Green Banking in the Face of Global Crises: Customer Perceptions, Climate Change Mitigation, and Pandemic-Driven Growth

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ARTICLE INFO	ABSTRACT
	Adopting sustainable financial practices is becoming increasingly important as climate change continues to pose serious hazards to global economies and financial systems. This study examines the connection between the development of green banking—a tactical method for encouraging social and environmental responsibility in the financial industry—and climate change. This study examines the Compound Annual Growth Rate (CAGR) of the primary digital banking services—NEFT, RTGS, mobile banking, POS, credit cards, and debit cards— to gauge the advancement of green banking (GB) practices. It does this by examining primary and secondary data, especially from the Reserve Bank of India (RBI). The results show that green banking is well viewed by the public, emphasizing its contribution to climate resilience and environmental preservation. According to the report, green banking is an essential instrument for raising environmental awareness among people and organizations, in addition to being an environmentally responsible financial option. In the end, the study promotes wider adoption of sustainable banking practices and advances knowledge of green finance as a tool to fight climate change. **Keywords:** - Green Banking, Climate Change, Financial Sustainability, CAGR, RBI, Digital Banking, Environmental Finance, NEFT, RTGS, Green Finance, Eco-Friendly Banking Practices

1. Introduction

The pursuit of the worldwide population's expanding demands and requirements has been driven by worldwide industrialization, and it continues to grow, indicating the growth and development of an economy. However, it has contributed to the depletion of the environment, resulting in the disturbance of the delicate ecological balance. The interference with the ecological equilibrium has harmed people and their surroundings. The current disasters from nature and accidents at work that happened in the prior thirty years have been linked either directly or indirectly with unequal industrialization. In turn, this has brought up significant concerns about safeguarding the environment. Officials from the government and conservationists are part of an international association. Environmental responsibility and environmentally friendly growth have become key items on the global agenda. Several conference activities, such as the United Nations Environment Program and the Earth Summit, have been organized to raise awareness of this grave challenge. Various organizations and governments have begun implementing multiple initiatives for the cause of sustainable development and environmental protection as they realize the importance of human well-being. Because combining the elements of social, economic, and ecological sustainability helps make advancement environmentally friendly, environmental sustainability is essential to achieving sustainable development and growth. Most businesses in advanced countries have included the preservation of the environment in their strategies and started to provide their customers with environmentally conscious or "green" goods and services. Indian organizations implemented environmentally friendly methods of organization after studying Western organizations. However, the concept of environmentally friendly and sustainable goods and services is relatively recent to a nation growing like India. Yadav et al. (2013) noted that, around the world—particularly in India—safeguarding the environment and promoting sustainable growth have become increasingly

significant. The banking industry represents one of many sectors that are important to these initiatives. The Reserve Bank of India (RBI) recently issued recommendations and guidelines for motivating banks to use green banking practices. This covers suggestions for evaluating hazards to the environment, funding initiatives utilizing energy from renewable sources, and promoting sustainable lending techniques. The banking industry can significantly contribute to achieving environmental protection and sustainable development goals while also improving its sustainability over time by using green banking practices. A banking technique called "green banking," frequently referred to as "sustainable banking" or "ethical banking," places importance on social and environmental responsibility while making financial decisions. Besides promoting sustainability and minimizing negative impacts on the natural world and society, green banks also aim to take economic viability into account. Promoting sustainable development through supporting green endeavours and initiatives like renewable energy, environmentally friendly agriculture, environmentally friendly transportation, and waste disposal is one of the main foundations of GB. By assisting initiatives that improve social well-being, such as those that promote affordable housing, medical care, and education, green banks enhance social responsibility. Hadi et al. (2023) define green banking as any form of banking that is environmentally friendly, encompassing practices that promote environmentally conscious behavior and reduce the carbon footprint of financial transactions. Kapoor et al. (2016) observed that many modern banks are making concerted efforts to integrate advanced, ecologically beneficial green banking initiatives into various aspects of their everyday operations. According to Agarwal et al. (2009), the term "green banking" has become increasingly prevalent with the growing interest in green finance. Scholars have examined the concept from various perspectives, including its application and its impact on long-term sustainability. Customers are becoming more aware of green banking, and consumer satisfaction within the banking industry is notably strong. The acceptance of green banking, customer views and opinions about green financial services, and the use of green banking as an environmental leadership tool will all be affected by customer loyalty to green banking features, their satisfaction with aspects of efforts, and overall consumer contentment with green banking. As a result, learning fresh knowledge regarding many facets of green banking has grown into a habit and a necessity. Sharma et al. (2022) noted that, beyond the concept of "green banking", the research of Lucas and Spilter explores the widely accepted notion of "customer satisfaction". The purpose of this research is to explore the expansion of green banking and evaluate public perceptions of its effectiveness in addressing climate change within Bareilly city. It also endeavours to understand the impact of green banking measures on promoting environmental responsibility and sustainable financial behavior.

2. Literature Review

"Green banking" is the practice of carrying out banking operations in places and ways that allow an overall reduction in internal as well as external carbon emissions. Banks ought to promote projects that use renewable resources and reduce pollutants to help reduce global carbon emissions. Banks are expected to use less energy overall (such as for air conditioning, lighting, and other electronic/electrical machinery) to reduce their carbon footprint. Rahman et al. (2013) report that usage of green banking products varies significantly across age groups, as younger individuals tend to be more environmentally conscious than those in middle-aged and senior demographics. According to Bibhu et al. (2016), there is a necessity to enhance knowledge about green banking among individuals in the middle-aged and senior age groups. The goals of this research were to evaluate and collect empirical information on the impact of green banking adoption on the link between corporate social responsibility and maintaining operations for financial institutions listed on the Indonesia Stock Exchange. Gusti et al. (2017) conclude the study by providing recommendations to enhance green banking practices, drawing on insights from various research conducted in developed countries. According to Chen et al. (2018), banks serve as key catalysts for economic development, positioning Indian banks to significantly contribute to the widespread implementation of green banking practices across the nation. The goal of the current research is to examine the idea and significance of green banking. Additionally, an effort has been made to research the various green banking adoption tactics. Dikau et al. (2018) found that financial ownership and the number of directors positively influence the extent of disclosure related to green banking. However, our research reveals no relationship between the disclosure of green finance and the number of independent members on the board. These findings have significant policy-related implications for government officials and other decision-makers. Bose et al. (2018) aim to propose a theoretical framework that accurately represents the features of green banking operations and their relationship to overall consumer satisfaction with environmentally friendly banking. Green banking initiative characteristics related to security and trust, ease and convenience of use, value creation, and environmental and social concern have been included in the model as distinct variables. These factors have been designed to influence how satisfied consumers are with green banking. Herath et al. (2019) identified six distinct dimensions of green banking: conceptual, legal, stakeholders, model, shareholder performance of financial institutions, and economic. The study also highlights that despite growing interest, only 178 articles were found across various portals, indicating that much remains to be explored in this field. Since 2011, there has been a rise in research interest in green banking, which peaked in 2015. The standard deviation of the annual growth rate of studies on green banking is 25.44%. According to Sharma et al. (2019), green banking is acknowledged as a recent development in the financial sector; the general bank customers remain largely unaware of such initiatives, as indicated by

