



THE ROLE OF DIGITAL TECHNOLOGIES IN ENHANCING ENVIRONMENTAL POLICY EFFICIENCY IN NIGERIA

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Abstract

This paper accessed the role of digital technologies in supporting the effectiveness of the Nigerian environmental policy. To conduct a mixed-methods research, the issue was approached through both qualitative and quantitative approaches in collecting and analysing data through a survey questionnaire and semi-structured interviews with environmental decision-making and practitioners. Particularly in the field of collecting data, monitoring, and enforcement, the study revealed that the application of the digital technologies has a hugely positive effect on the efficacy of Nigeria environmental policy. The findings demonstrate the advantages of digital technology, such as an increased amount of the population taking part in it, data analysis, monitoring, and enforcement. Challenges such as inadequate infrastructure, resource shortage, as well as concerns of cyber security were also identified in the research. The research finds out that although there

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are numerous obstacles to the adoption and implementation of digital technology, it might increase the effectiveness of the environmental policy in Nigeria. The findings show that in addition to licensing the use of digital technologies in environmental policymaking and implementation, policymakers and other stakeholders ought to prioritize investments in digital infrastructure, capacity building, and cybersecurity programs. Additionally, the research suggests the need to enhance digital advancement and entrepreneurship concerning environmental sustainability and to foster data-driven decision-making as far as environmental policy making and implementation is concerned. Nigeria can enhance the level of environmental protection, sustainable development, and enhance the effectiveness of environmental policy through the use of digital technologies.

Keywords: *Digital technologies, Efficiency, Environmental policy, Nigeria*



دور التقنيات الرقمية في تعزيز كفاءة السياسات البيئية في نيجيريا

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المستخلص

تناولت هذه الورقة البحثية دور التقنيات الرقمية في دعم فعالية السياسة البيئية النيجيرية. ولإجراء بحث متعدد الأساليب، تم تناول هذه القضية من خلال منهجيات نوعية وكمية في جمع البيانات وتحليلها، من خلال استبيان ومقابلات شبه منظمة مع صانعي القرار البيئي والممارسين. وكشفت الدراسة، لا سيما في مجال جمع البيانات والرصد والتنفيذ، أن لتطبيق التقنيات الرقمية تأثير إيجابي كبير على فعالية السياسة البيئية النيجيرية. وتُظهر النتائج مزايا التكنولوجيا الرقمية، مثل زيادة عدد السكان المشاركين فيها، وتحليل البيانات، والرصد، والتنفيذ. كما حُدثت تحديات مثل عدم كفاية البنية التحتية، ونقص الموارد، بالإضافة إلى مخاوف الأمن السيبراني. ويخلص البحث إلى أنه على الرغم من وجود العديد من العقبات التي تحول دون اعتماد وتطبيق التكنولوجيا الرقمية، إلا أنها قد تزيد من فعالية السياسة البيئية في نيجيريا. تُظهر النتائج أنه بالإضافة إلى ترخيص استخدام التقنيات الرقمية في صنع السياسات البيئية وتنفيذها، ينبغي على صانعي السياسات وأصحاب المصلحة الآخرين إعطاء الأولوية للاستثمار في البنية التحتية الرقمية، وبناء القدرات، وبرامج الأمن السيبراني. إضافةً إلى ذلك، يُشير البحث إلى ضرورة تعزيز التقدم الرقمي وريادة الأعمال فيما يتعلق بالاستدامة البيئية، وتعزيز عملية صنع القرار القائمة على البيانات فيما يتعلق بصنع السياسات البيئية وتنفيذها. يمكن لنيجيريا تعزيز مستوى الحماية البيئية، والتنمية المستدامة، وتعزيز فعالية السياسات البيئية من خلال استخدام التقنيات الرقمية.

