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Carbon Footprint Reduction through Digitalization: An Analysis of India's Digital India Program

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Abstract

The decrease of carbon footprint entails diminishing the aggregate emissions of greenhouse gases (GHGs), such as carbon dioxide (CO_2) and methane (CO_4), resulting from human activities. This is accomplished by deliberate modifications in daily practices and industry, including minimizing energy usage, embracing sustainable mobility, decreasing consumption and waste, and transitioning to renewable energy sources. This paper examines how India's Digital India program contributes to carbon footprint reduction through digitalization, acknowledging both its potential to improve efficiency and its associated digital carbon footprint. The program's initiatives, such as promoting digital payments and e-governance, can reduce paper usage and optimize resource allocation. However, the analysis should also consider the environmental cost of digital technology manufacturing, usage, and maintenance, suggesting a need for both digital transformation and green computing strategies.

1. Introduction

The process of digitalization, which has been advocated for by initiatives such as India's Digital India Program, has a dual-sided impact on carbon emissions. On the one hand, there is a primary advantage in the form of improved efficiency in the management of resources. On the other hand, there is a secondary difficulty that arises from the higher energy consumption that is required by digital infrastructure. According to a study of the program, there is a considerable opportunity to lower the carbon footprint of the program, especially through the implementation of measures such as digital payments and e-governance. However, the research also points out that it is essential to make a concentrated effort to switch to environmentally friendly energy sources. A total carbon footprint of 850 kilos per person per year is the result of the production and usage of digital devices, the transfer of data over the internet, and the utilization of data centers. If we want to ensure that climate change does not exceed bearable limits, this already constitutes about half of the carbon dioxide budget that is accessible to each individual. The digital carbon footprint refers to the "CO2 emissions or the aggregate greenhouse gas emissions arising from the production, utilization, and data transmission of digital devices and infrastructure." It includes the carbon emissions linked to the manufacturing, operation, and disposal of information and communication technologies and its supporting infrastructure.

2. The Role of Digitization in Carbon Footprint Reduction

The capability of digital technology to enhance efficiency and replace physical operations that are heavy in carbon is the foundational assumption underlying the strategy of carbon footprint reduction through digitization.

- **Improved Energy Efficiency:** By providing real-time data and facilitating more effective management, digital solutions such as smart grids and Internet of Things (IoT) sensors may improve energy use in a variety of industries, including agriculture and buildings.

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- **Resource Optimization:** By maximizing the use of shared resources, cloud computing and data analytics lessen the need for physical infrastructure and commodities.
- **Dematerialization and Service Substitution:** The transition from physical to digital services, such as e-governance, online banking, and digital education, decreases the demand for paper, physical travel, and brick-and-mortar infrastructure, which leads to a direct reduction in emissions.
- **Enabling Green Innovation:** By enhancing the flow of information and cooperation, digital platforms make it easier to develop and implement green solutions. These technologies include monitoring carbon capture and integrating renewable energy sources.

3. Analysis of India's Digital India Program

India's Digital India Program, which aims to transform the nation into a digitally empowered society, has laid a strong foundation for integrating these environmental benefits into its development.

Major Impact

- **E-governance and Public Services:** By making government services available online, the program has reduced reliance on physical paperwork and citizen travel to government offices, contributing to emission savings.
- **Digital Payments:** The unprecedented growth of digital payment systems like UPI has significantly reduced the need for cash transactions, leading to an avoidance of emissions associated with printing currency, managing ATMs, and physical bank branches.
- **Digital Infrastructure:** Initiatives like BharatNet, which enhances internet connectivity, enable these digital services to reach a wider population, thereby amplifying the potential for economy-wide efficiency gains.

4. Challenges and Considerations

Despite the clear benefits, the program faces challenges:

- **Increased Energy Demand:** The rapid expansion of digital infrastructure, particularly data centers and network equipment, leads to a substantial increase in electricity consumption, which, if sourced from fossil fuels, can raise the digital carbon footprint.
- **Hardware Production and Disposal:** The lifecycle of digital devices (production, usage, and disposal) also contributes to the overall carbon footprint.
- **Policy Gaps:** While general sustainability goals exist, a specific, integrated national policy for "green computing" or energy efficiency in the entire digital sector has been noted as a gap, though governmental bodies like the Bureau of Energy Efficiency (BEE) have labeling programs.