their methodical examination. The primary concern individuals have is information security, and it has been shown that using greener banking services would save you time right away. However, a thorough examination of the issue within the Nepali national context is needed. Rekha et al. (2019) applied the theory of change conceptual framework at the sectoral, organizational, and combined levels to identify the challenges of green banking and explore the necessary actions to overcome them and achieve desired outcomes. The study by Park et al. (2020) investigates the link between climate variables and green banking progress across Brazil, Russia, India, China, and South Africa from 1990 to 2018. Using unit root tests, cointegration tests, FMOLS, DOLS, and Granger causality methods, the study examines longterm interactions between environmental factors and green banking growth in these emerging economies. The results indicate that both carbon dioxide emissions and renewable electricity sources significantly and positively influence green banking development, as shown by dynamic and fully adjusted standard least-squares estimation methods. Ngong et al. (2020) conducted research using secondary data collected from various sources, including newspaper articles and reports on green banking in Bangladesh, annual and quarterly reports, websites of commercial banks and non-bank financial institutions, as well as information from the Central Bank of Bangladesh. Khairunnesso et al. (2021) noted that the concept of "Green Banking" gained significant prominence in the early 2000s, aligning with the growing adoption of sustainable practices and policies by many financial institutions worldwide. The concept of Green Banking encompasses the implementation of sustainable development principles within the realm of financial services, products, and operations. Rehman et al. (2021) examined the progress of Indonesian financial institutions in sustainable and green banking over nine years, using data from sustainability reports. The study's findings reveal that disclosures concerning sustainability and green finance have been steadily evolving, reflecting ongoing improvements in transparency and environmental responsibility within the financial sector. According to Jutai (2021), the concept of Green Banking encompasses a diverse range of initiatives, including the provision of financial support for renewable energy projects, the enhancement of energy efficiency in both infrastructure and operational processes, the promotion of sustainable business practices, and the incorporation of environmental risk assessment into loan decisionmaking processes. The study conducted by Hasan et al. (2021) indicates that green banking relies on the principle of sustainable development, with a focus on meeting present needs while safeguarding the ability of future generations to meet their own needs. Green banking acknowledges the interconnectedness of the economy, society, and environment, aiming to achieve a harmonious equilibrium in banking activities and decision-making. Chen et al. (2022) examine the role of climate change awareness in influencing pro-environmental consumer attitudes and purchasing behaviour. The study, conducted in May 2021 with a sample of 1,000 Polish citizens, situates its analysis within the context of Poland's status as one of the most environmentally detrimental industrial sectors among OECD countries. Employing objective variable analysis and categorical logistic regression, the findings demonstrate that heightened understanding of global warming significantly enhances pro-climate purchasing tendencies, underscoring the importance of environmental literacy in fostering sustainable consumption patterns. Lukasz et al. (2022) conducted an in-depth review of the literature, which highlights the importance of GB as a spur for environmentally friendly growth and a tool for minimizing the effects of warming temperatures. It highlights the need for financial companies and banks to prioritize and embrace best practices to ensure long-term profitability, environmental stewardship, and social responsibility—all of which will eventually contribute to a sustainable and prosperous future. Maitham et al. (2023) report that the adoption of environmentally sustainable banking technologies—such as chatbots, facial recognition systems, and fraud detection mechanisms—significantly strengthens bank stability and enhances institutional responsiveness to climate change initiatives. Moreover, the study finds that these technologies partially and positively mediate the relationship between AI-driven green financial innovations and bank stability, a conclusion further corroborated by Elshamly et al. (2023).

3. Research Methodology Research gap

There is still a significant knowledge gap on consumer perception and their active role in implementing green banking practices. However, much research has examined green banking mainly through the prism of environmental sustainability and institutional initiatives toward sustainable development. The majority of the research now in publication concentrates on the environmental advantages and banks' strategic use of them, frequently ignoring how consumers view green banking as a safety net for their finances and personal lives, particularly in light of climate change. Furthermore, not much research has examined how consumers' immediate advantages—like ease, financial savings, and digital empowerment—affect their propensity to switch from conventional to green banking platforms. Furthermore, studies using secondary data have assessed the expansion of green banking using factors like card usage, POS, RTGS, NEFT, and mobile banking. Examining how these factors changed during pivotal times like the COVID-19 epidemic and how much they helped consumers and the environment in times of crisis, however, has received little scholarly attention. By integrating primary and secondary data, this study seeks to close this knowledge gap by offering a thorough grasp of consumer perception, the real advantages for end users, and the development trajectory of green banking in the face of global obstacles.

Research Question
1. How much do customers know about and think about green banking?
2. What advantages do clients see in using green banking services?
3. In what ways have the components of green banking (RTGS, NEFT, etc.) expanded recently?
4. What impact has green banking had on consumers' environmental responsibility?
5. How did the COVID-19 epidemic affect the uptake and expansion of green banking services?

Research Objective
1. To investigate how consumers see green banking
2. To determine the main advantages of green banking as seen by clients.
3. To use secondary data to evaluate the expansion of green banking variables (POS, RTGS, NEFT, mobile banking, credit card, and debit card).
4. To investigate how consumer behavior in green banking helps mitigate climate change.
5. To assess how green banking supported sustainable and safe banking during the COVID-19 epidemic.

Based on the above research objective, we define the research hypothesis statements as follows; H_1: Customers' perceptions of green banking are overwhelmingly good.

H_2: Consumers believe that green banking offers a wide range of advantages for both the environment and themselves.

H_3: Over the past few years, there has been a notable increase in green banking variables such as POS, RTGS, NEFT, and mobile banking.

H_4: By promoting sustainable consumer behavior, green banking helps mitigate the effects of climate change.