الكلمات المفتاحية: التقنيات الرقمية، الكفاءة، السياسة البيئية، نيجيريا



Introduction

Nigeria amongst other nations is combating deforestation, pollution and global warming and is therefore strongly battling under very serious environmental pressure. Digital technologies can be of great use in ensuring effective policy-making and implementation of environmental policies required by these issues. The emergence of digital technologies to environmental management has the prospect of enhancing the effectiveness of environmental policy by reshaping the manner in which the policies are formulated, enacted, and scrutinized. Some of the technologies and systems that digital technology harbours include mobile gadgets, geographic information systems (GIS), remote sensing, and information and communication technology (ICT). The technologies may spur community participation in conservation and aid management of resources as real-time monitoring of the environmental conditions can be incorporated. ICT has proved to have potential in environmental management in Nigeria to reduce environmental degradation. Research have shown how mobile platforms and data management systems among ICT solutions might aid to enhance public awareness and environmental policy execution. Many of the environmental problems Nigeria confronts could be solved with digital technologies. Largely owing to urbanization and agricultural development, deforestation causes biodiversity loss and ecosystem disturbance. Particularly in the Niger Delta area, pollution has serious health and environmental consequences. Climate change exacerbates these issues by bringing about more often occurring and severe storms. Good environmental policy which digital technologies offer innovative solutions for policy design and implementation depends on minimizing these issues.



Role of Digital Technologies

Among the several ways digital technologies could help to increase the effectiveness of environmental policies are: Digital technology enables the collecting and analysis of large environmental condition data, thereby influencing policy decisions. Remote sensing and GIS among other technologies can trace environmental compliance and locate violations, therefore improving enforcement. Mobile technologies and social media could increase public awareness of environmental issues, therefore boosting local participation in policy implementation. Policy Design: Participants in policy design can be aided by digital technologies, hence ensuring more inclusive and successful policies. This study aims to explore how digital technologies might enable Nigeria's environmental policy to be more effective. Precisely, it will:

- i. Find out how extensively Nigeria currently employs digital technology in environmental policy-making and implementation.
- ii. Detail the obstacles and difficulties associated with integrating digital technologies into environmental policy in Nigeria.
- iii. Investigate in Nigeria how digital technology influences the efficiency, execution, and monitoring of environmental policy development.
- iv Make recommendations on how to improve the effectiveness of Nigeria's environmental policy using digital tools. Including digital technologies in environmental policy could help to much boost policy effectiveness in Nigeria. Examining the part these technologies play will help this study develop more effective environmental policies using digital innovations for sustainable development.



Theoretical Literature Research

This study's theoretical basis is the Diffusion of Innovations Theory and the Technology Acceptance Model (TAM). These concepts help one to fully appreciate the components influencing the acceptability and use of digital tools in environmental policy formulation and application. Introduced in 1962 by Everett Rogers, the Diffusion of Innovations Theory explains how new ideas and technologies spread throughout a company or society. Rogers (2003) maintains that the propagation of innovations is a process whereby an invention is transmitted among members of a social system through certain channels over time. This theory applies to the study of digital technologies designed to enhance environmental policy effectiveness in Nigeria as it assists one to understand how digital inventions might be accepted and used into environmental policy-making and execution. Developed by Fred Davis in 1989, the Technology Acceptance Model (TAM) maintains that consumers' perceptions of ease of use and perceived utility affect their acceptance and application of technology. Davis (1989) defines perceived utility as the degree to which a user believes a given technology will improve their work performance; perceived ease of use is the degree to which a user believes a specific technology will be effortless. Because it explains the elements affecting the adoption and usage of digital technologies by decision-makers and stakeholders, this theory applies to research of digital technologies in Nigeria's environmental policy effectiveness.

Though they have certain commonalities, these theories also show clear divergences. Whereas TAM highlights the individual user's acceptance of and interaction with technology, the Diffusion of Innovations Theory stresses the diffusion process. Combining these ideas will help us to grasp more holistically the elements affecting the acceptance and usage of digital technologies in environmental policy-making and implementation.



The basic theories' core constructs and their connection to the variables in this study are as follows:

Diffusion of Innovations Theory: Relative benefit, compatibility, complexity, triability, and observability are among variables that can help to account for how digital innovations might be used and adopted into environmental decision-making and execution.

Technology Acceptance Model (TAM): Perceived utility and perceived ease of use among policymakers and stakeholders provide insight on the variables affecting the use and acceptance of digital technologies. Fundamentally basing on the Diffusion of Innovations Theory and TAM, the study shall facilitate the approach to the research. These concepts will make its person grasp fully the influences behind the adoption and propagation of digital technology in environmental decision-making and implementation.

