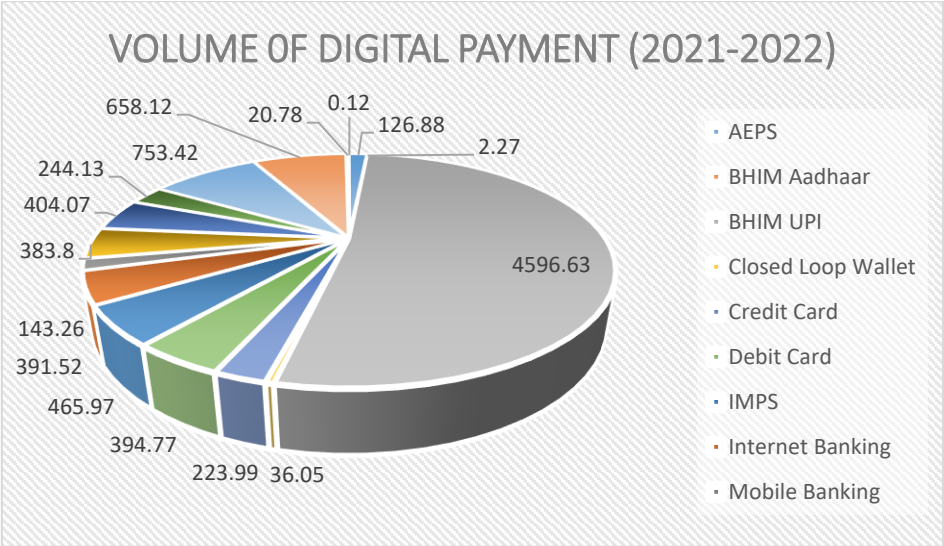
Data Analysis

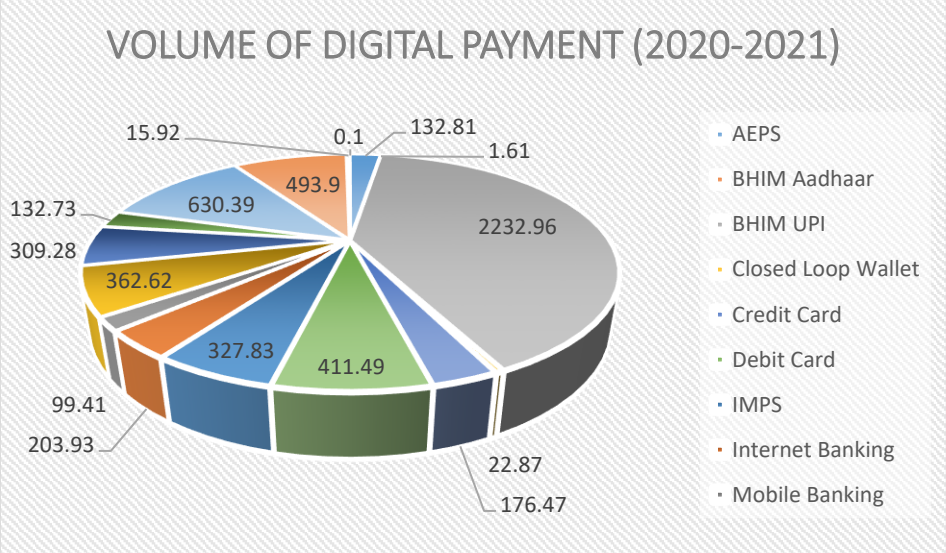
Pie Chart Analysis

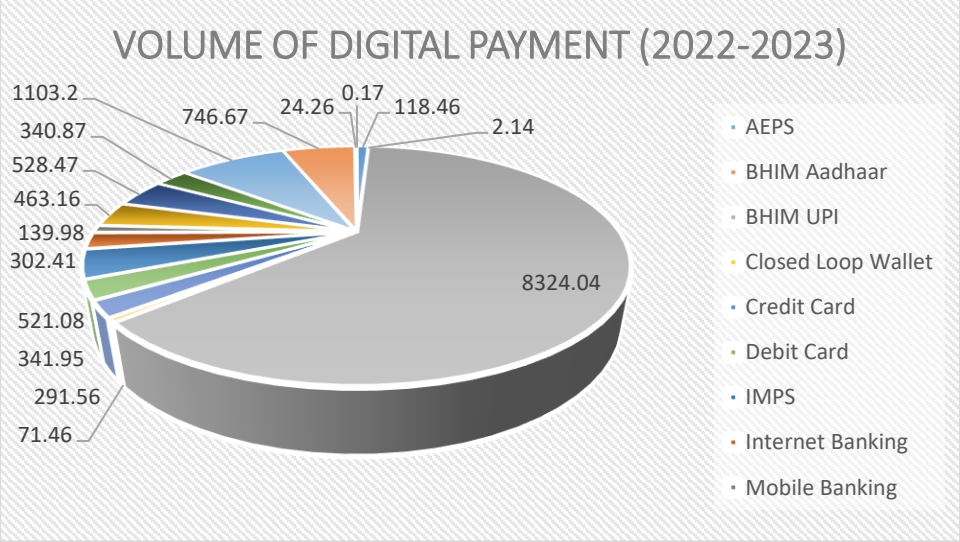
Value in crores (Volume)