H_5: The uptake of green financial services was further accelerated by the COVID-19 pandemic. **Research**

Design
To investigate consumer views of green banking and evaluate the development of green banking variables, this study uses a descriptive and analytical research design, integrating primary and secondary data sources. Both qualitative and quantitative methods are used to guarantee a comprehensive grasp of the subject.

Study area and sample
Customers in Uttar Pradesh were given a structured questionnaire to complete to collect primary data. The study included 200 responders in total. Closed-ended questions on a 5-point Likert scale were used in the survey to gauge consumer perceptions, awareness, and perceived advantages of green banking services. To ensure the inclusion of a wide set of bank customers who are familiar with digital and green banking services, a non-probability convenience and purposive sample technique was employed for participant selection. The Reserve Bank of India (RBI) website and other official banking portals served as the source of secondary data. In order to examine the evolution of green banking over time, the study concentrated on important green banking

Statistial tools
A variety of statistical techniques are used in this study's data analysis to guarantee a thorough comprehension of the results. Customer perception data is analysed using descriptive statistics, such as Mean and Standard Deviation (S.D.), which reveal information about the responses' central tendency and variability. The Compound Annual Growth Rate (CAGR), which provides a transparent indicator of year-over-year advancement, is used to analyze the growth trend of green banking variables over the past few years. To improve clarity and visual interpretation, data is also presented via tabulation and graphical representation. Depending on the appropriateness and characteristics of the data, inferential statistical methods like correlation analysis or t-tests are used when appropriate to identify significant differences or correlations between variables.
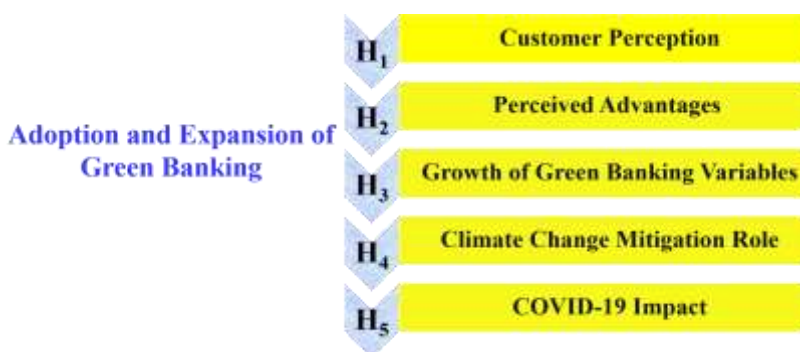

Figure 1.1: Conceptual framework

The study's theoretical framework, which combines sustainability and behavioural theories to explain the uptake and growth of green banking practices, is shown in Figure 1.1 Five independent variables make up the model: the Theory of Planned Behavior-based Customer Perception (H_1), the Value-Belief-Norm Theory-based Perceived Advantages (H_2), the Diffusion of Innovations-based Growth of Green Banking Variables (H_3), the Ecological Modernization-based Climate Change Mitigation Role (H_4), and the Crisis-Induced Behavioural Change Model-based COVID-19 Impact (H_5). The dependent variable in the framework, the adoption and expansion of green banking, is thought to be directly impacted by each of these elements. This framework illustrates how the transition to ecologically conscious banking practices is influenced by a variety of factors, including consumer attitudes, perceived advantages, technological adoption patterns, environmental concerns, and outside crises. The model is strong for analysing green banking in the contemporary socioeconomic and environmental context since it integrates several theories to provide a comprehensive knowledge of behavioural intentions as well as external causes.

Table 1.1 Descriptive Statistics (Respondent profile table)

Variables	Attributes	Frequency	Percent	Variables	Attributes	Frequency	Percent
Bank name	BOB	26	13.0	**Gender**	Male	94	47.0
	Canara bank	24	12.0		Female	106	53.0
	SBI	36	18.0		**Total**	**200**	**100.0**
	ICICI	17	8.5	**Respondent occupation**	Student	84	42.0
	AXIS	20	10.0		Public sector	30	15.0
	HDFC	19	9.5		Private sector	55	27.5
	PNB	37	18.5		Business	31	15.5
	Kotak Mahindra	21	10.5		**Total**	**200**	**100.0**
	Total	**200**	**100.0**	**Respondent income**	0- 20000	130	65.0
Experience with green banking	0-4	56	28.0		20000- 40000	63	31.5
	5-9	75	37.5		40000- above	7	3.5
	10-14	65	32.5		Total	200	100.0
	15-20	4	2.0	**Awareness of GB**	Yes	194	97.0
	Total	200	100.0		No	6	3.0