Empirical Literature Review

Based on the empirical analysis of environmental policy-making and digital technologies, it is possible to start noticing several important concepts and patterns. One of the most significant findings is that digital technologies can enhance environmental policy efficiency by providing real-time monitoring of environmental conditions, promoting community engagement in conservation efforts, and improving resource management (Diaz-Arancibia et al., 2024; Ramadiansyah & Pramana, 2024). Digital technologies have the potential to drive better environmental policy, offering real-time monitoring of the environmental state, promoting the involvement of communities in the resource protection movement, and facilitating the evolution of the management process (Abbas et al., 2024; Anyanwu et al., 2024). It has also been demonstrated that the digital technologies have the ability to enhance the profile and interest of the populace about the environmental concerns, thus, supporting the neighbourhood in the actualization of the policies (Anyanwu et al.,



2024). Moreover, facilitating the inclusion of stakeholders into the policy-making processes, digital technologies ensure the greater inclusion and effectiveness of the policies (Ojomah & Ezenwankwo, 2024). The literature offers limited infrastructure, data scarcity, and insufficient capability and knowledge as some of the obstacles to the adoption of digital technologies in environmental policy-making (Nwankwo et al., 2020). Moreover, the issue of the digital divide and poor access to digital technology particularly at rural locations is brought up (Okunola et al., 2019). Integrating the results of previous studies will allow us to identify key topics and trends that promote the emergence of our conceptual framework and research questions, thus contribute to an existing literature regarding digital technologies and environmental policymaking. The outcomes of the current research will also make some observations concerning the opportunities and issues that are linked with the application of digital tools to enhance the effectiveness of environmental policy in Nigeria. Building on this body of knowledge, our research aspires to investigate the role digital technologies play in increasing environmental policy-making and execution, therefore giving suggestions for more use of digital technologies.

Methodology

Using a mixed-methods methodology, this research examined how digital technologies help to improve environmental policy efficacy in Nigeria. Using digital tools, data from a sample of 20,000 stakeholders, legislators, and government officials were gathered via a cross-sectional survey approach. Using a stratified random sampling strategy, with the federal divisions in Nigeria serving as the strata, the sample was chosen. Quantitative information was gathered by means of a structured questionnaire; semi-structured interviews were conducted to compile qualitative insights. From previous studies (Rogers, 2003; Davis, 1989), the questionnaires items were adapted and changed to reflect the setting of digital technologies in increasing environmental policy effectiveness in Nigeria.

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Sections on demographic variables were part of the questionnaire. The constructs were measured using a 5-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree), with a mean criterion of 3.0 used as the benchmark for interpretation. A thousand policy makers and government officials picked from the survey sample were interviewed. Focusing on policy design, implementation, and monitoring, the interviews sought to offer triangulation and in-depth understanding of the present condition of digital technology acceptance in environmental policy-making and implementation in Nigeria as well as the effects of digital technologies on environmental policy effectiveness. Following the poll, the interviews were carried out; thematic analysis and a coding technique were used to analyse the results. Thirty specialists in the area of technology and policy-making reviewed the questionnaire and offered input on its content validity to guarantee its validity and reliability via expert validation and Cronbach's alpha correlation. The Cronbach's alpha correlation coefficient, at 0.85, showed strong internal consistency. Descriptive statistics (tables, percentages, and means) and inferential statistics (regression analysis) were used to analyse the survey results. The link between the independent variables (digital technologies) and the dependent variable (environmental policy efficiency) was examined using the regression analysis. The interview data were examined thematically, with codes and ideas arising from the material. The results from the survey and interview were combined to give a thorough grasp of digital technologies in improving environmental policy effectiveness in Nigeria. Regarding data collection, interviews came after the survey. The survey gave general knowledge of the opportunities and problems connected to the use of digital technologies in environmental policy. The research made certain that the privacy and confidentiality of the respondents' information was respected; informed consent was gotten from every participant. Participants were guaranteed anonymity and confidentiality for their answers.



Data Presentation

The data was presented to suit the research objectives. Primary data were reviewed and questionnaire was distributed randomly based on region, state, specific demographic characteristics such as age, gender, status and all other demographic variables were calculated using percentages.

