

ROLE OF DIGITAL PUBLIC INFRASTRUCTURE IN FINANCIAL INCLUSION

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Abstract

Digital public infrastructure (DPI) is a new term referring to the basic capabilities that are building blocks for developing digital services at a societal scale. It is the intermediate layer between physical infrastructure (for example, broadband and data centres) and sectoral applications (for example, social protection and e-commerce). The most common types of Digital public infrastructure are platforms and systems for digital identification (ID), digital payments, and data sharing. With digital transformation of economies and societies progressing at an increasingly rapid pace, the global community has recognized the need for clear policies, increased financing, creative innovation, and effective regulation of digital technologies to serve the public good and enhance financial inclusion of underserved populations. This paper attempts to understand in detail about the digital public infrastructure, its importance, approaches and various challenges faced while implementation of it in India. This paper examines the impact of digital public infrastructure in India and also aims to study the role of digital public infrastructure in the area of financial inclusion. In this study we also came to know about how India used digital public infrastructure to foster financial inclusion.

Keywords: [Digital public infrastructure, Financial inclusion, Economic growth, Digital transformation]

Introduction

Digital public infrastructure, or DPI, brings together these priorities in a holistic framework for countries to adopt and adapt per their own developmental objectives. The Group of Twenty (G20) New Delhi Leaders' Declaration defines DPI as "a set of shared digital systems that are secure and interoperable, built on open technologies, to deliver equitable access to public and/or private services at a societal scale." As in the case of India, successful DPI requires a symbiotic and mutually reinforcing relationship between the public and private sectors on public policy, digital assets, and market innovation. Digital Public Infrastructure refers to platforms such as Identification (ID), payment and data exchange systems that help countries deliver vital services to their people. It has transformed the way governments operate, and India is no exception. India has undergone a new wave of digital public infrastructure developments that have significant implications for its economic and social development. Digital financial services, based on technology-driven innovation, contribute to enhanced financial inclusion at affordable prices, which potentially reaches many new people who are unbanked or under banked. Digital

finance has the potential to transform emerging market and advanced economies alike. India's approach rests on the principle of providing digital financial infrastructure as a public good.

Objectives Of Study

The present study has been taken with an overall objective of highlighting the following aspects-

1. To understand the digital public infrastructure and its importance.
2. To study the role of digital public infrastructure in the area of financial inclusion.
3. To know about how India used digital public infrastructure to foster financial inclusion.
4. To study various approaches of digital public infrastructure and challenges faced while implementation.

Review Of Literature

Poole, Toohey, and Harris (2014) argue, "Public infrastructure is an investment where the government has the primary role in, and responsibility for, deciding on whether and how the infrastructure is provided in the interests of the broader community and extends beyond infrastructure that is owned or directly funded by the public sector." This definition can be expanded to cover

this new concept of DPI. In fact, the private sector has a key role to play in the design and implementation of DPI- for example, as developers of use cases and services that drive adoption, as service providers and sources of innovation for development of DPI, as operators of DPI, and as participants in publicprivate partnerships and other collaborations to achieve scale.

As recognized by the G-20, DPI is just as much about governance and community as it is about technology. The paradigm shift toward a horizontal mind-set for digitalization can only be realized if there is a whole-of-country approach that facilitates coordination across government (including regulators) and collaboration with the private sector, civil society, and other stakeholders. The other necessary elements of governance include transparency and accountability, political will to clarify roles and responsibilities, and legal and institutional safeguards to protect against misuse.