The 200 respondents' professional and demographic traits are compiled in Table 1.1. The percentage of females was slightly larger (53.0%) than that of males (47.0%). Numerous banks were represented among the respondents, with Punjab National Bank (18.5%) and State Bank of India (18.0%) having the most presence. Bank of Baroda (14.0%), Kotak Mahindra (10.5%), Axis Bank (10.0%), HDFC Bank (9.5%), ICICI Bank (8.5%), and Canara Bank (12.0%) were next in line. According to occupation, students made up the largest group (42.0%), followed by workers in the private sector (27.5%), entrepreneurs (15.5%), and public sector workers (15.0%). 65.0% of the income was between ₹1 and ₹20,000 per month, 31.5% was between ₹20,000 and 40,000, and just 3.5% was over ₹40,000, according to the income distribution. 32.5% had 10–14 years, 28.0% had 0–4 years, 37.5% had 5–9 years, and just 2.0% had 15–20 years of expertise in green banking. 97.0% of respondents reported being familiar with green banking, indicating a remarkably high level of awareness.
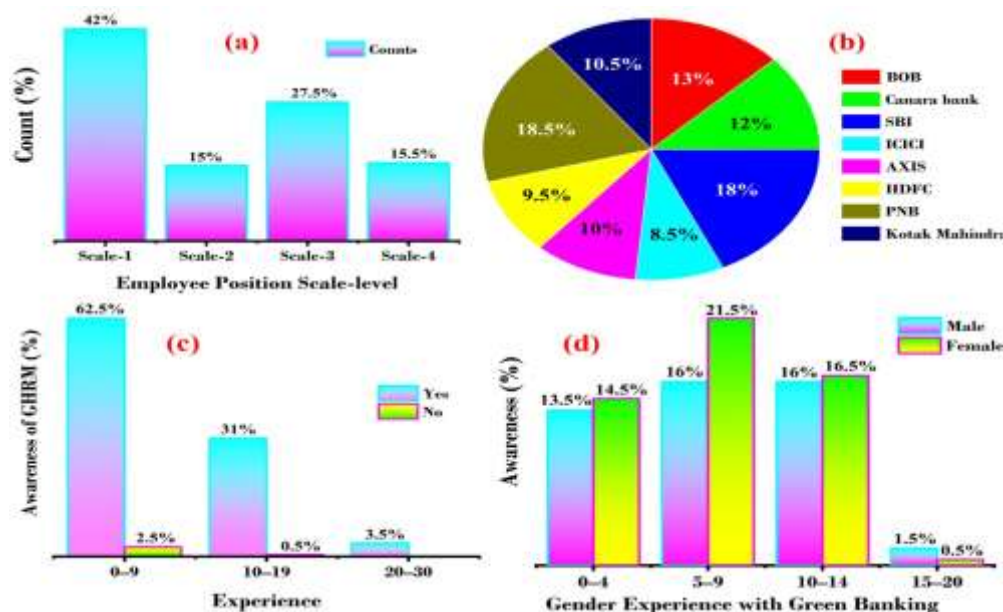
Figure 2: Respondent profile: (a) Employee Position Scale-level Distribution – Respondent percentages across different organizational scales (Scale-1 to Scale-4), **(b)** Bank-wise Distribution of Respondents – Percentage distribution of respondents according to their associated banks, **(c)** Awareness of Green Human Resource Management (GHRM) – Awareness levels categorized by gender and years of experience with Green Banking, and **(d)** Gender-wise Distribution of Respondents – Proportion of male and female respondents in the sample.
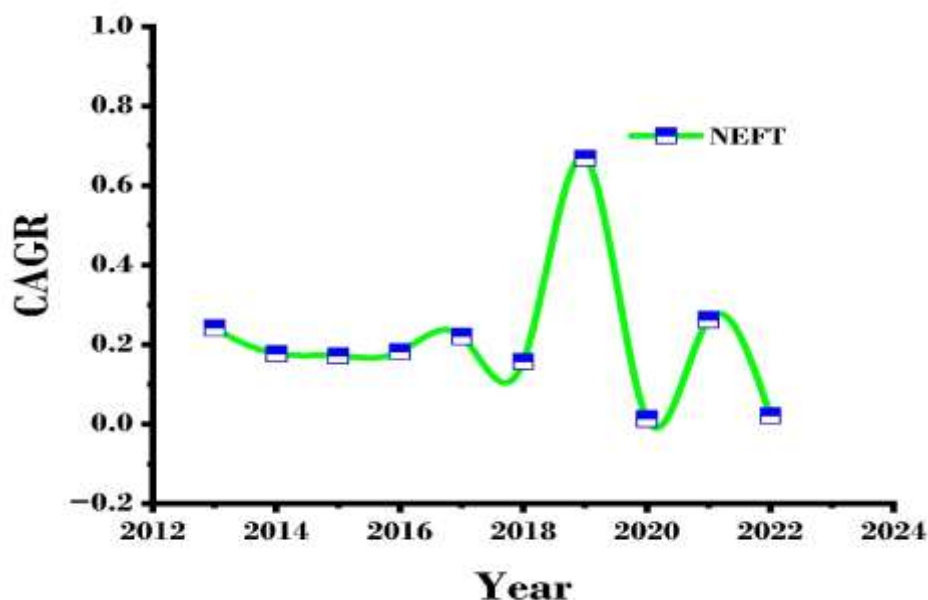
4. Results

Figure 4.1: Trend of NEFT Growth Rate from 2012 to 2022

From 2012 to 2022, the NEFT growth trend was relatively steady until 2018, after which it abruptly declined in 2019, suggesting a brief slowdown in transaction volumes. A robust rebound from 2020 peaked in 2021, most likely due to a rise in the use of digital payments during the COVID-19 pandemic. Despite slowing down in 2022, growth was still higher than the harmful 2019 levels, indicating a continued reliance on NEFT as a digital transaction method.
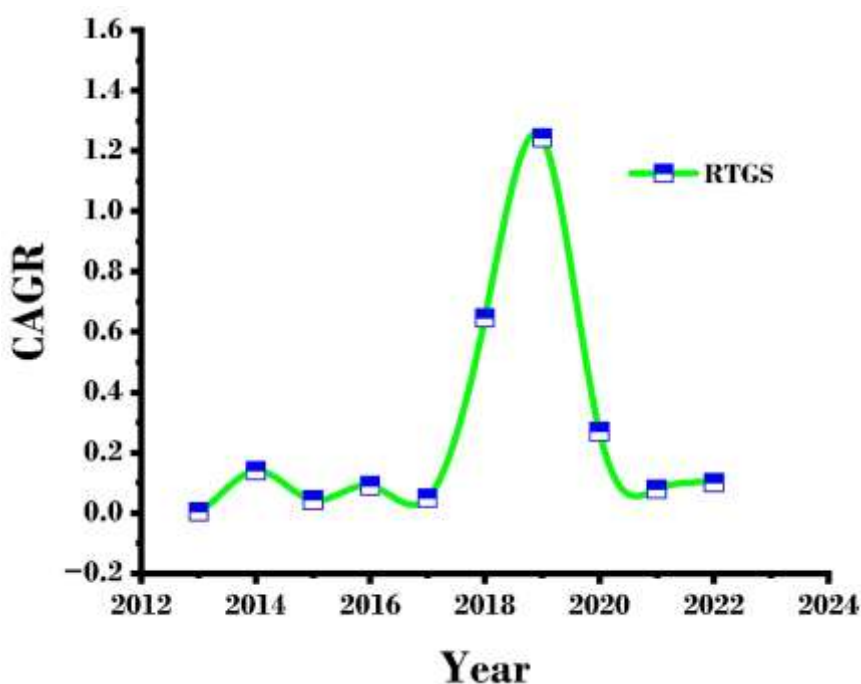