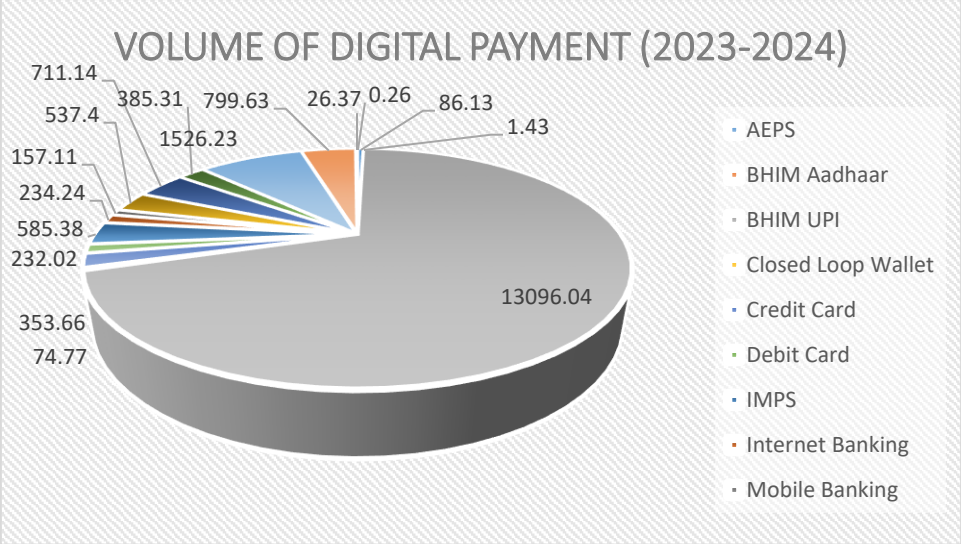
	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024
AEPS	88.61	132.81	126.88	118.46	86.13
BHIM Aadhaar	0.91	1.61	2.27	2.14	1.43
BHIM UPI	1251.76	2232.96	4596.63	8324.04	13096.04
Closed Loop Wallet	149.85	22.87	36.05	71.46	74.77
Credit Card	217.73	176.47	223.99	291.56	353.66
Debit Card	512.39	411.49	394.77	341.95	232.02
IMPS	257.91	327.83	465.97	521.08	585.38
Internet Banking	189.42	203.93	391.52	302.41	234.24
Mobile Banking	126.39	99.41	143.26	139.98	157.11
NACH	340.1	362.62	383.8	463.16	537.4
NEFT	274.45	309.28	404.07	528.47	711.14
NETC	58.26	132.73	244.13	340.87	385.31
Others	555.64	630.39	753.42	1103.2	1526.23
PPI	533.18	493.9	658.12	746.67	799.63
RTGS	15.07	15.92	20.78	24.26	26.37
USSD	0.1	0.1	0.12	0.17	0.26




VOLUME 0F DIGITAL PAYMENT (2021-2022)
658.12
20.78
0.12
126.88
2.27
753.42
244.13
404.07
383.8
4596.63
143.26
391.52
465.97
394.77
223.99
36.05
AEPS
BHIM Aadhaar
BHIM UPI
Closed Loop Wallet
Credit Card
Debit Card
IMPS
Internet Banking
Mobile Banking


VOLUME OF DIGITAL PAYMENT (2020-2021)
15.92
0.1
132.81
1.61
493.9
630.39
132.73
309.28
2232.96
362.62
327.83
411.49
99.41
203.93
22.87
176.47
AEPS
BHIM Aadhaar
BHIM UPI
Closed Loop Wallet
Credit Card
Debit Card
IMPS
Internet Banking
Mobile Banking


VOLUME OF DIGITAL PAYMENT (2022-2023)
1103.2
746.67
24.26
0.17
118.46
2.14
340.87
528.47
463.16
139.98
302.41
8324.04
521.08
341.95
291.56
71.46
AEPS
BHIM Aadhaar
BHIM UPI
Closed Loop Wallet
Credit Card
Debit Card
IMPS
Internet Banking
Mobile Banking



Key Findings:

BHIM UPI Transactions: Significant Growth: BHIM UPI transactions have shown exponential growth, increasing from 1,251.76 crores in 2019-2020 to 13,096.04 crores in 2023-2024. This indicates a massive adoption of UPI as a preferred digital payment method.

Year-on-Year Increase: The growth rate is consistent, with a particularly sharp rise from 2021-2022 onwards, reflecting the increasing reliance on UPI for transactions.

