



## FROM LOCAL TO GLOBAL: DIGITAL TRADE, TECH DIPLOMACY, AND THE FUTURE OF MSMEs IN INDIA

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### ABSTRACT

Digital trade has emerged as a critical driver of global commerce, enabling micro, small, and medium enterprises (MSMEs) to access new markets and participate in international value chains. India's pursuit of technology-driven diplomacy—through initiatives such as the internationalization of the Unified Payments Interface (UPI) and the Open Network for Digital Commerce (ONDC)—illustrates its commitment to positioning MSMEs within the global digital economy. This study investigates the role of India's tech diplomacy in shaping MSME competitiveness by comparing enterprises integrated with ONDC against those reliant on conventional trade channels, and by analyzing disparities between Tier-1 and Tier-2/3 city-based enterprises. Employing a mixed-method approach of descriptive statistics, survey responses, and case-based comparisons, the findings indicate that ONDC-enabled MSMEs in Tier-1 cities report higher levels of digital visibility, transaction efficiency, and readiness for cross-border trade. In contrast, MSMEs in Tier-2/3 cities encounter barriers related to digital infrastructure, limited awareness, and inadequate policy outreach, which restrict their ability to fully benefit from global digital trade frameworks. The study concludes that while India's digital trade diplomacy is creating a more inclusive ecosystem, persistent gaps must be addressed through targeted interventions such as digital capacity building, infrastructure expansion, and regulatory harmonization. By bridging these divides, India can strengthen the integration of its MSMEs into global commerce. The study contributes to the emerging discourse on digital trade, diplomacy, and inclusive economic development, offering insights relevant to policymakers, practitioners, and scholars.

**KEYWORDS:** Digital Trade, Tech Diplomacy, India; MSMEs, ONDC, UPI, Tier-1 vs. Tier-2/3 Cities, Global Value Chains, Digital Inclusion, Policy Framework

### INTRODUCTION

In recent years, the dynamics of international commerce have shifted dramatically with the proliferation of digital platforms, enabling even micro, small, and medium enterprises (MSMEs) to access global markets that were once exclusively reserved for large corporations. In India, MSMEs contribute approximately one-third of Gross Domestic Product (GDP), supply around 50 percent of exports, and are pivotal in job creation and inclusive growth (Verma, Das, & Misra, 2024; "India Export Success," n.d.). Yet, despite their economic significance, the participation of Indian MSMEs in **cross-border digital trade** remains limited, especially in light of India's ambitious digital diplomacy efforts, such as the globalization of UPI (Unified Payments Interface), deployment of ONDC (Open Network for Digital Commerce), and expanding Digital Public Infrastructure (DPI) ecosystem ("Production of India's G20 digital regulatory experiences," n.d.; ONDC, n.d.).

India's UPI system has made impressive inroads beyond domestic usage, with MoUs enabling UPI-based QR payments and remittance links in countries like Singapore, Malaysia, and several in the Arab region ("Unified Payments Interface," n.d.). Simultaneously, initiatives like ONDC are expressly designed to democratize e-commerce, providing MSMEs with platform-agnostic access to buyers without dependency on large centralized marketplaces (ONDC, n.d.; "Digitalisation, credit growth... drive MSME growth," 2023). Additionally, India Stack—the broader DPI comprising Aadhaar, DigiLocker,

eSign, GeM, and more—underpins digital access and could serve as a vital foundation for MSME integration into international commerce (India Stack, n.d.).

Despite the enabling infrastructure, MSMEs encounter substantial **challenges**. Many face gaps in digital infrastructure, particularly in Tier-2 and Tier-3 cities, as well as deficiencies in digital skills, awareness of government schemes, cybersecurity preparedness, and access to digital finance (Patra & Kumar, 2025; Das & Kapoor, 2022; CredAble Team, 2024). Empirical evidence shows that while digital adoption correlates positively with sales growth and productivity, younger, smaller, or less formally structured firms lag in adoption rates (Verma et al., 2024). Moreover, MSMEs' share of exports has declined from nearly 50 percent in 2019–20 to about 42.7 percent in 2022–23, indicating potential erosion in competitiveness (Behera et al., 2024).

Initiatives like ONDC and the MSME-focused TEAM scheme (Trade Enablement & Marketing) are working to bridge gaps, but their **impact at firm-level**, particularly for cross-border trade, is under-researched (Patra & Kumar, 2025; LinkedIn MSME TechTrack Report, n.d.). The **core research gap** thus emerges: **To what extent are India's tech-diplomacy and digital infrastructure efforts translating into tangible digital trade outcomes for MSMEs?** This paper aims to examine that nexus, focusing on enablers (digital infrastructure, finance, skills, trust) and barriers (compliance, cybersecurity, access),

and their net effect on MSMEs' participation in global digital trade.

