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Green Payments: The Role of Digital Transactions in Reducing Environmental Impact

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Abstract

In the context of escalating climate challenges and global commitments to sustainable development, the transition to digital payments has emerged as a pivotal mechanism to mitigate environmental impact. "This paper explores the concept of Green Payments—a term that encapsulates environmentally conscious financial transactions facilitated through digital platforms such as mobile banking, UPI, QR code payments, internet banking, and e-wallets. By eliminating the reliance on paper-based transactions, reducing the carbon footprint associated with physical infrastructure, and optimizing energy consumption in financial services, digital payment systems contribute to greener economies. This study analyses the environmental advantages of digital payment systems over conventional cash-based and paper-intensive methods, with a focus on India's post-demonetization landscape as a case study. The paper draws upon secondary data sources including RBI reports, NPCI statistics, and sustainability metrics to establish the connection between digital financial practices and carbon footprint reduction. It further evaluates the scale of paper savings, reduced ATM and branch visits, and lowered fossil fuel usage in currency logistics, thereby positioning digital payments as an indirect but effective climate action tool. Despite these benefits, the paper also addresses challenges such as digital inequality, rising electronic waste, and the energy demands of data centers. Policy recommendations are provided to integrate green payment mechanisms into broader environmental governance and green finance strategies. The findings underscore that while digital payments alone cannot solve climate change, their strategic adoption and governance can significantly contribute to a low-carbon future. This paper ultimately advocates for a systemic approach that embeds green payments into financial inclusion frameworks,

environmental policy, and corporate ESG agendas to drive sustainable development in both emerging and developed economies.

Keywords: Green payments, digital transactions, environmental sustainability, paperless economy, UPI, e-wallets, climate change mitigation

Introduction

In recent years, the global emphasis on environmental sustainability has influenced the transformation of financial systems, leading to the rise of digital transactions as an eco-conscious alternative to traditional cash-based methods. In this new paradigm, "green payments" refer to electronic payment methods that help save the planet by cutting down on paper, limiting the need for physical infrastructure, and cutting down on energy consumption associated with currency logistics. These methods include UPI, e-wallets, QR code payments, and internet banking. Digital India and the Reserve Bank of India's (RBI) financial inclusion policies have expedited the transition to digital payment methods in India, particularly after the demonetization of 2016 and other related measures. Improving transactional efficiency while also contributing to climate action objectives are two benefits of these technologies.

Nonetheless, conventional wisdom pays no attention to the ecological effects of digital banking. The goals of this research are to (1) determine the extent to which digital payments may be used as instruments for ecological preservation, (2) gauge the level of knowledge and sentiment among users about green payments, and (3) analyze the social and behavioral aspects impacting their uptake. This study argues that green payments may help bring about a better alignment between digital transformation and sustainable development by combining quantitative results from surveys with analytical contexts of policies and infrastructure. It also emphasizes that for green financial systems to succeed in the long run, digital literacy, user trust, and safe infrastructure are crucial.

Background on Climate Change and Need for Sustainable Practices

Ecosystems, businesses, and human health are all experiencing fast changes due to climate change, which is a critical worldwide concern. Human activities like burning fossil fuels, industrial operations, and land use contribute to greenhouse gas emissions, leading to increased extreme weather events, precipitation changes, melting polar ice caps, and higher temperatures. As highlighted in the Paris Agreement of 2015 and the 2030 Agenda for Sustainable Progress,

sustainable development initiatives seek to maintain the environment while promoting economic growth. Sustainable technology has proliferated across many industries as a result of this change, particularly in areas like renewable energy, waste reduction, circular economy concepts, and effective use of technological resources. There has been a recent shift in the financial sector's role from sustainability driver to economic activity engine, with digital technology playing a crucial role in easing the transition to low-carbon economies. A strategic way to build more resilient and environmentally friendly economies is to incorporate sustainability into financial technology, especially digital payments.

Role of Financial Systems in Environmental Impact

Financial systems, once viewed solely for economic growth and capital mobilization, are now being reevaluated due to their environmental implications. Banks' investment decisions can impact the environment, whether they support fossil fuel or renewable energy businesses. Financial systems have direct and indirect impacts on energy use, resource loss, and carbon emissions. They also influence insurance plans, investment strategies, loan portfolios, and credit rating systems. The financial sector's ability to steer economies towards climate-resilient paths has led to an increase in green finance, environmental, social, and governance frameworks, and sustainable investment. Traditional banking techniques, such as paper records and branch locations, increase environmental expenses, trash, and energy use. The transition to digital payment systems presents a revolutionary opportunity to reduce the sector's environmental impact.