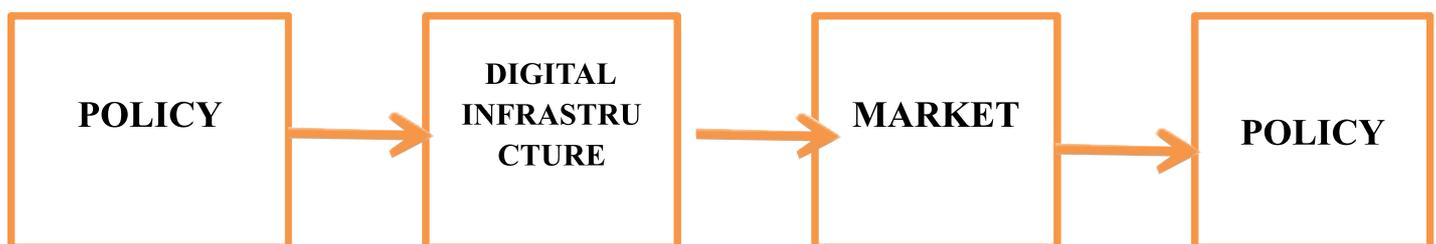
(Khera and sahay 2021) Technological developments are changing the way people access financial services. Digital financial services are faster, more efficient, and typically cheaper than traditional financial services and therefore increasingly reach lower-income households and micro, small, and medium enterprises (MSMEs). Although digital financial services are still small relative

to traditional services, they are growing rapidly and at varying speeds across regions and countries.

Meaning Of Digital Public Infrastructure

Digital Public Infrastructure refers to the basic capabilities such as for identification, payments, and data sharing that are the building blocks for developing transformative digital services at a societal scale. At its simplest, it can be understood as an intermediate layer in the digital ecosystem. It includes a physical layer (including internet connectivity, devices, servers, data centres, the cloud, and routers) and enables applications across various sectors (for example, information systems and solutions to different verticals, e-commerce, social protection and remote education). The focus on reusable and horizontal foundations is a paradigm shift from conventional approaches to digitalization that have in many cases led to fragmentation. The "public" in Digital Public Infrastructure refers to public benefit and common good, not government ownership. The intention is to convey that digital ID, digital payments, data sharing, and other foundational capabilities are just as important for the functioning and transformation of economies and societies in today's digital age as physical infrastructure like roads and railways were in previous centuries.

India's Digital Public Infrastructure Framework:



SERVICES GIVEN BY DIGITAL PUBLIC INFRASTRUCTURE

The common enabler behind all these experiences is digital public infrastructure, which includes the solutions and systems that facilitate essential society-wide functions and services such as:

- **Identification:** the ability for people and businesses to securely verify their identity, as well as complementary trust services such as electronic signatures and decentralized, verifiable credentials (e.g., academic qualifications, passports, and driver's licenses).

- **Payments:** easily transferring money between people, businesses, and governments.
- **Data exchange:** seamless flows of data across government and the private sector, with safeguards for personal data protection like consent.

Importance Of Digital Public Infrastructure

1. Foundational & cross-cutting- Verifying an identity or making and receiving a payment are at the core of most transactions, and thus having digital public infrastructure prevents the need to re-invent the wheel with every new system. This is a distinction between digitalization in specific sectors, which is very important, and the processes supported by a digital public infrastructure.

2. Complements and works together at policy, process, and technology levels- A person can use their digital ID to exercise consent over sharing their personal data from official sources, or a small business could use payment transaction data to access cheaper credit. These connections can also be described as a digital stack.

3. Enables sectoral applications to be easily built on top- Government agencies and the private sector can focus on their core business and innovate when they do not need to recreate the wheel and can instead depend on the processes that digital stacks support, enabled by standards (e.g., for data and semantics) and open application programming interfaces (APIs) that allow different systems to communicate with each other.

4. Public benefit -We argue that the 'public' refers to governments having a primary role and responsibility in deciding whether and how DPI is provided in the interests of the broader society and economy, such as through regulating, operating, and partnering with the private sector.

Just like railways and roads were instrumental for how economies and societies have evolved and integrated, digital public infrastructure positively transforms how people and businesses around the world access services

and economic opportunities and how governments can meet the needs of their constituents. Apart from improving the quality of these services and allowing the development of new products and services, digital public infrastructure can also make them more inclusive by removing physical and cost barriers.

Impact Of Digital Public Infrastructure In India

Digital public infrastructure has a significant impact on India's economy and society. The impact can be seen in the following areas:

1. Financial inclusion: UPI has played a significant role in promoting financial inclusion in India. UPI has made it easier for the unbanked population to access digital financial services, reducing the cost of cash handling and promoting financial literacy.