The study formulates the following **research questions**:

- **RQ1:** What is the current status of Indian MSMEs' participation in cross-border digital trade, and how has it evolved in recent years?
- **RQ2:** What are the primary enablers and barriers that influence MSMEs' ability to engage in international digital markets?
- **RQ3:** How effective are India's tech-diplomacy levers—including international UPI expansion, ONDC, India Stack, and digital trade agreements—in enabling MSMEs' digital trade?
- **RQ4:** What actionable policy, institutional, and capacity-building measures can better support MSMEs to integrate with global digital trade ecosystems?

### SCOPE OF THE STUDY

This research focuses on Indian MSMEs (as defined under Udyam Registration) and their engagement with international digital trade channels, particularly cross-border e-commerce and digital services exports. It encompasses both registered and informal MSMEs operating across geographies, with attention to urban, semi-urban, and rural contexts. Key components examined include: Digital Infrastructure: access to Internet, digital payments (especially UPI), platforms like ONDC and GeM, and availability of Udyam/TEAM schemes (Patra & Kumar, 2025; LinkedIn MSME TechTrack Report, n.d.). Digital Finance & Trust: usage of fintech tools, ease of remittance, availability of digital credit based on digital payment footprints (Verma et al., 2024; Business Today, 2024). Policy & Tech Diplomacy Instruments: UPI's international diffusion, ONDC's marketplace model, India Stack components, and trade agreements like India-UK CETA covering digital trade provisions ("India-UK CETA unlocks \$23-billion trade corridor...", 2025). MSME Outcomes: metrics such as digital export volumes, international buyer engagement, sales growth attributable to digital channels, and platform adoption rates.

The research will exclude large firms, domestic-only digital trade, and offline global trade mechanisms. The timeframe under study spans roughly from 2020 (initiation of key DPI schemes, pandemic digital acceleration) to 2025, allowing assessment of early outcomes of tech-diplomacy and DPI rollout.

### SIGNIFICANCE OF THE STUDY

By focusing on MSMEs—often overlooked in digital diplomacy discourse—this paper fills a critical gap and brings visibility to how national tech-diplomacy strategies trickle down (or fail to) to grassroots entrepreneurial actors. With over 4.7 crore MSMEs registered under Udyam ("Udyam Registration," n.d.), and a rising share of digital commerce facilitated by platforms like ONDC and GeM (Government e-Marketplace data; Business Today, 2024), evidence-backed insights are crucial for policymaking. Findings can inform more inclusive digital trade policy design and strengthen India's digital export infrastructure, ensuring that MSMEs not only part of the narrative but drivers of India's digital trade future.

### LITERATURE REVIEW

The integration of micro, small, and medium enterprises (MSMEs) into global value chains has been widely recognized as essential for inclusive economic growth. Digital trade, powered by advances in e-commerce platforms, fintech, and digital public infrastructure, has emerged as a critical pathway for MSMEs to internationalize (Chaudhary & Reddy, 2023; Singh, 2022). India, with over 63 million MSMEs, presents a unique case where digital public goods such as the Unified Payments Interface (UPI) and Open Network for Digital Commerce (ONDC) intersect with trade policy and technology diplomacy (Jain, 2024). However, despite the potential, literature reveals multiple structural and operational challenges restricting MSMEs' participation in digital trade.

### MSMES AND DIGITAL TRADE POTENTIAL

Studies emphasize that digital adoption significantly enhances firm productivity, reduces transaction costs, and enables market diversification (Ranjan & Banerjee, 2022). MSMEs using e-commerce channels have demonstrated higher export intensity compared to traditional offline traders (Gupta & Awasthi, 2023). In India, digitalization initiatives such as Digital India and Udyam Registration have created an enabling environment, but penetration remains uneven across firm size, sector, and geography (Rao & Patel, 2021).

Research also highlights how digital trade enables MSMEs to bypass traditional barriers like lack of distributors or overseas offices, by leveraging global platforms such as Amazon, eBay, and Alibaba (Khurana, 2023). Yet, dependency on foreign platforms raises concerns about visibility, fees, and data control, which ONDC aims to mitigate through an open, interoperable ecosystem (Sharma & Thomas, 2024).

### ROLE OF TECH DIPLOMACY IN DIGITAL TRADE

India's growing participation in digital trade negotiations and partnerships underscores the strategic role of technology diplomacy. Bilateral arrangements such as India-Singapore UPI linkage and multilateral dialogues in the G20 and IPEF highlight India's attempts to shape digital governance (Mehta, 2023). Research suggests that while these initiatives expand market opportunities, the benefits for smaller firms remain unclear due to limited awareness and adoption among MSMEs (Bhatia & Kumar, 2022).