Mobile Banking: Moderate Growth: Mobile banking transactions have seen a moderate increase from 126.39 crores in 2019-2020 to 157.11 crores in 2023-2024. The growth is not as steep as UPI, indicating that while mobile banking is growing, it is not as rapidly adopted as UPI.

Fluctuations: There are some fluctuations, such as a dip in 2020-2021, possibly due to external factors like the COVID-19 pandemic.

Internet Banking: Variable Growth: Internet banking transactions have shown variability, peaking at 391.52 crores in 2021-2022 but then declining to 234.24 crores in 2023-2024. This suggests that while internet banking is still used, its growth is not as robust as UPI.

Potential Decline: The decline in recent years could indicate a shift towards more mobile-centric solutions like UPI.

Other Digital Services: NEFT and IMPS: Both NEFT and IMPS have shown steady growth, indicating continued use for larger transactions and interbank transfers.

Debit and Credit Cards: Debit card transactions have declined, while credit card transactions have increased, reflecting a shift in consumer behavior towards credit-based spending.

PPI (Prepaid Instruments): PPI transactions have grown steadily, indicating a preference for digital wallets and prepaid cards.

Comparative and Trend Analysis

Credit Limit Range- 0.0025 and Less

Metric	Number of Accounts	Amount Outstanding	Credit Limit	Key Interpretation
Mean	21,468,752.67	14,569.41	26,281.68	Average values, but high variability noted.

Median	6,406,634.00	7,460.19	9,188.93	Typical values are lower than averages (right-skewed).
Std. Deviation	28,104,709.85	17,289.54	33,585.45	High variability in data.
Skewness (Pos.)	1.032	1.193	1.06	Data is right-skewed; a few high values dominate.
Confidence Interval	(-8,025,331.50 to 50,962,836.83)	(-3,574.85 to 32,713.67)	(-8,964.09 to 61,527.45)	Low sample size, high variability, and possible zero means.
Overall Implication	High Variability, Limited Reliability	High Variability, Limited Reliability	High Variability, Limited Reliability	Results are highly variable and limited by small sample size. Further analysis with more data is needed.

Key Observations:

Number of Accounts: Most accounts are clustered at the lower end, with one outlier at 64,406,258.

Amount Outstanding: All cases are concentrated at the lower end, indicating smaller transactions dominate.

The data shows a strong preference for smaller credit limits and transactions, reflecting a shift toward digital banking and frequent, low-value transactions. The presence of outliers highlights the dominance of a few large accounts in the overall distribution.

Credit Limit Range- Above 0.0025 and upto 0.02

Metric	Credit Limit	Number of Accounts	Amount Outstanding	Key Interpretation
Mean	627,080.56	76,995,581.00	433,558.54	Average values, but high variability noted.
Median	424,056.52	43,184,334.50	314,180.64	Typical values are lower than averages (right-skewed).
Std. Deviation	699,395.68	87,009,766.27	476,909.38	High variability in data.
Skewness (Pos.)	1.368	1.354	1.439	Data is right-skewed; a few high values dominate.
Confidence Interval	(-106,890.18 to 1,361,051.31)	(-14,315,568.75 to 168,306,730.75)	(-66,927.16 to 934,044.24)	Low sample size, high variability, and possible zero means.
Overall Implication	High Variability, Limited Reliability	High Variability, Limited Reliability	High Variability, Limited Reliability	Results are highly variable and limited by small sample size. Further analysis with more data is needed.

Key Observations:

Credit Limit: High variability with a range from 14,936.45 to 1,881,241.69.

Number of Accounts: Wide range from 1,531,114 to 230,986,743, indicating significant differences in scale.
Amount Outstanding: Range from 7,294.15 to 1,300,675.62, with high variability.

Credit Limit Range- Above 0.02 and upto 0.05

Metric	Number of Accounts	Credit Limit	Amount Outstanding	Key Interpretation
Mean	18,485,949.33	623,185.19	407,368.83	Average values, but high variability noted.
Median	14,430,883.00	486,077.99	253,266.63	Typical values are lower than averages (right-skewed).
Std. Deviation	21,205,167.21	715,002.95	475,110.61	High variability in data.
Skewness (Pos.)	1.178	1.177	1.173	Data is right-skewed; a few high values dominate.
Confidence Interval	(-3,767,508.89 to 40,739,407.56)	(-127,164.39 to 1,373,534.76)	(-91,229.18 to 905,966.84)	Low sample size, high variability, and possible zero means.
Overall Implication	High Variability, Limited Reliability	High Variability, Limited Reliability	High Variability, Limited Reliability	Results are highly variable and limited by small sample size. Further analysis with more data is needed.

Key Observations:
Number of Accounts: High variability with a range from 854,898 to 55,457,848.
Credit Limit: Wide range from 27,820.94 to 1,869,555.56, indicating significant differences in scale.
Amount Outstanding: Range from 9,837.41 to 1,222,106.50, with high variability.