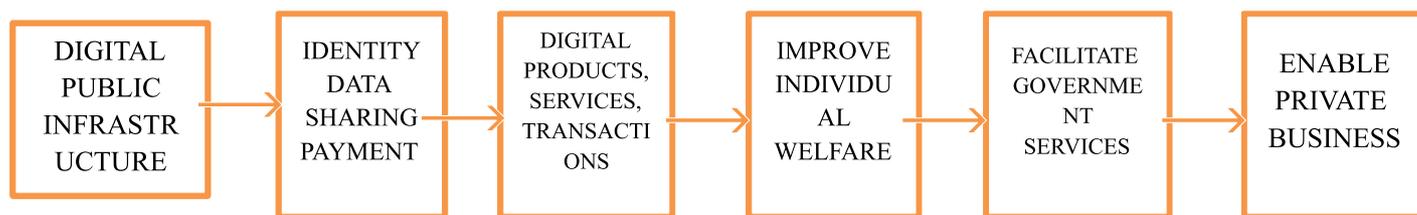
2. E-Governance: Aadhaar has enabled the government to implement various e-governance initiatives such as Direct Benefit Transfer (DBT), which has reduced corruption and leakage in welfare schemes. Aadhaar has made it possible to create a digital identity for citizens, enabling the government to provide services in a more efficient and transparent manner.

3. Business efficiency: GSTN has simplified the tax administration process, reducing compliance costs for businesses and promoting transparency in tax administration. GSTN has made it possible for taxpayers to file returns online, reducing the time and cost of compliance.

4. Education and research: It has facilitated collaboration and resource-sharing among academics and research institutions, promoting innovation and knowledge sharing. It has made it possible for researchers to collaborate and share resources and data, accelerating the pace of research and development.

Digital public infrastructure represents a transformative shift in a country's approach to digitalization. The broad theory portrayed in figure can be applied to any element of DPI. Implementation of one or more elements

expected to act through various mechanisms to improve individual welfare, facilitate public services and efficiency, and enable commerce and innovation. As the adoption continues to scale up, it may become possible



Approaches To Digital Public Infrastructure

The approach to governing and implementing digital public infrastructure including individual layers, will differ markedly among countries, reflecting differences in the political economy, legal, and sociocultural circumstances of the country as well as the desired outcomes. In the case of digital identification, there are three well-established architectural approaches that, importantly, are not necessarily mutually exclusive.

1. Centralized- A centralized approach has a single authority (typically a government agency) for issuing and authenticating identity credentials. Examples include India's Aadhaar.

- The advantage of this approach is its simplicity for users and service providers.
- The disadvantage is the absence of choice for users and service providers, potentially monopolistic effects on pricing, and the possibility of limited incentives for innovation.

2. Federated- A federated approach has an ecosystem of authentication providers (from the public or private sectors or both) that users can choose from, operating according to common standards to achieve interoperability and portability. Although there are several providers of identity credentials and authentication services, the data they use are typically from a centralized source, such as a national identification (ID) system or civil registry.

- The advantages of this approach are the provision of choice and lower pricing through competition.

in the future to measure the distinct impact of applying its approach in addition to studying the effects of its subcomponents.

- The disadvantages are potential complexity for users and the need for strong supervisory and regulatory capabilities, which are often lacking in low- and middle-income countries.

3. Decentralized- This emerging approach involves authentication against a credential that is fully controlled by the user (for example, a digital wallet on a smartphone). In contrast to the other two architectures, the issuer of the identification (for example, a national ID or driving license authority) will not know about authentications that take place, since this verification is done against the credential, typically using asymmetric cryptography.

- The advantages are the increased privacy and potential for greater interoperability and portability.
- The disadvantage is the complexity for users and service providers, especially the other architectures.

Challenges Faced While Implementing Digital Public Infrastructure

While digital public infrastructure has brought significant benefits to India, there are also challenges and controversies associated with these initiatives. Some of the key challenges and controversies include:

1. Privacy concerns: The Aadhaar initiative has faced criticism over privacy concerns. Critics argue that Aadhaar collects sensitive personal information that could be used for identity theft and other malicious activities.

2. Security risks: UPI has faced criticism over security concerns, with reports of fraudulent transactions and

security breaches. UPI's security concerns have raised questions about the safety and reliability of digital payment systems.

