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DIGITAL PUBLIC INFRASTRUCTURE IN INDIA: EMERGING TRENDS IN THE SECTOR WITH REFERENCE TO THE "OPEN NETWORK FOR DIGITAL COMMERCE" PLATFORM

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Abstract

Digital Public Infrastructure is now acknowledged as a significant contributor to the 4th industrial revolution and an essential requirement to a nation's economic growth. Even if economic activities depend more and more on digital public infrastructure, emerging economies find it difficult to develop a strong digital public infrastructure because of low affordability index and lack of cooperation amongst different stakeholders.

The "Open Network for Digital Commerce" (ONDC) is an open-protocol digital platform that will enable local businesses in all economic sectors such as auto, grocery, restaurants, beverages, bookings for different services, hospitality, and tourism to be recognized and searchable by websites and applications. This digital tool aims to break up the monopoly of large companies, provide new opportunities, and support small businesses, micro, small, and medium-sized organizations by giving them access to top-tier platforms.1

With the global economy becoming increasingly digital, companies are looking for creative methods to engage with customers. The "ONDC" is a new network that aims to facilitate "digital transactions" between businesses of all sizes by giving them a platform to communicate with one another. The internet has completely changed how people interact and trade in recent years. With the popularity of online shopping growing, it is critical for companies to stay competitive to have a strong digital infrastructure. Digital commerce conducted online is flourishing and growing quickly. Traders, especially smaller ones, would be allowed to store their data on ONDC in order to contact customers and establish credit history.2

Additionally, platforms would be specifically created to comply with the "Digital Personal Data Protection Act, 2023" and the "Information Technology Act, 2000". Regardless of the platform or the application that they are using, ONDC hopes to enable digital connections and business transactions between customers and sellers via an open network (ON).3

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1 Ram Girdhar, "Open Network for Digital Commerce in India: Opportunities and Challenges" 21(1) Business, Management and Economics Engineering 645 (2023).

Keywords- *Digital Infrastructure, Digital Commerce, Public Goods, Digital financial services, Open Network, Digital monopoly*

Aims and Objectives of the Study

The objective of this research is to comprehensively assess the changing landscape and gap between Traditional Agricultural Practices, Plant Genetic Resources and Protection of Plant Varieties and Farmers' Rights in the Indian context. This research aims to:

1. To analyze the Digital Public Infrastructure in India.
2. To understand the emerging trends in the sector with reference to the ONDC Platform.

Research Methodology

Doctrinal Methodology: This project explores the Digital Public Infrastructure in India, the emerging trends in the sector with reference to the ONDC Platform. In order to carry out the study, various research articles on the above topic have been consulted. It has been further substantiated by papers available in online journals. The methods used are doctrinal, qualitative and multi-disciplinary in order to bring about a holistic approach to the study.

DIGITAL PUBLIC INFRASTRUCTURE IN INDIA

The hardware and software resources needed to make data, computerized devices, techniques, systems, and processes usable are referred to as "Digital Public Infrastructure" (DPI). Numerous efforts for the development of digital infrastructure have been launched by the "Government of India" (GOI). Government-to-Citizen, Government-to-Government, Government-to-Business, and Government-to-Education are some of the categories for digital infrastructure. Online communication between government agencies is supported by "Government-to-Government". "Government-to-Citizen" suggests that citizens are permitted to access government data and carry out transactions online. Businesses may obtain government data and conduct online transactions with government entities, thanks to "Government-to-Business". The term "Government-to-Education" describes the online retrieval of research and educational materials.4

"Digital Public Goods" (DPGs) are electronic channels that are vital to the provision of basic services for the good of society at large. These Digital Public Goods operate on "Digital Public Infrastructure", consisting of openly available, compatible platforms open to both users and developers.

India, as a front runner in this category, has commendably launched multiple DPI trials, such as account aggregators, "Unified Payments Interface", and the "Aadhaar" system. These programmes have transitioned the digital environment and also made it easier for socio-economic and financial inclusion in multiple fields. The "Digital Public Infrastructure" ecosystem in India, also called the "India Stack", consists of separate though linked "blocks" which operate as payment systems, identity confirmation as well as permission and data sharing systems. India Stack's modular layers foster competitiveness, inclusivity, and innovation in the digital sphere.[5]

[2] Dr. A. Shaji George, A.S. Hovan George, "Open Network for Digital Commerce (ONDC): Democratizing Digital Commerce and Curbing Digital Monopolies in India" *1(2) Partners Universal International Research Journal 92-93 (2022).*

[3] *Supra* note 2, at 93.