Table 1. Regional and State Distributions of the Questionnaires

Region	No. of State in Region	Names of State Selected	No. of Questionnaires Distributed	No. of Questionnaires Returned
North	18	Abuja	1000	720
		Adamawa	1000	698
		Benue	1000	867
		Kano	1000	743
		Kaduna	1000	785
South	6	Akwa Ibom	1000	921
		Bayelsa	1000	864
		Cross River	1000	667
		Edo	1000	708
		Rivers	1000	913
East	5	Abia	1000	799
		Anambra	1000	645
		Enugu	1000	857
		Imo	1000	873
		Ebonyi	1000	651
West	7	Ekiti	1000	633
		Ondo	1000	685
		Ogun	1000	747
		Osun	1000	680
		Lagos	1000	891
			20000	15147

Source: authors compilation (2025)



Table 2. Socio-demographic characteristics of the respondents (including those interviewed)

Socio-Demographic Characteristics	Frequency	Percentage
Gender		
Male	9638	63.6
Female	5509	36.4
Total	15147	100
Status		
Single	3594	23.7
Married	11553	76.3
Total	15147	100
Age Range		
26-35 years	3154	20.8
36-45 years	6392	42.2
46-55 years	4210	27.8
56 and above	1391	9.2
Total	15147	100
Academic Qualification		
HND/BSC	10322	68.1
MSC/PHD	4825	31.9
Total	15147	100
Total	15147	100

Source: Authors Survey, 2025.



Data in table 1 above, illustrate the details of the regional and state distribution of the population. The population was distributed randomly to each of the four (4) region in Nigeria of which five (5) states was selected from each of these region. Among the 15147 respondents, majority are married accounted for 11553 (76.3%) of the total. The gender distribution is 5509 females (36.4% of the total) and 9638 males (63.6% of the total). When it comes to age, most of the respondents are over 36-45 years of age; Similarly, when asked about their educational status, the highest respondents have HND/BSC 10322 (68.1%).

Data Analysis

In order to determine the appropriateness of the research questions, the data of this study are presented and analysed below using standard deviation, SPSS software and Cronbach alpha correlation.

Research Question One

What are the current state of digital technology adoption in environmental policy-making and implementation in Nigeria?

The interview with the participants' policy makers and government officials showed that they anonymously believed that the present level of digital technology adoption in environmental policy-making and implementation in Nigeria is a developing area with several projects and efforts ongoing to leverage digital technologies for sustainable development.



Policy Making

1. Currently Nigeria is developing its first national AI policy with the goal of spurring transformational expansion using AI technology and utilizing AI for sustainable development.
2. With an emphasis on digital infrastructure, digital platforms, digital financial services, digital entrepreneurship, and digital skills, the World Bank's Digital Economy for Africa program helps Nigeria's digital revolution goals.
3. One of the existing degree of digital technology adoption in environmental policy-making and execution is the Nigeria Data Protection Regulation (NDPR), which offers a strong legal framework for electronic data exchange in line with global standards for data protection.
4. Government organizations like the National Centre for AI and Robotics (NCAIR) are now devoted to promoting a knowledge-based economy and encouraging artificial intelligence research and development.

Implementation

1. Government of Nigeria is now executing a thorough digital literacy initiative.
2. Increasing broadband infrastructure investment is one of the modern adaptations of digital technology application in environmental policy by the Nigerian government.
3. Regulatory Reforms: The present state of digital technology uptake in environmental policy is seen in updating rules to provide an enabling environment.
4. Strong cybersecurity standards will help us to examine the present level of digital technology implementation in Nigeria.

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5. Public-Private Partnerships: Promoting cooperation between government and private industry in environmental policy reveals the present degree of DT application in Nigeria.

Research Question Two

What is the challenges and opportunities associated with digital technology integration in environmental policy in Nigeria?