3. Implementation challenges: The implementation of digital public infrastructure has also faced challenges. For instance, the implementation of GSTN faced initial technical glitches, causing delays in the filing of returns. Similarly, the implementation of Aadhaar faced challenges in the enrolment process, with reports of errors in the biometric identification process. Another challenge is the digital divide, which refers to the gap in access to digital infrastructure between different sections of society. The digital divide could prevent the full benefits of digital public infrastructure from reaching marginalized communities, exacerbating existing inequalities.

4. Exclusion from services: Poorly designed DPI can create unnecessary barriers for people and firms to access services. Systems and processes need to be reimaged, since digitalizing poor practices will lead to poor digital practices.

5. Data protection and security breaches: Leaks and misuse of data, not just of DPI but also of the applications using DPI, can erode public trust and have potentially disastrous consequences. Continuous investment in security postures and in legal and institutional frameworks for protecting personal data can reduce these risks.

6. Vendor and technology lock-in: Inadequately selected or procured technology can lead to a dependence that makes it harder to adapt DPI and can increase the total cost of ownership in the medium and long terms. The risk can be reduced substantially by building capacity to manage procurement and contracts effectively, by using modular designs, and by adopting open standards.

7. Inertia and legacy legal frameworks: Resistance to the changes that can be brought about by DPI can come from a variety of sources. A comprehensive review and reform of laws and regulations may be needed to address

this key bottleneck.

How To Build Good Digital Public Infrastructure

Following are the some suggestions or success factors which should have to be followed to build good digital public infrastructure.

1. Focus on use cases- Building digital public infrastructure (DPI) for its own sake is unlikely to achieve high adoption. The design of DPI should be driven by solving real world problems that people, firms, and government agencies face.

2. Prioritize inclusion and universal accessibility- DPI should be designed to work for all parts of society, which means accommodating various factors (for example, access to digital infrastructure and devices, awareness, skills, and trust in technology) and ensuring accessibility for individuals with different needs, including those with disabilities.

3. Build public trust and accountability- Adoption is enabled at a faster rate when all stakeholders have confidence that DPI works as intended and is in their best interests and that grievance redress mechanisms are in place.

4. A whole of country approach and public private partnership- The shift in mind-set requires coordination and collaboration across a wide range of stakeholders; a whole-of-country approach benefits from having a singular vision.

5. Promote interoperability- The true power of DPI comes when different layers or elements can work together to enable exponential innovation. The adoption of common standards and open application programming interfaces can help to address this need.

6. Strengthen capacity and culture in government- Civil servants need incentives to take risks and to think and act boldly. Budget and procurement policies may also need to be made fit for purpose.

7. Cross border use of DPI- as DPI gains global traction, there is an opportunity for enhanced regional and international cooperation to establish standards for cross border use. This cooperation includes mutual

recognition of digital IDs, interoperable fast payment systems, and secure data sharing. Such cooperation can lower the costs and risks associated with international transactions, such as remittances, access to services across borders, and cross border data flows.

Research Methodology

Research Methodology is a way to systematically solve the research problem. The Research Methodology includes the various methods and techniques for conducting a research. Here Descriptive research is done through questionnaires or interviews (person or phone), or through observation. For present study, the research was descriptive and conclusion oriented.

Sampling Technique: Convenience Sampling was used to select the sample. Convenient sampling is a non-probability sampling technique that attempts to obtain a

sample of convenient elements .In case of convenience sampling, the selection of sample depends upon the discretion of the interviewer. In this project, Questionnaire Method was used for the collecting the data. With the help of this method of collecting data, a sample survey was conducted.

Tools of Presentation & Analysis: percentage, bar graphs and pie charts are used to analyse the data obtained with the help of questionnaire.

Data collection: Data Information has been collected from both Primary sources include questionnaires, direct interviewing and Secondary Data includes text books and internet.