Figure 4.2: Trend of RTGS Growth Rate from 2012 to 2022

The RTGS system's utilization or acceptance started to increase steadily and favourably on the graph, and the utilization or expansion of the RTGS system seems to have slowed down in 2018. The graph demonstrates that the RTGS system began a phase of steady development throughout the peak of the pandemic. This might be the result of continued efforts to increase the efficiency and accessibility of the RTGS system, as well as the steady acceptance of electronic banking and online payment options.
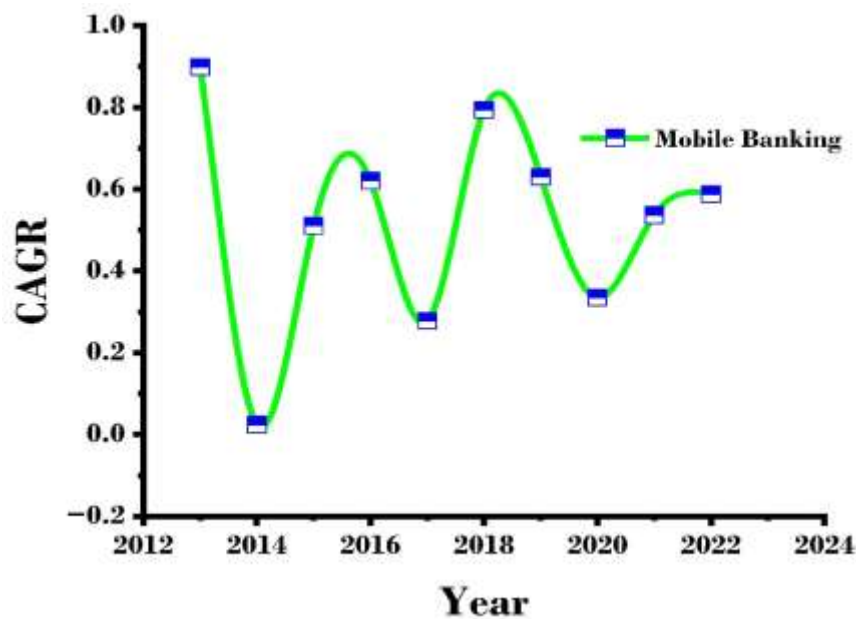

Figure 4.3: Trend of Mobile Banking Growth Rate from 2012 to 2022

The graph shows that mobile banking has grown consistently and positively since that time. During the COVID-19 pandemic, there was an apparent rise in the use of mobile banking. This can be attributed to several factors, such as the need for contactless transactions to reduce the virus's capability to propagate, lockdowns and other restrictions that restricted the capacity of individuals to enter banks physically, and increasing awareness of online banking options. After the pandemic, the growth of mobile banking continued, and the idea of conducting transactions without cash is becoming increasingly accepted, which is in keeping with the expansion of mobile banking. The adoption of mobile banking is expected to increase as more people become more comfortable with online financial transactions.
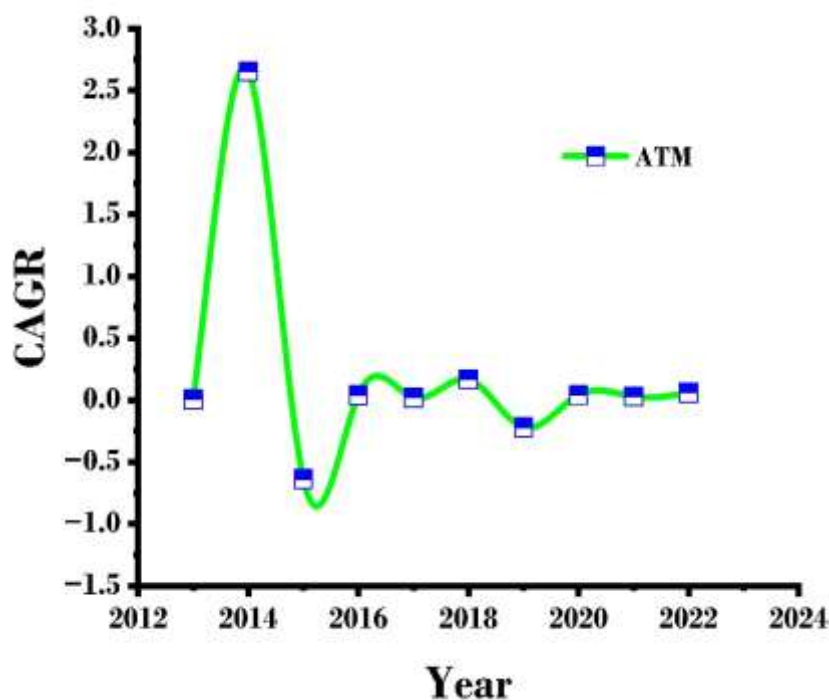

Figure 4.4: Trend of ATM Growth Rate from 2012 to 2022

The graph shows that over time, the number of individuals using ATMs has risen significantly and rapidly. The ease of obtaining cash and carrying out financial transactions without having to go to a real bank location may be responsible for this rise.
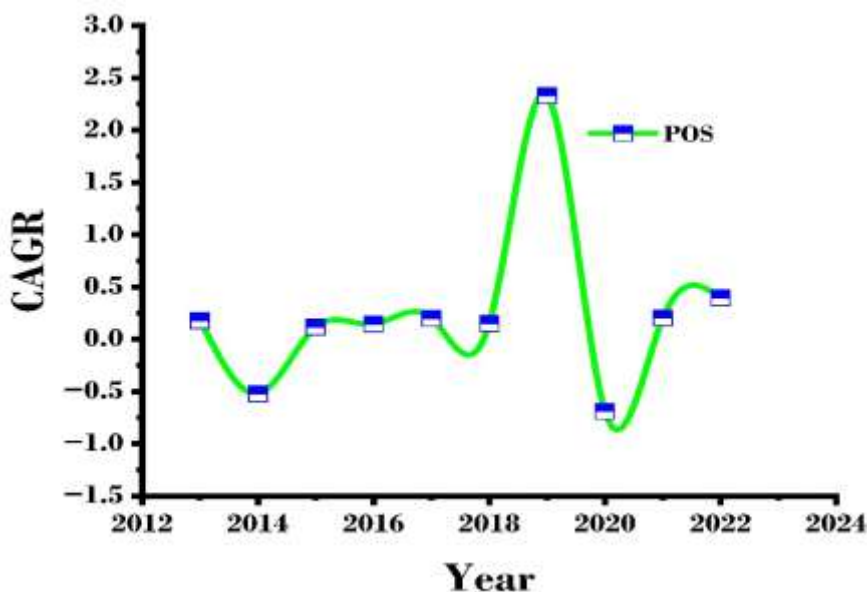
Figure 4.5: Trend of POS Growth Rate from 2012 to 2022

The graph shows an insufficient adoption of POS machines, which is probably caused by a lack of public understanding and familiarity. Probably, people weren't accurate about the benefits and how POS terminals work. However, it started to grow rapidly after 2015, after a fall in POS utilization during the COVID-19 outbreak. This may be the outcome of several factors, such as lower consumer spending brought on by economic turmoil, lockdowns that caused retailers to close, and an affinity for contactless payment methods that reduce physical contact. After the COVID-19 pandemic, the adoption of POS machines started growing again.