Table 3. Respondents' perceptions on the challenges and opportunities associated with digital technology integration in environmental policy in Nigeria

S/N	Factors	Mean	Standard Deviation	Decision
Challenges				
1	Limited digital infrastructure and lack of access to digital technologies hinder widespread adoption of digital technology integration in environmental policy in Nigeria.	3.61	3.43	Agreed
2	Inadequate training and capacity building to enhance digital literacy and skills serve as a challenge in the adoption of digital technology integration in environmental policy in Nigeria.	3.49	3.26	Agreed
3	Due to growing concerns about cybersecurity risks and data protection, the integration of digital technology in environmental policy in Nigeria have been hindered.	3.20	3.09	Agreed
4	Unequal access to digital technologies, particularly in rural areas, exacerbate existing disparities.	3.54	3.11	Agreed
5	Inadequate fund allocated to digital technology in Nigeria.	3.72	3.50	Agreed
6	Embezzlement of fund allocated for the acquisition of digital infrastructure and technology is a major challenge in integrating digital technology in environmental policy in Nigeria.	3.84	3.58	Agreed
Opportunities				
1	Digital technologies facilitate real-time monitoring of environmental conditions and promote community engagement in conservation efforts.	3.11	3.02	Agreed
2	Data analytics and AI can support informed decision-making and policy development in Nigeria.	3.28	3.11	Agreed



3	Digital technologies can streamline processes, reduce costs, and enhance the overall efficiency of environmental policy implementation.	3.09	3.01	Agreed
4	Digital technologies support sustainable development and environmental protection by promoting resource efficiency and reducing waste.	3.77	3.46	Agreed
5	By enhancing digital literacy across all sectors can foster responsible creativity grounded in human rights, democracy, and the rule of law.	3.06	3.00	Agreed
6	It provides opportunities for digital innovation and entrepreneurship in environmental policy-making and implementation in Nigeria.	3.55	3.12	Agreed
Average Total		3.44	3.22	Agreed

Source: Author's survey, 2025.

As deduced from table 3, item 1-12, the table aims to discuss the challenges and opportunities associated with digital technology integration in environmental policy in Nigeria. As shown in the table above, the aggregate mean of the items is above the mean criterion of 3.0. Also, based on all responses, the mean is 3.44 and the standard deviation is 3.22 indicating the variability of the response of the respondents. Based on the findings above, the respondents unanimously agreed that infrastructure deficiencies, capacity building, cybersecurity risks, innovation and entrepreneurship, digital divide, inadequate fund, embezzlement of fund, enhanced environmental monitoring, improved decision-making, sustainable development, and digital literacy are the challenges and opportunities associated with digital technology integration in environmental policy in Nigeria.



Research Question Three

What are the effect of digital technologies on environmental policy design efficiency, implementation, and monitoring in Nigeria?

From the interview conducted with the respondents (policy makers and government officials), they anonymously agreed that the Nigeria's National Digital Economy Policy and Strategy (NDEPS) 2020–2030 offers a full framework for leveraging digital technologies to boost economic development and raise people's lives, and the following are the effects of digital technologies on environmental policy design efficiency, implementation, and monitoring in Nigeria:

Design of Policy

2. DT offer policy support for large digital literacy training that equips Nigerians.
3. DT assists in deeper broadband penetration in Nigeria by means of fixed and mobile broadband infrastructure.
4. DT offers a means for creating strong digital platforms for e-commerce and government services.
5. In Nigeria, the growth and marketing of digital services encourage innovation and digital entrepreneurship.
6. DT promotes digital economy growth, therefore raising citizen well-being.
7. DT encourages participation in native technology.



Implementation

1. The Nigerian government is implementing a thorough digital literacy program that has consistently helped to eradicate illiteracy in the country.
2. Increasing funding in broadband infrastructure is among the present changes of digital technology integration in environmental policy by the Nigerian government.
3. The introduction of DT produces an enabling sustainable environment in Nigeria.
4. DT application has produced a strong cybersecurity policy in Nigeria.
5. Environmental policy under DT promotes government-private sector cooperation.

Monitoring

1. It offers a venue for national and sub-national monitoring of government performance.
2. Determine program influence and efficacy.
3. DT helps governmental agencies to develop capacities.
4. DT sets up a data management system for the National monitoring and evaluation system.

Discussion of Findings

The research examined how digital technologies may help Nigeria's environmental policy effectiveness. The results derived from both quantitative and qualitative data are listed below. The findings of this research sets out in line with the findings reached regarding empirical studies conducted on the role that digital technologies can play in supplementing environmental policy-making and execution. The findings of this study are consistent with those of Abbas et al. (2024; Diaz-Arancibia et al., 2024; Ramadiansyah & Pramana, 2024).



who found that digital technologies can enhance environmental policy efficiency by providing real-time monitoring of environmental conditions and promoting community engagement in conservation efforts. However, our study highlights the specific challenges and opportunities of using digital technologies in environmental policy-making and implementation in Nigeria, which adds to the existing literature on the topic. In line with these observations, the current study has noted that digital technology would be useful in making massive efforts in Nigeria to develop and actualize environmental policy.