5. Strategies for reducing a carbon footprint:

a) Improve energy efficiency: Reduce energy consumption by using LED lights, choosing energy-efficient appliances, and properly insulating homes.
b) Switch to renewable energy: Transitioning to green energy sources like solar or wind power can significantly lower your footprint. This can involve getting your energy from a renewable provider or installing solar panels at home.
c) Change transportation habits: Opt for walking, cycling, or public transport instead of driving. Carpooling, using electric bikes, and choosing zero-emission vehicles are also effective alternatives.

- Reduce consumption and waste: Adopt a "reduce, reuse, recycle" approach to limit the production of carbon-intensive materials.
- Consume locally and sustainably: Buying local and seasonal products reduces the emissions from transportation.
- Support sustainable practices: Invest in companies or projects that focus on sustainability, such as reforestation or renewable energy initiatives.
- Conserve water: Using and heating less water lowers your carbon footprint.

Digital India aims to provide the much-needed thrust to the below listed nine pillars of growth areas:

i. Broadband Highways - This covers three sub-components, namely Broadband for All - Rural, Broadband for All - Urban and National Information Infrastructure (NII)
ii. Universal Access to Mobile Connectivity - This initiative focuses on network penetration and filling the gaps in connectivity in the country
iii. Public Internet Access Programme - The two sub-components of Public Internet Access Programme are Common Services Centres (CSCs) and Post Offices as multiservice centres
iv. e-Governance: Reforming Government through Technology - Government Process Re-engineering using IT to simplify and make the government processes more efficient
v. e-Kranti - Electronic Delivery of Services – Transforming e-Governance for Transforming Governance
vi. Information for All - Online hosting of information & documents would facilitate open and easy access to information for citizens
vii. Electronics Manufacturing - This pillar was to promote electronics manufacturing in the country with the target of NET ZERO Imports
viii. IT for Jobs - This pillar focuses on providing training to the youth in the skills required for availing employment opportunities in the IT/ITES sector
ix. Early Harvest Programmes - Early Harvest Programme basically consists of those projects which are to be implemented within short timeline

6. Some notable Digital India efforts and achievements:

a. Aarogya Setu App: This is a digital contact tracking app that is used in India, and it has been downloaded 192 million times across the Android, iOS, and KaiOS platforms (Businessworld, 2021).
b. As of this date, 458 million individuals have registered for the COVID-19 immunization using the Cowin portal, which is the official vaccination registration website for India (cowin.gov.in).

7. CSD Working Paper Series: Towards a New Indian Model of Information and Communications Technology-Led Growth and Development

a. e-NAM is the electronic trading portal for farmers and has onboard 17.1 million farmers (enam.gov.in))
b. Jan Dhan Accounts- universalizing bank accounts for every household 428 million bank accounts (pmjdy.gov.in)
c. Direct Benefit Transfer (DBT)- 17.6 trillion Rupees government welfare benefits cumulatively transferred directly to beneficiary bank accounts (dbtbharat.gov.in)
d. Svanidhi Scheme to facilitate street vendors to access affordable working capital loan 4.3 million applications (pmsvanidhi.mohua.gov.in)
e. Aadhaar- unique number assigned to an individual and can be used as an identity document in India 1.24+ billion. Aadhaar enabled Direct Benefit Transfer has delivered around 6 billion transactions worth Rs 5.25 trillion in Financial Year 2020- 21. The removal of ghost accounts and checking the leakage has saved the Government exchequer of value worth Rs 1.78 trillion (Businessworld 2021, uidai.gov.in)
f. Jeevan Pramaan digitizes the whole process of securing the life certificate required for purposes like accessing pensions 45.8 million pensioners have submitted digital life certificates (jeevanpramaan.gov.in)
g. PM Kisan DBT income transfer to around 100 million farmers (pmkisan.gov.in)
h. UMANG is an M-Governance application that provides a single platform for all Indian Citizens to access pan India e-Government services ranging from Central to Local Government bodies of 259 Departments providing 21500+ services (umang.gov.in)
i. Common Service Centres are centres that ensure that the government services are available near the locality of citizens living in villages and remote areas. 350+ services are delivered to citizens near their locality through the network of 374 thousand CSCs (Businessworld, 2021)
j. Digi Locker aims at ‘Digital Empowerment’ of citizen by providing access to authentic digital documents to citizen’s digital document wallet 74.2 million users and 4.3 billion documents (digilocker.gov.in)