Credit Limit Range- Above 0.05 and upto 0.1

Metric	Number of Accounts	Credit Limit	Amount Outstanding	Key Interpretation
Mean	9,135,129.67	677,592.99	447,862.38	Average values, but high variability noted.
Median	6,368,410.00	461,039.06	270,043.37	Typical values are lower than averages (right-skewed).
Std. Deviation	10,651,095.85	792,083.59	529,033.35	High variability in data.
Skewness (Pos.)	1.108	1.102	1.101	Data is right-skewed; a few high values dominate.
Confidence Interval	(-2,042,509.92 to 20,312,769.25)	(-153,647.75 to 1,508,833.74)	(-107,324.07 to 1,003,048.83)	Low sample size, high variability, and possible zero means.

Overall Implication	High Variability, Limited Reliability	High Variability, Limited Reliability	High Variability, Limited Reliability	Results are highly variable and limited by small sample size. Further analysis with more data is needed.

Key Observations:

Number of Accounts: High variability with a range from 288,267 to 27,405,389.
Credit Limit: Wide range from 20,394.88 to 2,032,778.99, indicating significant differences in scale.
Amount Outstanding: Range from 9,090.42 to 1,343,587.14, with high variability.

Credit Limit Range- Above 0.1 and upto 0.25

Metric	Number of Accounts	Credit Limit	Amount Outstanding	Key Interpretation
Mean	5,391,574.00	865,222.68	632,997.84	Average values, but high variability noted.
Median	3,937,274.50	630,050.12	446,676.08	Typical values are lower than averages (right-skewed).
Std. Deviation	6,407,762.65	1,029,031.04	751,802.14	High variability in data.
Skewness (Pos.)	0.999	0.996	1.007	Data is right-skewed; a few high values dominate.
Confidence Interval	(-1,332,960.50 to 12,116,108.50)	(-214,679.17 to 1,945,124.53)	(-155,970.12 to 1,421,965.80)	Low sample size, high variability, and possible zero means.
Overall Implication	High Variability, Limited Reliability	High Variability, Limited Reliability	High Variability, Limited Reliability	Results are highly variable and limited by small sample size. Further analysis with more data is needed.

Key Observations:

Number of Accounts: High variability with a range from 109,490 to 16,174,722.
Credit Limit: Wide range from 17,809.55 to 2,595,668.05, indicating significant differences in scale.
Amount Outstanding: Range from 12,538.89 to 1,898,993.52, with high variability.

Credit Limit Range- Above 0.25 and upto 0.5

Metric	Number of Accounts	Credit Limit	Amount Outstanding	Key Interpretation
Mean	1,847,016.67	659,088.71	505,246.04	Average values, but high variability noted.
Median	1,263,368.00	450,655.61	346,853.08	Typical values are lower than averages (right-skewed).
Std. Deviation	2,223,614.93	793,435.75	607,760.34	High variability in data.
Skewness (Pos.)	0.946	0.946	0.949	Data is right-skewed; a few high values dominate.

Confidence Interval	(-486,524.09 to 4,180,557.42)	(-173,571.03 to 1,491,748.46)	(-132,559.32 to 1,143,051.41)	Low sample size, high variability, and possible zero means.
Overall Implication	High Variability, Limited Reliability	High Variability, Limited Reliability	High Variability, Limited Reliability	Results are highly variable and limited by small sample size. Further analysis with more data is needed.

Key Observations:

Number of Accounts: High variability with a range from 56,858 to 5,541,050.

Credit Limit: Wide range from 20,208.21 to 1,977,266.14, indicating significant differences in scale.

Amount Outstanding: Range from 15,429.37 to 1,515,738.13, with high variability.

Credit Limit Range-Above 0.5 and upto 1.0

Metric	Number of Accounts	Credit Limit	Amount Outstanding	Key Interpretation
Mean	652,012.00	460,689.02	347,407.28	Average values, but high variability noted.
Median	437,341.00	308,503.54	229,929.25	Typical values are lower than averages (right-skewed).
Std. Deviation	786,082.34	555,373.40	418,838.91	High variability in data.
Skewness (Pos.)	0.948	0.95	0.952	Data is right-skewed; a few high values dominate.
Confidence Interval	(-172,930.82 to 1,476,954.82)	(-122,139.62 to 1,043,517.65)	(-92,137.20 to 786,951.76)	Low sample size, high variability, and possible zero means.
Overall Implication	High Variability, Limited Reliability	High Variability, Limited Reliability	High Variability, Limited Reliability	Results are highly variable and limited by small sample size. Further analysis with more data is needed.

Key Observations:

Number of Accounts: High variability with a range from 12,929 to 1,956,036.

Credit Limit: Wide range from 8,870.39 to 1,382,067.05, indicating significant differences in scale.