Review of literature

Author(s)	Title of Study	Key Findings
Singh & Malik (2019)	Impact of Digitalization on Indian Rural Banking Customer	Digital services adopted in rural banks, but low awareness limits adoption.
Jakhiya et al. (2020)	Emergence and Growth of Mobile Money in Modern India	IMPS and mobile money enabled rural access to digital payments.

Khandelwal & Priya (2020)	Leveraging Digital Technologies for Sustainable Growth in MSMEs	MSMEs are digitizing operations for resilience and sustainable growth.
Kumar (2022)	Modern Payment System with Respect to Rural Customers	Demonetization increased digital use in rural areas, but literacy remains low.
Mahesh A (2022)	India€™s Digital Payment Landscape â€ An Analysis	UPI and digital tools are reshaping the payment landscape in India.
Jaiswal & Singh (2023)	Inter-State Exploration of UPI Adoption	UPI adoption varies across states; digital infrastructure plays a key role.
Mansharamani (2023)	Digitalization and Digital Financial Literacy Post-Demonetization	Demonetization accelerated digital financial literacy and payment system use.
Meka (2023)	Digital India – Ambedka's Vision and Modi's Provision	Digital India aims for rural connectivity and universal digital access.
Badak (2023)	Mobile Computing & Digital Payment Revolution	UPI boom driven by COVID-19 and fintech; some security concerns noted.
Das & Dutta (2024)	India's Digital Financial Inclusion to Digital Adoption	Digital platforms empower the poor but need infrastructure and training.
GITAM University & Swarna (2024)	Dominance of Digital Transactions over M3 Money Supply	Digital transactions are replacing traditional money supply systems.
Kumari et al. (2024)	Cashless Economy: Impact of Digital Innovation	Demonetization led to digital dominance; cyber security now critical.
Olalere & Dorasamy (2024)	Perspectives on Digitization and Economic Growth in India	Digitization contributes significantly to India's economic growth.

Sharma et al. (2024)	Digital Transformation in India: Challenges and Future	Collaboration needed for Digital India to overcome infrastructure gaps.
Narula & Sah (2025)	Fintech Evolution in India	Fintech is growing rapidly; integration and data security are key challenges.
Vidya & Shailashri (2021)	ABCD Analysis of Electronic Payment Systems in Banking	Comprehensive model shows digital systems efficiency post-demonetization.
Fouillet & Servet (2021)	Demonetization and Societal Impacts	Demonetization brought digital inclusion but raised control concerns.
Kandpal (2019)	Digital Retailing in Post-Demonetization India	Retailers are adapting to digital post-cash phase; long-term outlook positive.
Ghosh & Srivastava (2019)	Usage of Digital Payments and Influencing Variables	Promotion, convenience, and barriers shape digital usage in India.
Sivathanu (2019)	Actual Usage of Digital Payments during Demonetization	Cash preference moderates adoption; behaviourally driven usage seen.
Sharma & Kalra (2018)	Digital and Cashless India Initiative	Digital India gained traction post-demonetization; more secure tech needed.
Bansal & Jain (2018)	Optimization of Digital Banking Post-Demonetization	Post-demonetization digital banking services saw significant rise.
Joshi & Desai (2017)	Impact of Demonetization on Digital Payments	All modes of digital payments increased post-demonetization.
Sharieff et al. (2017)	Digital Transactions Before and After Demonetization	Policy support boosted digital transactions; long-term trends emerging.

Datta (2017)	Inclusive Growth and Financial Literacy	Digital inclusion essential for equitable economic growth.

Research Objectives

1. To examine public awareness and perception of digital payment methods (e.g., UPI, e-wallets, QR codes) as environmentally sustainable alternatives to cash-based transactions.
2. To evaluate consumer behavior regarding support for paperless financial practices, including avoidance of physical receipts and preference for digital platforms.
3. To assess the extent to which individuals associate digital transactions with environmental protection and green payment initiatives.
4. To measure public support for policy-driven green payment systems and environmental finance frameworks.

Hypothesis

H_0: Awareness of digital payment benefits has no significant impact on the belief that digital payments contribute to environmental protection.