[4] Dr. Ajay Dutta, Novedeep Jeerh, "Digital Infrastructure Development in India for Citizen Empowerment" *11(1) International Journal of Creative Research Thoughts 617 (2023).*

[5] *Supra* note 4, at 619.

"India Stack" is a set of "Application Programming Interfaces" (APIs) that enables the governments, companies, startups, entrepreneurs and developers to leverage a distinct digital public infrastructure in order to address India's pressing issues in the direction of providing services that are presence-less, cashless, and paperless. It seeks to liberate identity, data, and payments which are the economic building blocks at the population level. The "India Stack" vision is not country-specific; it may be implemented in any country, developed or developing.

The idea for this plan originated in India, where it was quickly adopted by billions of people and enterprises, putting the nation in a position to benefit from the "Internet Age" and encourage social and financial inclusion.[6]

Some of the essential elements in order to create inclusive Digital Public Infrastructure are -

- **User-Centric Design**: Giving users' wants and preferences first priority, lowering technological risks, and accommodating a range of demographics—including those with poor digital literacy or little access to smartphones.
- **Policy Targets**: To control information leaks amidst the community and regions and to protect the data privacy of the population, thus making "inclusion" the primary goal of the regulatory frameworks.
- **Preparing Use Cases**: The goal is to locate underserved areas and create use cases which are best suited to meet the emerging needs, thus monitoring the results on receptive clients regularly via feedback loops and disconnected data collection systems.
- **User Participation**: To increase user participation with the use of offline channels as well as to increase institutional capabilities and build trust and public awareness. Also, to utilise dependable human contacts, such community leaders or business correspondents, to help vulnerable customers feel more at ease using digital platforms.

Contemporary administration requires a strong "Digital Public Infrastructure", and India has made great strides in this area. But overcoming obstacles and keeping up with technology developments are essential to its continuous success in offering its residents effective and easily available digital services.[7]

IMPACT OF DIGITAL PUBLIC INFRASTRUCTURE ON THE SOCIO-ECONOMIC CONDITIONS IN INDIA

The country has benefited greatly from "Digital Public Infrastructure". It has aided in the transformation of several industries, including finance, healthcare, and education. Some of the sectors in which it has brought transformation are as follows -

India's Digital Public Infrastructure has played a critical role in boosting the country's Financial Inclusion. Lakhs of people now have accessibility to digital financial services such as online mobile based payments as well as digital wallets, thanks to the "Unified Payments Interface". By providing a secured and trustworthy mechanism to verify one's identity, "Aadhaar" has supported in minimizing the number of people who are excluded from the financial system of the country.

The national "Health Stack", operating on the "India Stack", tries to create a national "digital health ecosystem" connecting diverse participants ranging from patients, healthcare professionals as well as insurance companies. The formation of a digital place for medical and related data, telemedicine and also e-prescriptions, the "Health Stack" is poised to uphold the quality and access to health and medical care related services in India.

The popular "DigiLocker" system has provided relief and comfort to students while accessing and sharing their educational qualification certificates, thus decreasing the administrative pressure on schools and other educational institutions. The "ePathshala platform", a component of the "National Mission on Education through ICT", provides the students with free accessibility to education related resources like electronic-books.[8]

[6] *Supra* note 2, at 95.
[7] *Supra* note 2, at 94.
[8] *Supra* note 4, at 619.

Thus, Digital Public Infrastructure has a far-reaching effect on the socio-economic realities of India, such as on "Financial Inclusion", "Healthcare" and "Education".

THE OPEN NETWORK DIGITAL COMMERCE PLATFORM

With the "micro, small and medium-sized enterprises" and lower-level traders coming online, the ONDC platform promises to provide newer avenues, decrease digital monopolies as well as provide for micro, small and medium enterprises and lower-level traders. The ONDC has been designed by the "Department for Promotion of Industry and Internal Trade", under the Ministry of Commerce and Industry. ONDC plans to grow electronic-commerce penetration to 25% of all the consumer purchases which are to be made in the coming two years in a country with a population of 1.35 billion, up from about 8% today.[9]

The ONDC employs a "free-software" approach, an open network protocol and open standards. Consumers, merchant class as well as traders can perform transactions in goods and services independently of any particular application or any platform in the ONDC.[10]

The ONDC intends to implement a more "dynamic pricing model", digitized inventory management, and "distribution cost optimization" in order to help and reduce the price of doing trade for everyone on this particular platform. As a default option, the ONDC will use a "hyper-local search engine model" based on Global Positioning System proximity data.[11]