Amount Outstanding: Range from 7,080.54 to 1,042,221.83, with high variability.

Credit Limit Range-Above 1.0 and upto 4.0

Metric	Number of Accounts	Credit Limit	Amount Outstanding	Key Interpretation
Mean	308,041.00	583,496.34	419,996.83	Average values, but high variability noted.
Median	169,194.50	319,959.29	230,803.52	Typical values are lower than averages (right-skewed).

Std. Deviation	376,315.31	712,527.42	512,344.99	High variability in data.
Skewness (Pos.)	1	1.004	1.006	Data is right-skewed; a few high values dominate.
Confidence Interval	(-86,877.70 to 702,959.70)	(-164,255.33 to 1,331,248.01)	(-117,676.27 to 957,669.93)	Low sample size, high variability, and possible zero means.
Overall Implication	High Variability, Limited Reliability	High Variability, Limited Reliability	High Variability, Limited Reliability	Results are highly variable and limited by small sample size. Further analysis with more data is needed.

Key Observations:

Number of Accounts: High variability with a range from 2,652 to 924,123.

Credit Limit: Wide range from 4,835.66 to 1,750,489.02, indicating significant differences in scale.

Amount Outstanding: Range from 3,544.19 to 1,259,990.48, with high variability.

Credit Limit Range- Above 4.0 and upto 6.0

Metric	Number of Accounts	Credit Limit	Amount Outstanding	Key Interpretation
Mean	36,717.67	182,086.96	124,244.50	Average values, but high variability noted.
Median	20,049.00	99,885.19	71,875.50	Typical values are lower than averages (right-skewed).
Std. Deviation	44,601.10	221,066.56	149,609.18	High variability in data.
Skewness (Pos.)	1.042	1.041	1.047	Data is right-skewed; a few high values dominate.
Confidence Interval	(-10,088.32 to 83,523.65)	(-49,908.16 to 414,082.09)	(-32,760.71 to 281,249.71)	Low sample size, high variability, and possible zero means.
Overall Implication	High Variability, Limited Reliability	High Variability, Limited Reliability	High Variability, Limited Reliability	Results are highly variable and limited by small sample size. Further analysis with more data is needed.

Key Observations:

Number of Accounts: High variability with a range from 216 to 110,153.

Credit Limit: Wide range from 1,074.93 to 546,260.89, indicating significant differences in scale.

Amount Outstanding: Range from 700.37 to 372,733.49, with high variability.

Credit Limit Range-Above 6.0 and upto 10.0

Metric	Number of Accounts	Credit Limit	Amount Outstanding	Key Interpretation
Mean	26,168.00	214,761.58	139,791.83	Average values, but high variability noted.
Median	15,049.00	123,199.33	83,692.37	Typical values are lower than averages (right-skewed).
Std. Deviation	31,501.61	258,645.71	167,297.27	High variability in data.
Skewness (Pos.)	1.056	1.055	1.059	Data is right-skewed; a few high values dominate.
Confidence Interval	(-6,890.91 to 59,226.91)	(-56,670.44 to 486,193.60)	(-35,775.89 to 315,359.55)	Low sample size, high variability, and possible zero means.
Overall Implication	High Variability, Limited Reliability	High Variability, Limited Reliability	High Variability, Limited Reliability	Results are highly variable and limited by small sample size. Further analysis with more data is needed.

Key Observations:

Number of Accounts: High variability with a range from 144 to 78,504.

Credit Limit: Wide range from 1,174.16 to 644,284.73, indicating significant differences in scale.

Amount Outstanding: Range from 749.75 to 419,375.50, with high variability.

Credit Limit Range- Above 10.0 and upto 25.0

Metric	Number of Accounts	Credit Limit	Amount Outstanding	Key Interpretation
Mean	22,930.67	379,732.57	233,521.64	Average values, but high variability noted.
Median	13,861.50	230,406.05	150,402.24	Typical values are lower than averages (right-skewed).
Std. Deviation	27,319.56	452,424.32	275,403.49	High variability in data.
Skewness (Pos.)	1.08	1.076	1.096	Data is right-skewed; a few high values dominate.
Confidence Interval	(-5,739.45 to 51,600.78)	(-95,057.63 to 854,522.78)	(-55,496.60 to 522,539.88)	Low sample size, high variability, and possible zero means.
Overall Implication	High Variability, Limited Reliability	High Variability, Limited Reliability	High Variability, Limited Reliability	Results are highly variable and limited by small sample size. Further analysis with more data is needed.

Key Observations:

Number of Accounts: High variability with a range from 99 to 68,792.

Credit Limit: Wide range from 1,648.76 to 1,139,197.72, indicating significant differences in scale.
Amount Outstanding: Range from 992.42 to 700,564.93, with high variability.