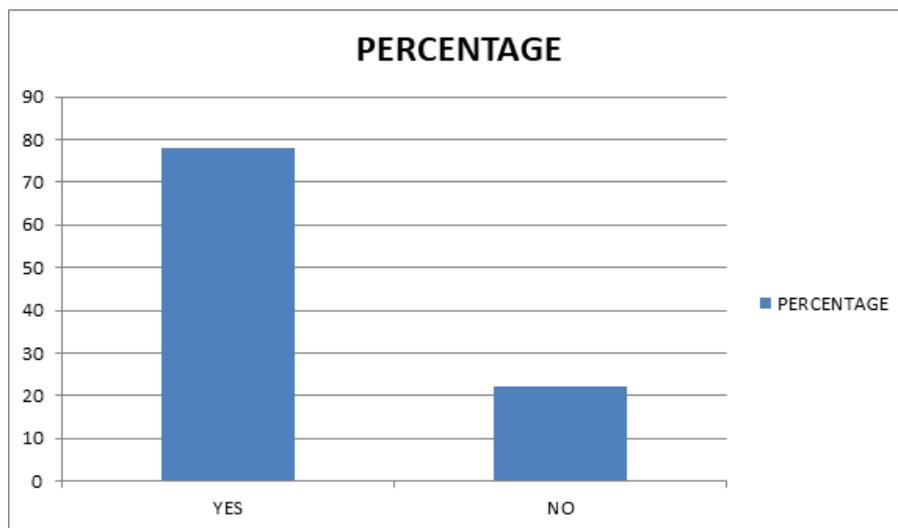
Data Analysis And Interpretation

Q1. Have you heard about digital public infrastructure and various technological facilities covered under it?

Table No.1

OPTIONS	RESPONSE	PERCENTAGE
YES	78	78
NO	22	22
TOTAL	100	100

Figure No.1



Interpretation:

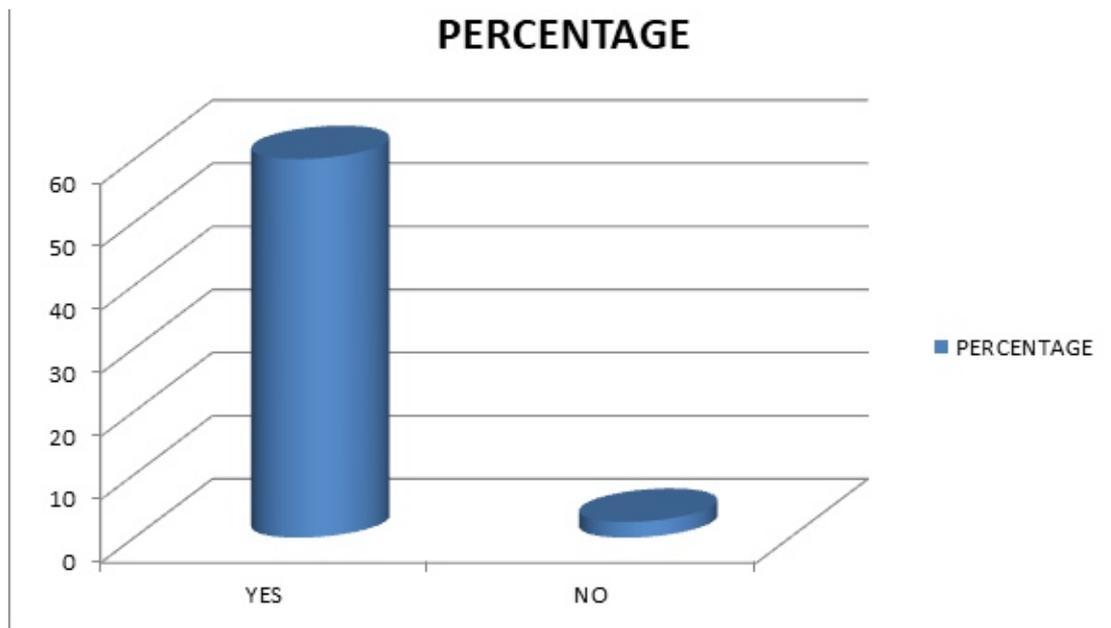
- Majority of the respondents are known about the availability of facilities given under digital public infrastructure.
- Very few people are still unaware about the facilities of digital public infrastructure due to some reasons.