An "Open Network for Digital Commerce" will almost certainly make electronic commerce highly accessible and increase inclusivity for customers. Using an ONDC-compliant application or platform, consumers can find any merchant, product, or service.[12]

Additionally, the platform will let customers choose their favorite local enterprises, standardize operations, improve efficiency and transportation, and boost customer value by matching demand with the closest available supply. ONDC-compatible software can be used by small businesses in place of platform-specific rules. Their business operations and visibility will both increase as a result.[13]

India is becoming a major player in the global economy and a market leader in technology as well as in developing economic and governance models that are different from those of both East Asia and the West. In the era of "digital diplomacy," India is a global leader in developing digital public infrastructure for the benefit of the public. Public digital infrastructure can unlock tremendous opportunities, activate delivery of services on an enormous scale, and change the lives of millions of citizens by employing an open-source software base and an inclusive ecosystem by working with Indian businesses, as demonstrated by the achievement and major impact of initiatives like the "India Stack" and the "JAM Trinity."[14]

An ONDC might revolutionize the Indian electronic commerce industry by enabling direct competition between businesses minus the need for middlemen. Small businesses in India may gain greatly from this as they won't have to rely on the current e-commerce platforms that mostly serve huge firms. Among other benefits, it will provide technological solutions to ease commerce. Through both seller- and buyer-side apps, access to the growth of digital commerce will open up new avenues for entrepreneurs to spur innovations across multiple categories of networks.[15]

The ONDC seeks to enhance the small and medium-sized enterprises' access to online resources by creating new possibilities and eliminating digital monopolies. This might revolutionize the electronic commerce industry, especially in India. It will make it simpler for companies to purchase, sell, and exchange goods and services while competing with the big guys.[16]

[9] *Supra* note 2, at 96.
[10] *Ibid.*
[11] *Ibid.*
Id. at 99.
[13] *Supra* note 2, at 96.
[14] *Id.* at 99.
[15] *Id.* at 99-100.
[16] *Id.* at 100.

Adopting ONDC widely to make it an essential public service is a long-term undertaking, taking into account the many use cases and collaborators in the ecosystem. ONDC will face difficulties in managing user expectations, fostering trust between small and major digital commerce firms, and resolving consumer and seller fraud concerns due to the revolutionary transformation it will bring to the sector. In order to obtain approval and identify useful factors for adoption on an even bigger and wider scale, the ONDC's first phase must be issued as soon as possible.[17]

RELATIONSHIP BETWEEN ONDC AND INDIA'S IT LEGISLATIONS

The ONDC, being a component of India's digital ecosystem, consists of large-scale collection and aggregation of personal meta data from across different segments such as buyers, sellers as well as the intermediaries. The "Digital Personal Data Protection Act, 2023" focuses on established principles of consent, purpose, limitation and also accountability for "data fiduciaries", directly applied to the ONDC participatories. All of these ensure that trust and privacy remains intact, which remains very crucial for its adoption among lower level merchants and consumers alike. These legislations also provide for safeguard against the misuse and abuse of private data, thus strengthening the ONDC's credibility as the national digital public infrastructure.[18]

The "Information Technology Act, 2000" gives a legal backing to the multiple electronic transactions, cybersecurity and digital signature. The above-mentioned are critical for the functioning of the ONDC. The provisions such as "Section 43A" and the "IT Rules" mandate

reasonable security practices for handling sensitive personal data. The said Act also empowers the Government to regulate intermediaries, which is relevant since ONDC operates as an "open network" of digital commerce intermediaries. Also, the "cybersecurity provisions" under the IT Act, 2000 ensure resilience of ONDC against fraud, hacking, and data breaches.[19]

Together, the "Digital Personal Data Protection Act, 2023" and the "Information Technology Act, 2000" provide the regulatory framework for ONDC's operation within India's "DPI ecosystem". While the IT Act ensures "secure digital transactions" and "intermediary liability", the DPDP Act ensures "data privacy" and protection, both of which are essential for ONDC's success in democratizing electronic commerce. These legislations complement ONDC's mission of creating a "trustworthy, inclusive, and transparent digital marketplace".

CONCLUSION

This research article thus reviews the current state of "Digital Public Infrastructure" in India and its further possibilities, with reference to the ONDC platform in India. The state of Digital Public Infrastructure in India is constantly expanding and improving with major successes such as "Aadhar", "UPI" and the "India Stack". This has given a boost to India's economic prospects and development journey as well as taking governance to the last mile. The Digital Public Infrastructure sector has contributed towards complimenting the physical infrastructural growth by intervening in various sectors financial inclusion, healthcare and education.