Figure 4.6: Trend of Debit Card Growth Rate from 2012 to 2022

The graph shows that several factors, such as financial conditions, technological advances, and external factors like the COVID-19 outbreak, may impact the use of debit cards. The use of debit cards could vary over time,

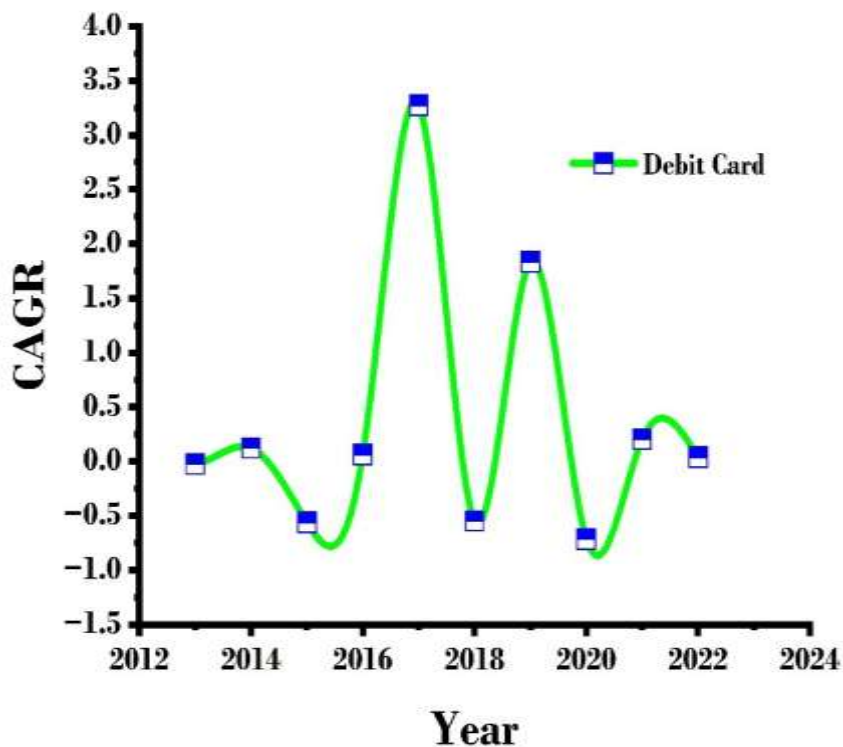which is normal. Security measures and limitations during the COVID-19 epidemic may have caused lessened spending, which could account for the initial drop in debit card usage. The use of debit cards could have developed once more as constraints relaxed and the economy started getting better.
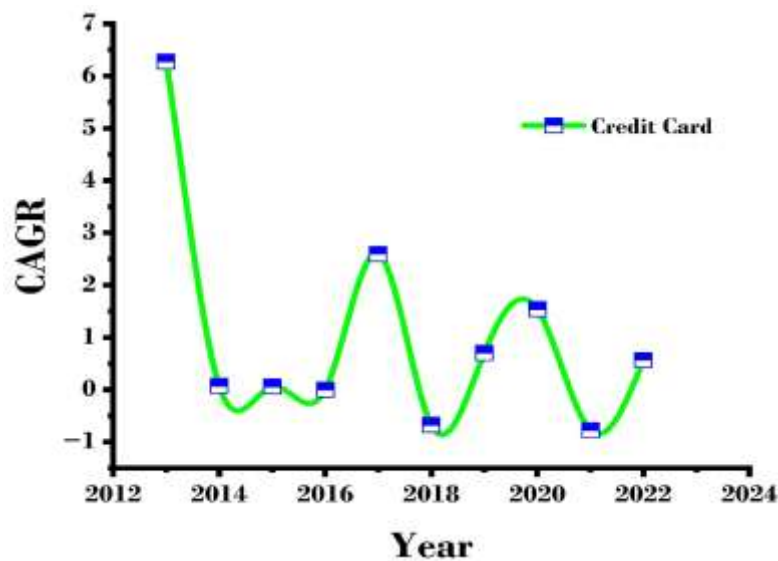

Figure 4.7: Trend of Credit Card Growth Rate from 2012 to 2022

The use of credit cards has been increasing all through time, with some fluctuation, but it is now on the upswing. Consumers may be less inclined to use credit cards during times of economic uncertainty due to worries about their financial well-being. People may feel more at ease utilizing credit cards for shopping if the economic situation improves. To promote card users, credit card suppliers frequently offer rewards, discounts, or advantages for traveling. To make use of these advantages, people might be tempted to apply for credit cards, especially if they align with their purchasing preferences.

Table 4.1: Descriptive Statistics of Green Banking Variables

Variable	Mean	S.D	Sted Error	DF	Sig(2-Tailed)
ATM	3.690909	1.304512	.1243803	109	0.0000
Mobile Banking	3.645455	1.26771	.1208714	109	0.0000
Internet Banking	3.609091	1.34161	.1279175	109	0.0000
Debit Card	3.754545	1.272045	.1212847	109	0.0000
Credit card	3.563636	1.351365	.1288476	109	0.0000
ECS	3.163636	1.384894	.1320445	109	0.0109
EFT	3.272727	1.407119	.1341635	109	0.0223
RTGS	3.363636	1.418924	.1352891	109	0.0042
Solar ATM	3.027273	1.505093	.143505	109	0.4248
CDM	3.663636	1.294145	.1233919	109	0.0000

With a strong statistical significance (p = 0.0000), the results demonstrate that the most popular and commonly used green banking channels are standard digital banking services like debit cards (mean = 3.75), ATMs (3.69), and mobile banking (3.64). In a similar vein, albeit having somewhat lower mean scores, Internet Banking (3.61), Credit Cards (3.56), RTGS (3.36), EFT (3.27), and ECS (3.16) also have notable adoption levels. This suggests that consumers choose contactless, tech-enabled, and convenient banking choices that minimize paper use and promote environmental sustainability. Solar ATMs, on the other hand, have the lowest mean score (3.03), and they are not statistically significant (p = 0.4248). This suggests that customers are not as aware of them, that there is less infrastructure available, or that they do not see many benefits. Overall, the results highlight that although digital green banking channels are widely accepted, more aggressive marketing campaigns, improved accessibility, and user education are needed to increase the uptake of cutting-edge eco-friendly technologies like solar ATMs.