Q2. Do you use mobile phone, digital wallets or any other banking platform to pay bills, send or receive money?

Table No.2

OPTIONS	RESPONSE	PERCENTAGE
YES	60	60
NO	40	40
TOTAL	100	100

Figure No.2



Interpretation:

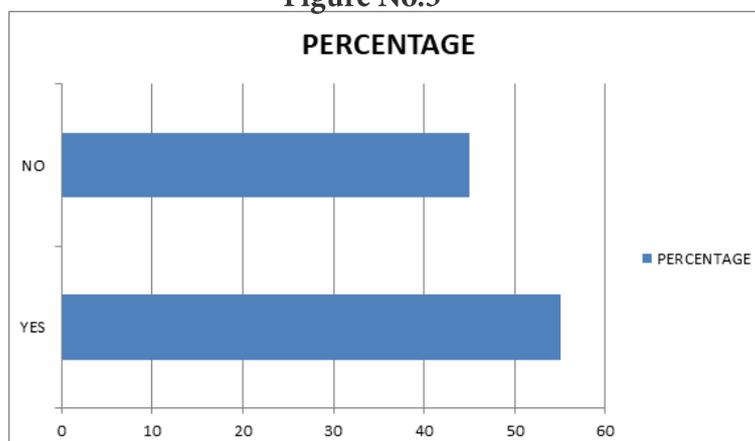
- More than half of the people use digital services given under digital public infrastructure.
- Some people are still unaware about the digital facilities of digital public infrastructure.

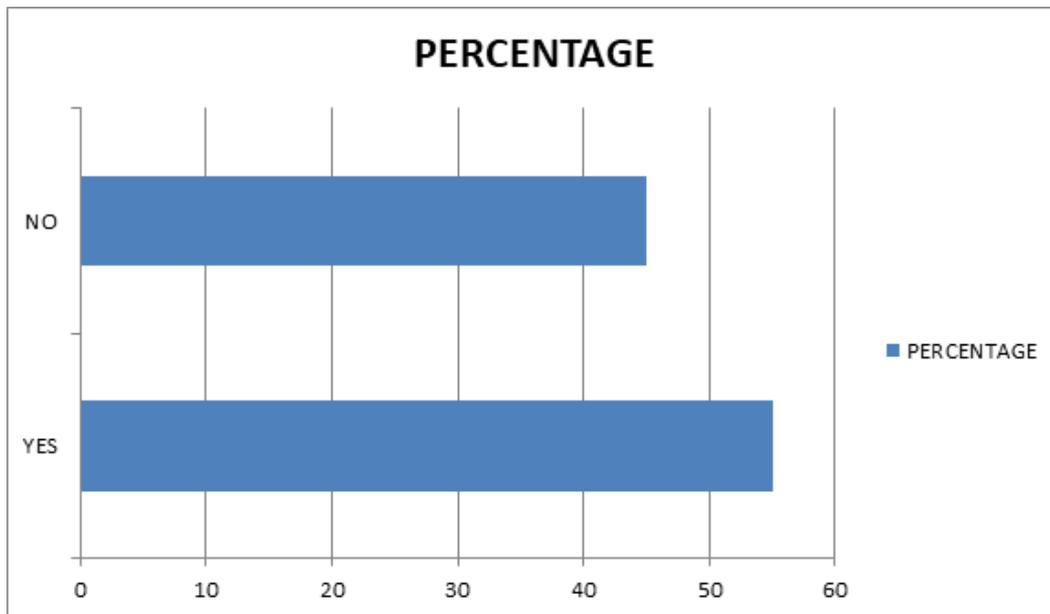
Q3. Have you experienced an increase in financial access after the implementation of digital public infrastructure?