Credit Limit Range- Above 25.0 and upto 100.0

Metric	Number of Accounts	Credit Limit	Amount Outstanding	Key Interpretation
Mean	14,189.00	710,652.49	379,460.45	Average values, but high variability noted.
Median	10,057.00	514,174.01	291,187.64	Typical values are lower than averages (right-skewed).
Std. Deviation	16,578.82	829,808.62	438,366.31	High variability in data.
Skewness (Pos.)	1.101	1.097	1.136	Data is right-skewed; a few high values dominate.
Confidence Interval	(-3,209.40 to 31,587.40)	(-160,178.25 to 1,581,483.22)	(-80,576.78 to 839,497.67)	Low sample size, high variability, and possible zero means.
Overall Implication	High Variability, Limited Reliability	High Variability, Limited Reliability	High Variability, Limited Reliability	Results are highly variable and limited by small sample size. Further analysis with more data is needed.

Key Observations:

Number of Accounts: High variability with a range from 45 to 42,567.
Credit Limit: Wide range from 2,341.37 to 2,131,957.46, indicating significant differences in scale.
Amount Outstanding: Range from 1,059.66 to 1,138,381.34, with high variability.

Credit Limit Range- Above 100.0

Metric	Number of Accounts	Credit Limit	Amount Outstanding	Key Interpretation
Mean	5,630.67	2,664,129.89	1,551,872.52	Average values, but high variability noted.
Median	3,886.00	1,459,888.45	685,932.49	Typical values are lower than averages (right-skewed).
Std. Deviation	6,636.87	3,268,321.60	1,968,829.83	High variability in data.
Skewness (Pos.)	1.068	0.997	0.988	Data is right-skewed; a few high values dominate.
Confidence Interval	(-1,334.30 to 12,595.63)	(-765,763.28 to 6,094,023.06)	(-514,287.67 to 3,618,032.70)	Low sample size, high variability, and possible zero means.

Overall Implication	High Variability, Limited Reliability	High Variability, Limited Reliability	High Variability, Limited Reliability	Results are highly variable and limited by small sample size. Further analysis with more data is needed.

Key Observations:

Number of Accounts: High variability with a range from 8 to 16,892.

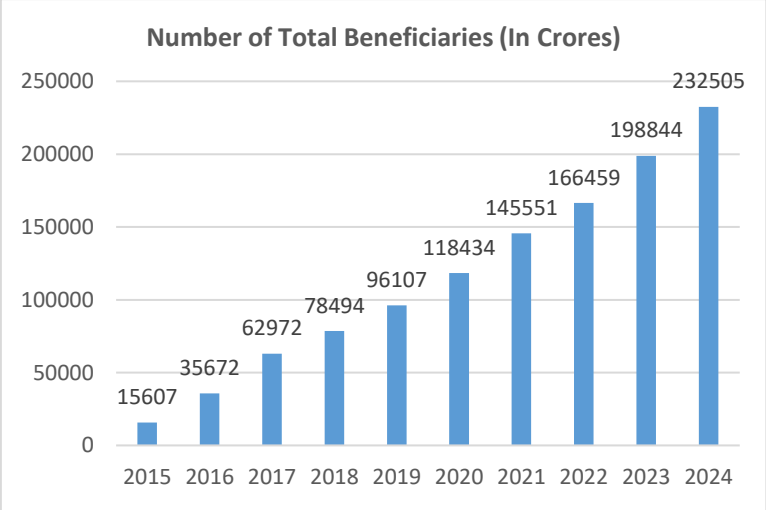
Credit Limit: Wide range from 1,497.75 to 7,992,389.67, indicating significant differences in scale.

Amount Outstanding: Range from 884.82 to 4,655,617.55, with high variability.

Bar Chart Analysis

Number of Total Beneficiaries:

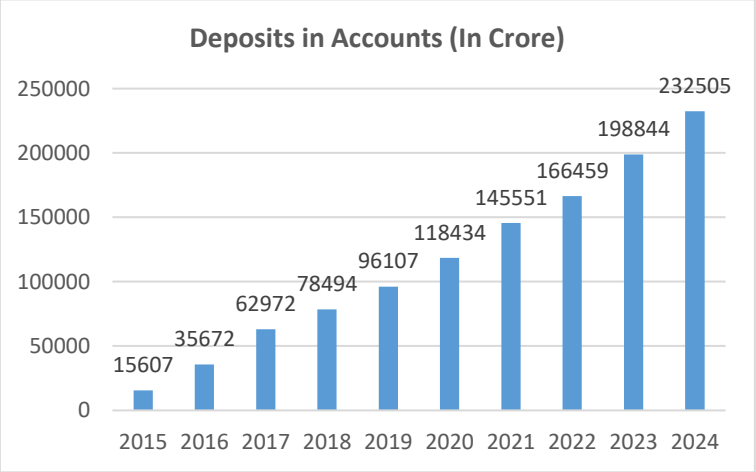
Year	Number of Total Beneficiaries (In Crores)	Yearly Growth
2015	14.76	0
2016	21.43	45.58%
2017	28.17	31.45%
2018	31.4	11.47%
2019	35.27	12.32%
2020	38.33	8.68%
2021	42.42	10.10%
2022	45.06	6.78%
2023	48.65	7.97%
2024	51.94	6.76%