The findings show that the technologies may not only help engage people in the area but also enrich data collection and analysis and improve surveillance and compliance, which increases the impact of environmental legislation. Such results are consistent with the findings of the Technology Acceptance Model (TAM) that assumes that the perceived utility and perceived ease of use can generate the attitude towards the acceptance and adoption of new technologies. The present research demonstrates that the issue of environmental protection in Nigeria is addressed by their environmental practitioners and legislators in respect to digital technologies that are viewed by them as convenient and helpful with positive effects regarding environmental policy.

The statistics also support those postulated in the Diffusion of Innovations Theory, which lays down the process of spreading new ideas and technologies in a social or organizational network. The findings show an embrace of the use of digital tools by the environmental practitioners and policymakers in Nigeria which, consequently, increase the efficacy of environmental policies. The same outcomes bring out the possible impediments that include inadequate support, cyberattacks, and lack of proper infrastructure. To cope up with these hurdles, the study proposes measures that should be adopted to ensure a wider adoption of digital technologies that would promote the sustainability agenda of Nigeria.

Also the DI theory suggests that digital innovations can be adopted and integrated into



environmental policy-making and implementation if they are perceived as having a relative advantage. The study's results show that policymakers and stakeholders in Nigeria perceive digital technologies as useful for improving environmental policy efficiency, which is consistent with the TAM. However, the study also highlights the challenges of limited infrastructure and inadequate capacity, which can affect the adoption and use of digital technologies. This suggests that the theories need to be adapted to account for the specific context of Nigeria.

Qualitative Results:

Theme 1: Advantages of Digital Technologies

"The digital technologies have increased the ability to collect and analyse data thus improving the policy evidence base. The signing of the more sophisticated digital tools allows the monitoring of the indicators of the environment systematically, which allows identifying trends and patterns more effectively ". Dr. O. A., 35yrs old Environmental Policy Analyst.

"I think digital technology has transformed us. We can now more effectively monitor environmental compliance and react swiftly to environmental disasters". Mr. I.O., 42 years old, Environmental Monitoring Officer.

Theme 2: Challenges of Digital Technologies

"One of our difficulties is a lack of infrastructure and means to enable digital technologies. Further funding in digital infrastructure and employee training is needed." 50-year-old Environmental Policy Maker Mrs. S.A.



"Cybersecurity is a top priority for us; therefore, we have to make certain our digital systems are safe and protected from cyber threats." Mr. T.O., IT expert, 38 years old.

Theme 3: Opportunities Offered by Digital Technologies

"Digital technologies provide many possibilities for environmental sustainability in Nigeria. We might use them to advance sustainable habits and lower trash." Dr. B.Z., Specialist in Environmental Sustainability, age 40.

"Digital tools enable us to interact with people more successfully and spread environmental consciousness. Social media and other digital channels let us reach a bigger audience." Mrs. N.Q., Environmental Educator, age 32.

Therefore, the study found that digital technologies significantly positively affect the efficacy of environmental policy in Nigeria. The results point up the benefits of digital technologies including better data gathering and analysis, improved monitoring and enforcement, and increased public involvement. Still, the study also pointed out shortcomings including insufficient resources, cybersecurity problems, and flawed infrastructure. The current paper formulates recommendations that would promote the implementation of digital technologies in environmental preservation plans in Nigeria. The empirical evidence shows that, under the right conditions, digital technologies significantly stimulate the effectiveness of the national environmental policy. The combination of these tools is useful in both the policy formulation and implementation as well as the monitoring of the same. Before the regression analysis was performed, the assumptions that were relevant, such as linearity, independence of observations, homoscedasticity, and normality were carried out systematically.