Table 4.2: Descriptive Statistics of Green Banking Environmental Impact Variables

Variable	Mean	Sted Error	S.D.	DF	Sig(2-Tailed)
GB_Eco_Friendly	4.027273	.0970449	1.017815	109	0.0000
GB_Waste_Mgnt	4.027273	.0970449	1.017815	109	0.0000
GB_Co2_Redu	4.1	.0912795	.9573473	109	0.0000
GB_RRR	4.127273	.081795	.8578733	109	0.0000
GB_EE_Loan	4.018182	.0922174	.9671847	109	0.0000
GB_Green_Growth	3.981818	.0983448	1.031449	109	0.0000
GB_Low_Intrest	4.154545	.0905791	.9500011	109	0.0000
GB_Green_Indus	4.090909	.0936209	.9819047	109	0.0000
GB_Less_Paper	4.165138	.0931255	.976708	109	0.0000
GB_Redues_Ghgs	3.990909	.0917765	.9625602	109	0.0000

Debit cards (M = 3.75), ATMs (M = 3.69), and mobile banking (M = 3.65) had the highest mean scores in the analysis of green banking service usage, suggesting higher usage and preference among respondents. Moderate acceptance was demonstrated by Internet Banking (M = 3.61), Credit Cards (M = 3.56), EFT (M = 3.27), and ECS (M = 3.16). The lowest grade was given to Solar ATMs (M = 3.03). Except for Solar ATMs, statistical tests revealed significant differences (p = 0.4248), indicating a limited uptake of this eco-innovation in comparison to more established options. With mean scores above 3.98, respondents showed substantial agreement on all facets of their impressions of the advantages of green banking. Reducing paper use (M = 4.17), providing low-interest green loans (M = 4.15), and encouraging reuse, reduce, and recycle (M = 4.13) received the highest scores. High ratings were also given to eco-friendly banking operations (M = 4.03), assistance for green companies (M = 4.09), and CO$_2$ reduction (M = 4.10). At the 1% level, all aspects were statistically significant (p < 0.05), suggesting that green banking is consistently acknowledged as a factor in environmental sustainability.

Table 4.3: Descriptive Statistics of Perceived Climate Change Impact Variables

Variable	Mean	Sted Error	S.D.	DF	Sig(2-Tailed)
increse_st	3.954545	.0986873	1.035041	109	0.0000
increases_wt	3.827273	.0990859	1.039222	109	0.0000
p_drought	3.807339	.1009026	1.058275	109	0.0000
decline_gw	3.863636	.1037072	1.08769	109	0.0000
changing_rainfall_pattern	3.890909	.1027929	1.078101	109	0.0000
lw_concen_river	3.863636	.1037072	1.08769	109	0.0000
Water shortage	4.109091	.0860062	.9020411	109	0.0000
Having flood	3.918182	.1001515	1.050398	109	0.0000
redu_forest_cover	3.936364	.1002726	1.051668	109	0.0000
cc_soil_moist	3.945455	.0911756	.9562576	109	0.0000

Table 4.3 presents the descriptive statistics for the perceived climate change impact variables, offering a quantitative overview of respondents' assessments regarding the extent to which climate change affects their environment, livelihoods, and daily activities. This descriptive analysis provides a foundation for subsequent inferential tests, allowing for a clearer understanding of how climate change is perceived within the study population. Results analysis uses the T-statistic to assess awareness, and all values in this table are marked as having a significance level. This shows that individuals are aware of the effects of climate change, and its short-run and long-run effects show that people choose the green banking option as one of the most important mechanisms for reducing the impact of climate change.

Analysing this statement uses the t-statistic method, and the results demonstrated in the table clearly show that people prefer to use green banking because it minimizes the adverse effects on the environment. The table's significant value suggests that most think that green banking activity deals with climate-related challenges. People understand that green banking helps combat climate change. This shows an increasing understanding that eco-friendly banking processes help resolve climate concerns. Reduced paper use, which in turn supports the preservation of trees, is linked to green banking. This suggests that paperless or digital banking methods are being recognized for their beneficial effects on sustainability.

Table 4.4: Descriptive Statistics of Green Banking Maintenance and Environmental Protection Variables

Variable	Mean	Sted Error	S.D.	DF	Sig(2-Tailed)
gb_main_st	3.890909	.1003292	1.052262	109	0.0000
Gbmaintwt	3.936364	.0897381	.9411809	109	0.0000
Gbmaintrt	3.854545	.0965081	1.012186	109	0.0000
Gbprotclimate	3.809091	.0996202	1.044825	109	0.0000
Gbsavetree	3.854545	.0982213	1.030154	109	0.0000
gbenhanceforestcover	3.881818	.0981326	1.029223	109	0.0000
gbmaint_sm	3.945455	.0835377	.8761505	109	0.0000
Gbusere	3.990826	.0912829	.9573827	109	0.0000
Gbusegt	4.054545	.0855111	.8968483	109	0.0000
Gbmaintrp	3.9	.0903611	.9477157	109	0.0000

With the highest agreement for the adoption of green technology (mean = 4.05), practical resource usage (mean = 3.99), and sustainability measures (mean = 3.94), the results show that respondents have a very favourable opinion of the environmental benefits of green banking. Strong support was also given to other factors, such as preserving water, preserving soil, preserving the climate, preserving trees, and increasing forest cover (means ranging from 3.80 to 3.89). Every variable is statistically significant (p = 0.0000), indicating that respondents consistently agreed that green banking successfully advances environmental preservation and sustainability.

Finding of secondary data

The increase of NEFT transactions from 2012 to 2022 was consistent until 2018, after which it abruptly slowed in 2019. A robust recovery started in 2020 and peaked in 2021, most likely as a result of the COVID-19 pandemic's increasing use of digital payments. Despite slowing in 2022, growth was still higher than the negative 2019 levels, indicating a continued reliance on NEFT. The use of RTGS had a consistent upward trend, slowed slightly in 2018, and then increased during the pandemic, presumably as a result of increased accessibility, efficiency, and acceptance of high-value electronic transactions. Throughout the decade, mobile banking grew steadily, but during the pandemic, its use surged due to contactless payment requirements. Fewer constraints and increased knowledge of internet financial services; when cashless transactions became more commonplace after the pandemic, this development continued. The ease of accessing cash without physically visiting bank branches is reflected in the steady increase in ATM usage. Due to a lack of public knowledge, POS machine adoption was slow at first.