The statistics depict varying annual growth rates among beneficiaries, reaching its highest in 2016 (45.58%) and reaching 6.76% in 2024. In spite of this, the overall number of beneficiaries continued to increase consistently, fueled by increased government schemes, financial inclusion, and lenient eligibility. Economic conditions (e.g., 2016 adversity, 2020 pandemic) and policy adjustments are significant drivers. Decreasing growth after 2016 indicates possible saturation or changing policy focus, but consistent overall growth underscores the continuous influence of social programs.

Deposits in Accounts:

Year	Deposits in Accounts (In Crore)	Yearly Growth
2015	15607	
2016	35672	128.56%
2017	62972	76.53%
2018	78494	24.65%
2019	96107	22.44%
2020	118434	23.23%
2021	145551	22.90%
2022	166459	14.36%
2023	198844	19.46%
2024	232505	16.93%

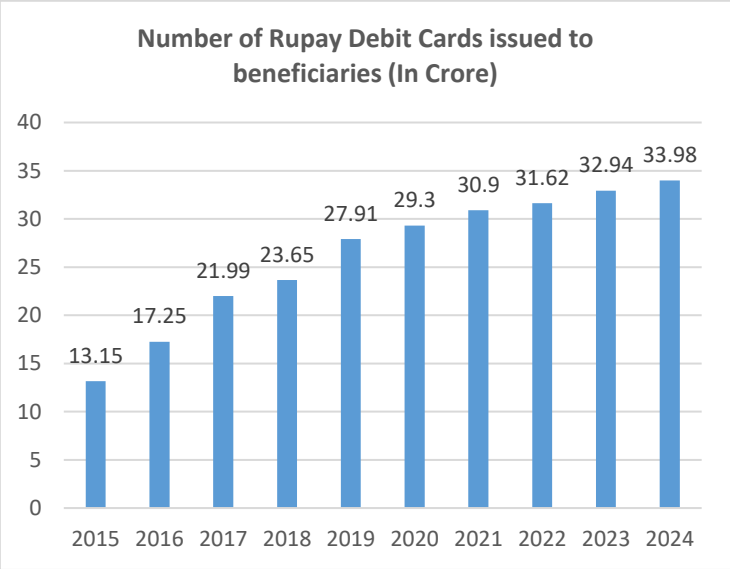


The figures reveal volatile annual growth rates in deposits, highest in 2016 (128.56%) and as low as 16.93% by 2024. Even with this, the amount deposited increased consistently due to enhanced benefits, direct benefit payments, and improving incomes. Government programs (e.g., 2016 measures), economic expansion, and policy changes (e.g., interest rates, salary rises) are primary drivers. The decelerating growth after 2016 indicates saturation or economic changes, but steady growth in deposits emphasizes the persistent effect of financial inclusion and income expansion.

Number of Rupay Debit Cards issued to beneficiaries:

Year	Number of Rupay Debit Cards issued to beneficiaries (In Crore)	Yearly Growth
2015	13.15	
2016	17.25	34.98%
2017	21.99	23.89%
2018	23.65	7.55%
2019	27.91	18.01%
2020	29.3	4.98%
2021	30.9	5.46%
2022	31.62	2.33%

2023	32.94	4.17%
2024	33.98	3.16%



The figures indicate varying annual growth rates in RuPay debit card issuance, highest in 2016 (34.98%) and lowest in 2022 (2.33%). Notwithstanding, the number of cards issued increased consistently, buoyed by government efforts (e.g., Jan Dhan Yojana, UPI integration), economic sentiments, and demographics. The important drivers are financial inclusion initiatives, economic growth, and policy realignments. The decelerating growth after 2016 indicates early saturation, but consistent increases indicate the continued effect of government initiatives and increasing financial access.

Findings, Suggestion and Conclusion

Findings:

a. Pie Chart Analysis (Digital Payment Transactions):

BHIM UPI Transactions: Exponential growth from 1,251.76 crores (2019-2020) to 13,096.04 crores (2023-2024).

Rapid increase from 2021-2022, reflecting UPI as the chosen digital payment instrument.

Mobile Banking: Gradual growth from 126.39 crores (2019-2020) to 157.11 crores (2023-2024).

Ups and downs are seen, with a fall in 2020-2021, presumably on account of the COVID-19 pandemic.

Internet Banking: Mixed growth, peaking at 391.52 crores (2021-2022) but dropping to 234.24 crores (2023-2024).

Decline indicates a trend towards mobile-oriented solutions such as UPI.