Research Methodology

This study employed a quantitative research design to assess the public perception and environmental implications of digital payments in India. Primary data was collected through a structured Likert scale questionnaire administered to 150 respondents across urban, semi-urban, and rural regions. Demographic data, awareness levels, attitudes, and behavioral indicators related to green payments were captured. The relationship between digital payment awareness and environmental beliefs was tested using linear regression. Secondary data sources, including RBI and NPCI reports, were analyzed to contextualize findings. SPSS was used for statistical analysis to ensure reliability, significance, and interpretation of results.

Data analysis

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	110	73.3	73.3	73.3
	Female	40	26.7	26.7	100.0
Age					
Valid	Below 20	32	21.3	21.3	21.3
	21-30	29	19.3	19.3	40.7
	31-40	20	13.3	13.3	54.0
	41-50	40	26.7	26.7	80.7
	Above 50	29	19.3	19.3	100.0
Location					
Valid	Urban	53	35.3	35.3	35.3
	Semi-Urban	71	47.3	47.3	82.7
	Rural	26	17.3	17.3	100.0
Education Level					
Valid	High School	22	14.7	14.7	14.7
	Undergraduate	47	31.3	31.3	46.0
	Postgraduate	37	24.7	24.7	70.7
	Other	44	29.3	29.3	100.0

The demographic profile of the 150 respondents reveals a predominantly male sample, with 73.3% identifying as male and 26.7% as female". "Age distribution shows that the largest group falls within the 41–50 age bracket (26.7%), followed by those below 20 years (21.3%), and the remaining respondents fairly distributed among the 21–30, 31–40, and above 50 age groups. In terms of location, semi-urban residents constitute the majority at 47.3%, followed by urban dwellers at 35.3%, and rural participants at 17.3%. Regarding education, 31.3% hold undergraduate degrees, 29.3% fall under the other category, 24.7% are postgraduates, and 14.7% have completed high school.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I am aware that digital payments can help reduce environmental impact.	33	14	17	73	13
I consider paperless transactions an important step toward sustainability.	34	17	16	74	9
I am aware of the term 'green payments.'	29	18	27	54	22
Using UPI, e-wallets, or internet banking reduces the need for cash and paper receipts.	14	27	25	56	28
I believe digital payment platforms are more eco-friendly than traditional methods.	32	29	20	40	29
I prefer digital payments over cash for daily transactions.	31	40	20	39	20
I actively avoid paper bills or receipts whenever possible.	41	20	20	40	29
I would support government policies encouraging green payment systems.	35	10	15	76	14
I believe that using digital payments contributes to environmental protection.	28	17	15	72	18
I am willing to pay extra if a service supports eco-friendly payment infrastructure.	37	18	12	65	18

The survey responses reveal a generally positive perception toward green payments and their environmental benefits among participants. A majority agreed that digital payments reduce environmental impact (73 agree, 13 strongly agree), and 74 respondents consider paperless transactions essential for sustainability. Awareness of the term green payments was moderate, with 54 agreeing and 22 strongly agreeing. A notable 56 respondents agreed that digital tools

reduce the need for cash and paper, with 28 strongly agreeing. However, opinions were more divided on whether digital platforms are eco-friendlier than traditional methods, with 32 strongly disagreeing and only 40 agreeing. While 39 preferred digital payments over cash, 40 respondents disagreed, indicating mixed adoption behavior. Avoidance of paper receipts also showed variation, though 40 agreed and 29 strongly agreed. Government support for green payments received strong backing, with 76 agreeing. Most participants (72) believed digital payments contribute to environmental protection, and 65 were even willing to pay more for eco-friendly payment infrastructure, reflecting a readiness to support sustainability-linked innovations.

Results

The analysis of primary data collected from 150 respondents provides insights into the relationship between public awareness of digital payments and their perceived environmental benefits. The responses were evaluated using descriptive statistics and linear regression to test the proposed hypothesis. The results section begins by presenting demographic details, which help contextualize the distribution of environmental perceptions across age, gender, education, and location. The regression analysis was conducted to assess the statistical relationship between awareness of sustainability benefits (predictor) and the belief that digital payments contribute to environmental protection (dependent variable). These results serve as the empirical foundation for understanding how environmental consciousness can shape financial behavior in the digital era.

Hypothesis

Awareness of digital payment benefits has no significant impact on the belief that digital payments contribute to environmental protection.