However, it rose quickly after 2015, fell during the pandemic due to lower consumer spending and store closures, and then recovered. The use of debit cards varied, declining under COVID-19 due to lower expenditure and then increasing when restrictions loosened. Overall, credit card usage rose with only slight variations, driven by consumer confidence, economic conditions, and promotional incentives. According to the secondary data, the adoption trends of green banking channels were significantly shaped by customer awareness, technological advancements, and external factors like the pandemic.

Finding of primary data

According to survey data, the most popular green banking services were debit cards (M = 3.75), ATMs (M = 3.69), and mobile banking (M = 3.65). Internet banking (M = 3.61), credit cards (M = 3.56), EFT (M = 3.27), and ECS (M = 3.16) were next in line. The least used ATMs were solar ones (M = 3.03). Except for Solar ATMs (p = 0.4248), t-test findings showed statistically significant differences for all services, underscoring their low adoption rate in comparison to established channels. With all mean scores above 3.98, respondents showed a significant agreement with the environmental benefits of green banking. The most highly regarded advantages were encouraging reuse, reduce, and recycle (M = 4.13), lowering paper use (M = 4.17), and providing low-interest green loans (M = 4.15), all of which were statistically significant at the 1% level (p < 0.05). With significant T-statistic results, awareness analysis revealed that respondents knew a great deal about climate change and its immediate and long-term effects. Participants also acknowledged that green banking, especially paperless transactions that preserve natural resources and lessen environmental harm, is a crucial tool for addressing climate change.

Discussion

The use of green banking in Uttar Pradesh has increased gradually over the past ten years, according to the examination of primary and secondary data. This growth has been driven mainly by customer awareness, technical developments, and outside events like the COVID-19 pandemic. The most noticeable growth trends

were seen in RTGS, NEFT, and mobile banking, which reflected a move toward contactless and digital transactions. According to the initial poll, the most popular services were debit cards, ATMs, and mobile banking. In contrast, solar ATMs were not very popular, suggesting that greater infrastructural support and awareness are needed for sustainable banking innovations. Consumers showed a high level of environmental awareness and acknowledged green banking as a valuable instrument for mitigating climate change, primarily through promoting reuse, reduce, and recycle habits and reducing paper use.

The importance of customer awareness and perceived benefits in promoting the use of green banking channels was confirmed by statistical results. Accordingly, future plans ought to concentrate on enhancing awareness efforts, providing incentives for environmentally friendly banking practices, and developing infrastructure for underutilized services (such as solar ATMs, ECS, and EFT). In the end, the study backs up the finding that green banking is a practical and ethical way to encourage sustainable financial behaviours, and that its further advancement can significantly aid in environmental conservation.

Conclusion

According to the study's findings, Uttar Pradesh has steadily increased its use of green banking practices over the last ten years, fuelled by developments in technology, growing consumer awareness, and outside influences like the COVID-19 epidemic. The fastest-growing channels, RTGS, NEFT, and mobile banking, showed a definite shift toward contactless and digital transactions. The poor uptake of innovations like solar ATMs highlights the need for more knowledge and infrastructure development, even while debit cards, ATMs, and mobile banking continue to be the most popular services. The findings also demonstrate that consumers are very environmentally sensitive and believe that green banking may effectively combat climate change by reducing paper consumption and encouraging reuse, reduce, and recycle behaviours. Overall, the study concludes that green banking is a practical and ethical way to promote sustainable financial practices. Accelerating its acceptance and optimizing its environmental benefits would need bolstering awareness campaigns, providing incentives for eco-friendly banking options, and developing infrastructure for underutilized services.

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Appendix: - Table 1: NEFT

Year	CAGR	Value
2012		2157314.67
2013	0.241785565	3326646.94
2014	0.177399114	4611626.44
2015	0.171786614	6332149.87
2016	0.181678231	8841982.58
2017	0.220279539	13166438.47
2018	0.157698526	17646528.21
2019	0.668836384	1935283.11
2020	0.013390127	1987457.47
2021	0.262378943	3167213.41
2022	0.020663898	2646921.33

Table 2: RTGS

Year	CAGR	Value
2012		4727038.42
2013	0.004890925	4680912.32
2014	0.13989005	6082140.27
2015	0.043133971	6618150.05
2016	0.090083858	7864233.99
2017	0.050169095	8673110.79
2018	0.646727143	1082419.07
2019	1.242796975	5444717.59
2020	0.269607351	8776355.67
2021	0.07880633	10214125.45
2022	0.101202814	12395448.88

: Mobile Banking

Year	CAGR	Value
2012		3513824.555
2013	0.898553459	12665599.01
2014	0.024565653	12050964.92
2015	0.510345764	27489990.25
2016	0.620640128	72201756.33
2017	0.278451349	118009283.5
2018	0.793492917	379590649
2019	0.630345559	1008962058
2020	0.335276012	1798941037
2021	0.536701267	4248110725
2022	0.588254287	358905765.3

: ATM

Year	CAGR	Value
2012		1332319.22
2013	0.006282512	1349112.43
2014	2.653925499	18012231.5
2015	-0.636711232	2377231.42
2016	0.039172923	2567125.53
2017	0.02065156	2674250.67
2018	0.167975041	3648121.03
2019	-0.219366941	2223121.08
2020	0.040992979	2409121.58
2021	0.029614795	2553925.75
2022	0.060464666	2396460.75

: POS

Year	CAGR	Value
2012		4746291.238
2013	0.179709017	6605476.95
2014	-0.520345431	1519712.21
2015	0.115335494	1890481.36
2016	0.14628652	2484041.06
2017	0.201564374	3586351.53
2018	0.151013125	4751310.45
2019	2.330116136	52690481.5
2020	-0.688429936	5114976.17
2021	0.202721299	7399010.08
2022	0.396862318	134242615.1

Table 6: Debit Card

Year	CAGR	Value
2012		8038400.39
2013	-0.024693304	7646312.55
2014	0.122215147	9629512.44
2015	-0.561828181	1848813.84
2016	0.062368657	2086621.52
2017	3.275229806	38138412.4

Year		
2018	-0.54742365	7811713.78
2019	1.832876499	62690481.5
2020	-0.714358698	5114976.17
2021	0.202721299	7399010.08
2022	0.037236115	11586331

Table 7: Credit Card

Year	CAGR	Value
2012		29906.1286
2013	6.27545268	1582997.53
2014	0.069363734	1810219.09
2015	0.059172805	2030788.91
2016	0.002002271	2038929.43
2017	2.598594153	26403891.2
2018	-0.677792256	2741194.69
2019	0.704166408	7960931.42
2020	1.540406101	51377169.8
2021	-0.77522235	2595831.08
2022	0.566205593	2656121.29