Table No.3

OPTIONS	RESPONSE	PERCENTAGE
YES	55	55
NO	45	45
TOTAL	100	100

Figure No.3





Interpretation:

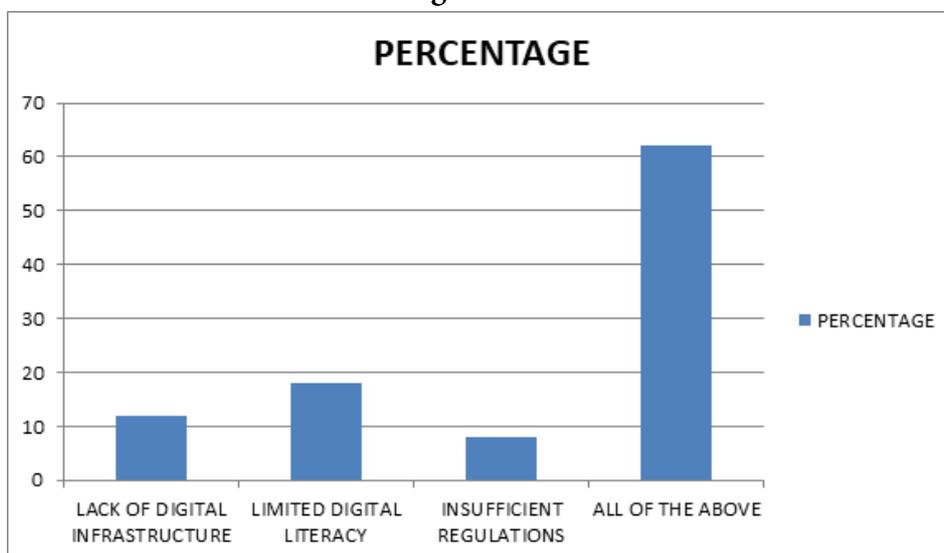
- Lot of people find and experienced an increase in the access and usage of digital financial services after the implementation of digital public infrastructure.
- Some people are still not experiencing any difference in the access or usage of digital financial services.

Q4. What do you think are the major challenges to enhancing digital financial inclusion in India?

Table No. 4

OPTIONS	RESPONSE	PERCENTAGE
Lack of digital infrastructure	12	12
Limited digital literacy	18	18
Insufficient regulations	8	8
All of the above	62	62
TOTAL	100	100

Figure No.4



Interpretation:

- Majority of people are in favour that all these are proving as challenges for the implementation of digital public infrastructure.
- Very less people thinks that insufficient regulations are a challenge in front of growth of digital public infrastructure.

Q5. What do you think are the major opportunities for enhancing digital public infrastructure in India?

Table No.5

OPTIONS	RESPONSE	PERCENTAGE
Growing mobile penetration	18	18
Increasing digital literacy	15	15
Development of digital payment systems	21	21
All of the above	46	46
TOTAL	100	100