k. Government e-Marketplace- dedicated e market for different goods & services procured by Government entities has 2.3 million sellers offering 3.7 million products and 0.1 million services and Rupees 1.26 trillion in transactions already (gem.gov.in)
l. Eshakti NABARD 1.25 million SHGs digitized (digitisation of all the SHG accounts), covering 14 million women leading to 'one-click' availability of social and financial information of all the members of the SelfHelp Groups and the SHGs (eshakti.nabard.org)
m. MyGov platform; it is a citizen engagement platform. MyGov users have increased from 11.1 million on 1st April 2020 to 18.6 million in August 2021 (Businessworld, 2021, mygov.in)
n. Unified Payment Interface – Launched in 2016, it has assumed leadership position in only 5 years and contributed 3.24 billion transactions valued at more than Rs 6 trillion in the month of July 2021 alone (npci.org.in)
o. GST Network – it is the platform for the goods and services tax; it has on boarded 12.8 million taxpayers and has processed Rs 34.14 trillion worth of payment (Businessworld, 2021)
p. Sectoral Platforms for health, education and GIS like the e-Hospital platform (for Healthcare), e-Sanjeevani (Tele-medicine consultation), DIKSHA and SWAYAM

8. Conclusion

Primarily by increasing efficiency and dematerialization, the Digital India Program has the potential to serve as a major catalyst for a future that is characterized by a smaller carbon footprint. Having said that, achieving this potential is contingent upon proactively addressing the escalating energy demands of the digital sector by actively investing in renewable energy sources and establishing mandated efficiency requirements for digital infrastructure. The backdrop for the integration of the program's aims with long-term environmental sustainability targets is made plain by India's commitment to the achievement of net-zero emissions by the year 2070. The primary objective of the study paper was to make clear the financial burden of digital transformation and the actions that have been implemented in order to achieve environmental sustainability in the middle of the technologies that are still being developed. In order to achieve a more environmentally friendly growth and to mitigate the effects of global warming, it is essential to monitor one's digital carbon footprint. In addition, this research provides insight into the potential of digital transformation to serve as both a blessing and a curse to the globe if it is not managed correctly. The findings of this investigation, which include the effects of the digital carbon footprint and the ways in which these can be overcome by transitioning to renewable energy sources, as well as the methods by which we can diminish the footprint through a reduction in the utilization of digital devices, are presented here.

An overview of the digital carbon footprint is what our research has attempted to provide. 8 This paper provides a foundation for research to be conducted in the future or for a study of how to achieve environmental sustainability. Digital India uses digital monitoring and assessment technologies to increase process efficiency, access to government services, citizen-government interaction, and transparency. For such objectives Digital India includes measures such as faceless tax assessments, online panchayat account audits, and geotagging of public assets. These projects indicate a shift from outdated systems and an indication of change. Change is tough at any size, but especially at a Government operations and systems scale enormously. Thus, Digital India needs ongoing support. To overcome citizen aversion to digital efforts, grievance redressal must be rapid, easy, and decentralized. Policy concerns also involve state governments more. States in India have more contact with residents, therefore their desire to digitize is vital for Digital India's goal of citizen digital empowerment. Thus, governments adopting the essence of Digital India will eventually digitise India. The Digital India plan is relevant and has been running for 7 years, demonstrating its relevance and the digitization concerns it attempts to address.

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