ONDC being one of the nascent additions to the Digital Public Infrastructure sector in India has the potential to further raise the economic prospects as well as create a level playing field in the electronic commerce sector, which in itself is a rapidly growing sector.

ONDC intends to be a community-led effort with the goal of democratizing the Indian electronic commerce market by ensuring an equal playing field for every firm. It is brought so as to shade the market bodies, merchants, and sellers' worries over huge businesses' rising domination in India's digital commerce sector.[20]

[17] *Supra* note 2, at 100.

[18] Government of India, *The Digital Personal Data Protection Act, 2023*, Gazette Notification, Aug. 11, 2023, available at <https://prsindia.org/billtrack/the-digital-personal-data-protection-bill-2023> (last visited Dec. 12, 2025).

[19] Government of India, *The Information Technology Act, 2000*, Ministry of Law, Justice and Company Affairs, June 9, 2000, available at <https://www.meity.gov.in/content/information-technology-act-2000> (last visited Dec. 12, 2025).

[20] *Supra* note 2, at 101.

The ONDC goes quite a distance toward resolving some of the most important problems facing the industry, but it fails to completely tackle all of the obstacles that now stand in the way of digital commerce acceptance and adoption across the buying and selling sides. In addition to helping the digital commerce industry flourish, ONDC's "market-creating potential" will have a big influence on economic growth, creating jobs, improving livelihoods, and streamlining supply chains, among many other things.[21]

RESEARCH FINDINGS

1. **Integration of Digital Public Infrastructure (DPI) with Economic Growth -** India's DPI ecosystem anchored by Aadhaar, UPI, and India Stack has significantly enhanced service delivery, financial inclusion, and governance efficiency. ONDC represents the next frontier, extending DPI into the e-commerce domain.[22]
2. **Democratizing Potential** - The ONDC architecture consisting of open networks reduces dependence on monopoly platforms, thus granting lower level retailers and local business people as well as startups accessibility to digital markets without steep entry barriers.[23]
3. **Challenges** - In spite of its promising future, the ONDC has multiple problems such as low digital literacy levels of small scale merchants, logistical bottlenecks in the rural landscape and also low consumer trust levels in online money transactions.[24]
4. **Impact** - The ONDC platform has the ability to increase job creation, push for supply chain transparency and also foster innovation in financial technology, logistics as well as retail, thus providing strength to India's digital economic landscape.
5. **Compatibility with India's Physical Infrastructure** - The various Digital infrastructure such as the ONDC supports our physical infrastructure by pushing for accessibility and closing last-mile delivery gaps, therefore supporting inclusivity in India's economic growth.

SUGGESTIONS

1. **Strengthen Digital Literacy Programs** - Targeted training initiatives for lower level businessmen and rural entrepreneurs will ensure effective participation in ONDC.
2. **Enhance Interoperability** - Seamless integration between ONDC and existing DPI layers (UPI, Aadhaar, DigiLocker) can improve user trust and adoption.[25]
3. **Policy Support and Incentives** - Subsidies, tax incentives, and reduced transaction costs should be introduced to encourage MSMEs and local sellers to join ONDC.[26]

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[21] *Ibid.*

[22] NASSCOM, *India's Digital Public Infrastructure*, February 2024, available at <https://new.nasscom.in/sites/default/files/publicreport/Digital%20Public%20Infrastructure%2022-2-2024_compres sed.pdf> (last visited Dec. 12, 2025).

[23] Muhammad Idrees ul Islam et al., *Open Network for Digital Commerce in India: Past, Present, and Future*, *Open Information Science*, Vol. 8, Issue 1, Aug. 26, 2024, available at <https://www.degruyterbrill.com/document/doi/10.1515/opis-2024-0005/html> (last visited Dec. 12, 2025).

[24] Abhijeet Kumar, *The ONDC Puzzle: Why India's E-Commerce Disruptor Isn't Clicking Yet*, *Business Standard*, May 5, 2025, available at <https://www.business-standard.com/companies/news/ondc-ecommerce-failure-struggles-india-125050501101_1.ht ml> (last visited Dec. 12, 2025).

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4. **Robust Grievance Redressal Mechanisms** - Transparent dispute resolution systems will support consumer confidence and also increase fairness in online commercial transactions.[27]
5. **Support for Logistics and Supply Chain Innovation** - To encourage startup culture in logistics and warehousing so as to integrate it with the ONDC platform. This can address infrastructure bottlenecks and also increase efficiency.
6. **Monitoring and Evaluating measures** - Some sort of an independent review body should be established so as to assess the impact of ONDC on competitiveness, inclusivity as well as on the economic growth of the nation, thereby promising accountability and corrective measures.

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