Other Digital Services:

NEFT and IMPS: Consistent growth, which suggests ongoing usage for higher value transactions and interbank transfers.

Debit and Credit Cards: Debit card transactions fell, whereas credit card transactions rose, indicating a movement towards credit-based expenditure.

PPI (Prepaid Instruments): Consistent growth, which shows preference for prepaid cards and digital wallets.

b. Comparative and Trend Analysis (Credit Limit Ranges):

General Observations across All Credit Limit Ranges

- High Variability: Right-skewed data with few high-value accounts dominating the distribution.
- Limited Reliability: Limited sample sizes and high variability constrain the reliability of the findings.
- Shift Towards Digital Banking: Strong demand for smaller credit limits and transactions, indicative of a trend towards low-value, frequent digital transactions.

Key Findings by Credit Limit Range:

- Lower Credit Limits (0.0025 and below): Accounts mostly grouped at the lower end, with smaller transactions prevalent.
- Mid-Range Credit Limits (0.0025 to 0.5): High variation in the count of accounts, credit limits, and outstanding amounts. Large differences in size, with some big accounts dominating the data.
- Higher Credit Limits (Above 0.5): Still high variation, with broad ranges for credit limits and outstanding amounts. Right-skewed data shows predominance by a few big-value accounts.

c. Bar Chart Analysis:

- Number of Total Beneficiaries: Maximum growth rate in 2016 (45.58%), minimum in 2024 (6.76%). Sustained annual growth in beneficiaries owing to government programmes, financial inclusion, and liberalized eligibility rules. Growth rates were influenced by economic conditions (e.g., 2016 adversity, 2020 pandemic) as well as by policy changes. Slowing down of growth after 2016 implies possible saturation or change of policy emphasis.
- Deposits in Accounts: Maximum growth rate in 2016 (128.56%), minimum in 2024 (16.93%). Consistent growth in deposits, fueled by enhanced benefits, direct benefit transfer, and income rise. Government schemes (e.g., 2016 schemes) and economic expansion were major propellants. Declining growth after 2016 reflects possible saturation or economic realignments.
- RuPay Debit Cards Issued: Maximum growth rate in 2016 (34.98%), lowest in 2022 (2.33%). Continuous card issuance growth, propelled by government initiatives (e.g., Jan Dhan Yojana, UPI integration) and economic trends. Declining growth after 2016 reflects preliminary saturation, but ongoing growth indicates the influence of financial inclusion initiatives.

Conclusion:

- Digital Transformation is Reshaping Banking: The rapid growth of UPI and the consistent uptake of mobile and internet banking underscore the revolutionary effect of digital technologies on the Indian banking industry. Government initiatives such as Digital India and PMJDY have been instrumental in promoting digital payment adoption and financial inclusion.
- Shift Towards Digital and Credit-Based Transactions: The reduction in debit card transactions and increase in credit card usage depict a change in consumer behavior towards credit consumption.Use of lower credit limits and repeated transactions signify a trend towards low-value transactions and digital banking.
- Saturation and Policy Changes: Slowing growth in beneficiaries, deposits, and RuPay card issuance after 2016 indicate possible saturation in some segments and the necessity for policy changes to maintain growth.
- Financial Inclusion and Economic Conditions: Economic conditions, including the 2016 economic downturn and the 2020 pandemic, had a major impact on the development of digital payments and

financial inclusion. Government schemes and financial inclusion efforts have proved to be effective in increasing the number of people in the formal banking system.

Suggestions:

- Improving Digital Payment Infrastructure: Policymakers need to work on strengthening the infrastructure for digital payments, especially for UPI, to maintain its growth and make it reliable. Security issues and trust in digital payment platforms need to be addressed.
- Promoting Financial Literacy: Financial literacy programs specifically aimed at educating consumers, particularly rural and underpenetrated areas, regarding the advantages and safe usage of digital payments should be launched. Credit management and judicious usage of credit-based financial products need to be highlighted in financial literacy efforts.
- Facilitating Innovation in Digital Banking: Banks and fintech companies must keep innovating and creating easy-to-use digital banking products that address the needs of various consumer segments. Focus must be on improving the user experience and making digital transactions secure.
- Policy Changes for Long-Term Growth: Policy makers must look at amending eligibility criteria and broadening the coverage of government schemes to benefit more people and ensure long-term growth in digital payments. Regulatory systems must be revised to meet new challenges in the digital banking sector, including cybersecurity threats and data protection issues.
- Emphasis on Inclusivity: There should be an effort to make digital banking services available to all sections of society, even those with limited digital knowledge or access to technology. Particular emphasis must be placed on disadvantaged groups, like women and rural communities, to ensure inclusive financial development.

With these areas addressed, the Indian banking industry can continue to capitalize on digital transformation to improve financial inclusion, operational effectiveness, and customer satisfaction while overcoming challenges of cybersecurity threats and infrastructural challenges.

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