Regression Analysis Results

Table 4

Variable	Coefficient	Standard Error	t-value	p-value	Confidence Intervals (CI) 95%
Digital Technologies	0.35	0.10	3.50	0.001	(0.15, 0.55)
Policy Design	0.25	0.12	2.08	0.038	(0.01, 0.49)
Implementation	0.30	0.11	2.73	0.007	(0.08, 0.52)
Monitoring	0.20	0.10	2.00	0.046	(0.00, 0.40)

$$R^2 = 0.65$$

$$F\text{-statistic} = 10.23 \text{ (} p < 0.001 \text{)}$$

Authors Compilation

The results of the regression analysis show that digital technologies have a strong positive effect on environmental policy effectiveness in Nigeria. Using a coefficient of 0.35, digital technology reveals that a one-unit increase in it corresponds with a 0.35-unit boost in environmental policy effectiveness. A p-value of 0.001 means statistically significant connection between environmental policy efficacy and digital technology. The results also point to policy design, implementation, and monitoring as key determinants of environmental policy success. The coefficients of these variables are 0.25, 0.30, and 0.20 respectively; this shows that a one-unit increase in each of these variables correlates with a respective increase in environmental policy efficiency. The p-values of 0.038, 0.007, and 0.046 respectively point toward statistically significant relationships between these variables and environmental policy effectiveness. Also again, $R^2 = 0.65$, indicate that 65%



of the variance in environmental policy efficiency is explained by the independent variables, F-statistic = 10.23, $p < 0.001$ indicate that the model is fit and statistically significant, while confidence intervals (CI) provide the range of values within which the true population parameter is likely to lie including 95% confidence intervals for coefficients as shown above, DT coefficient is 0.35 with 95% CI of (0.15, 0.55).

Fundamentally, the regression analysis findings indicate that digital technologies have a great positive influence on Nigerian environmental policy effectiveness. The results explain the role digital technologies can play in improving civic engagement, stronger monitoring and enforcement activities, and data collection and analysis refinement. The report thus presents viable outlines to be undertaken to promote the application of digital devices in environmental sustainability in Nigeria.

Conclusion

In Nigeria, the study has shown how considerably digital technologies affect environmental policy effectiveness. The findings highlight how digital technology supports more public involvement, better data collecting and analysis, stronger surveillance and enforcement. Meanwhile, the study found issues that have to be resolved in order to fully utilize the potential of digital technologies: limited resources, cyber security problems, and insufficient infrastructure. Therefore, this study provides insights on the opportunities and challenges of utilizing digital technologies in environmental policy-making and implementation in Nigeria, therefore adding to the expanding corpus of research on the contribution of digital technologies to environmental sustainability, with ramifications for legislators, practitioners, and researchers. Ideas for future researchers

Building on this research, future academics can look at particular elements of digital technologies in Nigerian environmental policy-making and execution, including: They can



also do case studies of successful ICT projects, questionnaires to measure awareness and acceptance of digital tools among environmental stakeholders, and experiments to assess the efficacy of digital technologies in advancing environmental sustainability. Moreover, academics can use theoretical models like the Diffusion of Innovations Theory and the Technology Acceptance Model (TAM) to explain the adoption and implementation of digital technologies in environmental decision-making. Interdisciplinary methods offer whole solutions to environmental issues including collaborations with computer scientists, politicians, and environmental experts. Future academics can so direct policy and action by studying these areas and therefore deepen knowledge of the role digital technologies play in advancing environmental sustainability in Nigeria.

Recommendations

As a way to make environmental policy work more effectively in Nigeria, the following recommendations can be offered:

- i. Keep an extensive internet platform to collect, process and share the information thus enabling informed policy forming and decision making.
- ii. Use digital technologies especially using remote sensing and Internet of Things sensors to monitor the environment, detect pollution, and monitor the effects of climate change.
- iii. Undertake capacity building programs and trainings to enhance digital literacy and knowledge of environmental sustainability among decision makers, stakeholders and the local people.
- iv. Encourage unity between the government, the business sphere, civil society, and global organizations to maximize the utilization of digital technologies to keep the environment healthy.



v. Put in place strong cyber-defence to guard the environmental data and the associated infrastructure against cyber-attacks.

vi. Promote the use of data analytics and evidence-based decision making to design and put up environmental policy.

vii. Devise an elaborate data strategy in the case of Nigeria that will enable collection, storage, and use of environmental data.

By following these recommendations, Nigeria may harness the power of digital technologies to boost environmental protection, forward sustainable development, and increase the efficacy of environmental policy.

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