Figure No.5

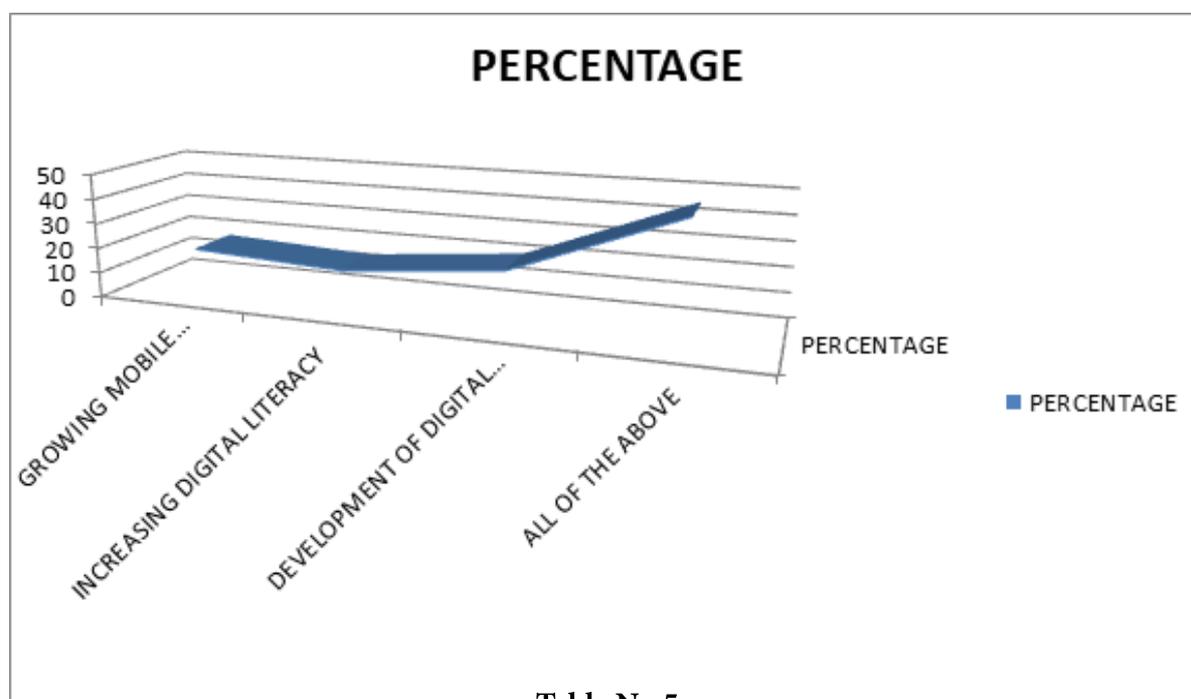
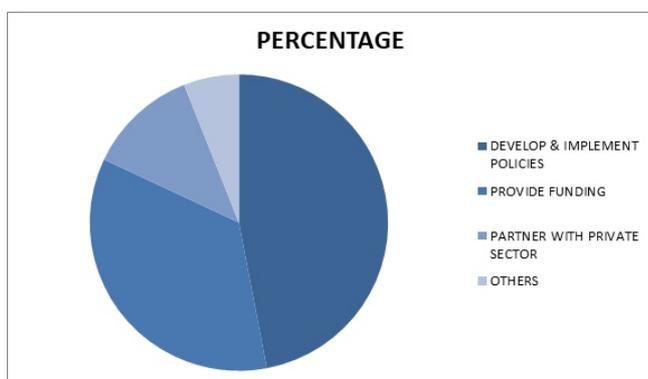


Table No.5

OPTIONS	RESPONSE	PERCENTAGE
Develop & implement policies	47	47
Provide funding	35	35
Partner with private sector	12	12
others	6	6
TOTAL	100	100

Figure No.5



Interpretation:

- Majority of people are in favour that government should take some steps for promoting digital public infrastructure.
- Out of these steps, opinion of the majority people are that government should have to develop & implement policies for the enhancement of digital public infrastructure.

Findings/Results

1. In addition to the impact on the livelihood of households, our findings indicate that digital public infrastructure efforts could also have direct effect on macroeconomic development and growth, from which poor and low-income people in turn would benefit.
2. It is observed that despite of some challenges being faced while the implementation of digital public infrastructure people experiences more access and ease while using digital financial services.
3. There are still many opportunities exist like growing mobile penetration, increasing digital literacy, development of digital payment systems and others for further enhancement of digital public infrastructure in better terms.
4. Our findings indicate government should also take some steps like funding of various projects, develop & implement policies and regulations for development and growth of digital financial inclusion and digital public infrastructure.

Limitations

This report had to work under several constraints and

limitations. Some of the key limitations are.

1. The sample size taken was small, therefore it can be said that the chosen sample is not the representative of the whole population and this hindered quantitative research.
2. The psychology and temperament of a respondent play a significant role. Some respondents are more sensitive as against this that is more tolerant. A change in the composition of the respondents can affect the answers adversely or favourably.
3. Respondents may not have been true in answering various questions and may be biased to certain this questions.

Conclusion

1. Digital financial inclusion is an important and relevant topic for India, as it has the potential to improve the lives and livelihoods of millions of people who are excluded or underserved by the formal financial system.
2. Digital India is a key initiative that has contributed to the expansion and improvement of digital financial inclusion in India, as it has provided digital infrastructure and services to all citizens, especially in rural areas.
3. However, there are still significant challenges and opportunities for enhancing digital financial inclusion in India, such as the limited digital literacy among the population, the lack of digital infrastructure, the insufficient regulations, the increasing digital literacy among the population, the development of digital payment systems, and the growing mobile penetration.

4. The government, the private sector, and civil society organizations all have important roles to play in promoting digital financial inclusion in India, and they need to work together and coordinate their efforts and actions to achieve the common goal of digital financial inclusion for all.

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