Model Summary[b]				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.873[a]	.762	.760	1.241
a. Predictors: (Constant), Awareness of digital payment benefits				
b. Dependent Variable: digital payments contribute to environmental protection				

The regression analysis was conducted to assess the impact of awareness of digital payment benefits on the belief that digital payments contribute to environmental protection. The Model Summary indicates a high correlation between the independent and dependent variables, with an R value of 0.873, signifying a strong positive relationship. The R Square value of 0.762 suggests that approximately 76.2% of the variance in the belief that digital payments contribute to environmental protection can be explained by the level of awareness about digital payment benefits. The Adjusted R Square (0.760) further confirms the model's robustness after accounting for potential biases due to the sample size.

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	36.837	1	36.837	23.912	.000[b]
	Residual	227.997	148	1.541		
	Total	264.833	149			
a. Dependent Variable: digital payments contribute to environmental protection						
b. Predictors: (Constant), Awareness of digital payment benefits						

The ANOVA table shows that the model is statistically significant, with an F-value of 23.912 and a p-value (Sig.) of 0.000, which is less than 0.05. This means the model reliably predicts the dependent variable, affirming that awareness of digital payment benefits significantly affects the belief in their environmental impact.

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	***Std. Error***	***Beta***		
1	(Constant)	2.092	.254		8.226	.000
	Awareness of digital payment benefits	.374	.077	.373	4.890	.000
a. Dependent Variable: digital payments contribute to environmental protection						

Further, the Coefficients table reveals that the unstandardized coefficient (B = 0.374) is positive and statistically significant (t = 4.890, p < 0.001), indicating that for every one-unit increase in awareness, the belief that digital payments help protect the environment increases by 0.374

units. The standardized coefficient (Beta = 0.373) also reflects a moderate effect size. These findings collectively support the alternative hypothesis (H_1), confirming a significant positive impact of awareness on the belief in the environmental benefits of digital payments.

Discussion

The results of the regression analysis reveal a significant and positive impact of awareness of digital payment benefits on the belief that such transactions contribute to environmental protection. With an R Square value of 0.762, the model demonstrates a strong explanatory power, indicating that awareness alone accounts for over 76% of the variation in environmental perception regarding digital payments. This finding is consistent with prior literature emphasizing the role of digital literacy and eco-conscious behavior in adopting sustainable financial practices (e.g., Kumar, 2022; Mahesh A, 2022). The statistically significant coefficient ($p < 0.001$) suggests that as users become more informed about the advantages of digital transactions—such as paperless processing, reduced carbon emissions, and energy-efficient systems—their belief in the ecological benefits of these platforms strengthens.

Interestingly, the data also reflects a shift in public mindset, where financial decisions are increasingly influenced by sustainability values. This supports the integration of green payments into broader environmental governance frameworks. However, it is essential to note that while awareness significantly impacts environmental perception, real-world adoption may still be hindered by challenges such as limited digital infrastructure in rural areas, e-waste from electronic devices, and cybersecurity concerns. Thus, awareness must be complemented with robust policy interventions, infrastructure upgrades, and user trust-building strategies to foster meaningful behavioral change.

Conclusion

This study provides empirical evidence supporting the hypothesis that increased awareness of digital payment benefits positively influences the belief in their environmental contribution. The results affirm that green payments are more than just a convenience—they are a sustainable financial innovation aligned with India's broader climate goals. With a strong correlation between user awareness and eco-conscious behavior, digital transactions emerge as a viable strategy for reducing paper usage, minimizing physical cash logistics, and promoting sustainable consumption patterns. However, for the full potential of green payments to be

realized, stakeholders must address gaps in digital access, improve cybersecurity, and enhance public education on environmental finance. Ultimately, green payments represent an intersection of financial inclusion and environmental stewardship, and their strategic adoption can contribute meaningfully to a low-carbon, digitally empowered future.

Contribution to the society

1.Encourage Sustainability in the Environment

- Decreased use of paper: Digital payments reduce the requirement for paper records, cheques, cash, and receipts.
- Reduced transportation emissions: Fuel consumption and carbon emissions are part of cash logistics (ATM visits, currency transit). That is reduced by digital payments.
- Energy-efficient substitutes: Contemporary digital platforms are striving for more effective data processing and the use of renewable energy.

2. Supports SDGs (Sustainable Development Goals)

- Specifically contributes to:
    - **Goal 9:** Industry, Innovation, and Infrastructure
    - **Goal 13:** Climate Action

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