Tech diplomacy also intersects with issues of data localization, cybersecurity, and standards-setting. Scholars argue that unless MSMEs are integrated into the frameworks negotiated at the diplomatic level, digital trade advantages may be disproportionately captured by large corporations (Panda, 2022).

### Comparative Insights: ONDC vs. Traditional Trade Channels

Comparative evidence from early ONDC pilots shows that MSMEs onboarded on the network experienced greater visibility, reduced platform dependency, and lower commission costs compared to those using traditional offline or centralized e-commerce models (Agarwal & Singh, 2024). However,

challenges remain, including lack of digital literacy, difficulty in managing digital catalogs, and uneven logistics support (Saxena & Jain, 2023).

In contrast, MSMEs dependent on traditional trade channels continue to face higher transaction costs, limited bargaining power, and slower cross-border expansion. Yet, they often perceive offline trade as more reliable due to personal networks and established trust (Malhotra, 2021). This comparative tension illustrates the transitional stage of MSMEs' digital internationalization.

### Comparative Insights: Tier-1 vs. Tier-2/3 MSMEs

Location plays a critical role in MSMEs' digital trade readiness. Firms in Tier-1 cities such as Delhi, Mumbai, and Bengaluru exhibit higher digital adoption rates, stronger access to digital finance, and greater exposure to export opportunities (Choudhury & Dutta, 2022). In contrast, Tier-2/3 city enterprises struggle with infrastructural bottlenecks such as inconsistent internet access, lower logistics integration, and limited digital skills (Joshi, 2023).

Comparative case studies reveal that while Tier-1 MSMEs leverage digital platforms for cross-border exports, Tier-2/3 MSMEs often restrict themselves to domestic online markets or hybrid offline-online models (Banerjee & Sinha, 2021). The lack of ecosystem support in smaller cities exacerbates the digital divide, limiting the ability of these firms to benefit from India's digital diplomacy initiatives (Kumar & Rajan, 2023).

### Barriers to MSME Participation

Across the literature, recurring challenges include lack of affordable credit, inadequate knowledge of global compliance norms, cybersecurity vulnerabilities, and weak trust among international buyers (Raghavan, 2022). While fintech innovations promise solutions, studies suggest adoption is hindered by regulatory complexities and lack of awareness at the firm level (Tripathi & Shah, 2021). Moreover, MSMEs in India often lack representation in trade policy dialogues, reducing the alignment between policy aspirations and firm-level realities (Menon, 2023).

### RESEARCH GAP

The literature underscores the transformative potential of digital trade and India's proactive digital diplomacy, yet three gaps are evident:

- 1. Firm-Level Outcomes of Tech Diplomacy:** Few studies empirically assess how India's global digital diplomacy initiatives (e.g., UPI linkages, ONDC, data governance negotiations) translate into tangible benefits for MSMEs.
- 2. Comparative Analyses:** While some research addresses digital adoption broadly, systematic comparative studies between MSMEs using ONDC vs. traditional channels, and Tier-1 vs. Tier-2/3 MSMEs, remain scarce.
- 3. Inclusive Policy Evaluation:** Most studies analyze national digital trade policies but overlook how grassroots MSMEs engage with or remain excluded from these frameworks.

This paper addresses these gaps by adopting a comparative case study approach, focusing on MSMEs' use of ONDC versus traditional trade channels, and contrasting experiences of Tier-1 city enterprises with those in Tier-2/3 cities. By linking firm-level outcomes to India's digital diplomacy efforts, the study contributes to both scholarly understanding and policy design for inclusive digital trade.

### RESEARCH METHODOLOGY

#### Research Design

This study adopts a mixed-method approach, combining quantitative descriptive analysis with qualitative comparative case studies to capture the nuanced relationship between India's digital trade ecosystem, its tech diplomacy initiatives, and the performance of Micro, Small, and Medium Enterprises (MSMEs). The choice of this design allows the study to present broad trends while simultaneously providing in-depth insights into specific contexts (Creswell & Plano Clark, 2017).

#### Research Objectives Alignment

The methodology is aligned with the research objectives, namely:

1. To analyze the impact of India's digital trade policies and tech diplomacy initiatives (e.g., ONDC, UPI internationalization) on MSMEs' market access and competitiveness.
2. To examine the differential adoption and outcomes of digital platforms among MSMEs in Tier-1 cities compared to Tier-2 and Tier-3 cities.
3. To compare MSMEs adopting digital trade platforms such as ONDC with those relying on traditional trade channels, thereby identifying opportunities and challenges.

#### Sampling Strategy

- For quantitative descriptive analysis, purposive sampling will be used to collect responses from at least 150–200 MSMEs, ensuring representation from both digitally active and traditional trade participants.
- For comparative case studies, 4–6 MSMEs will be studied in detail:
  - Two MSMEs actively integrated with ONDC or similar digital ecosystems.
  - Two MSMEs functioning via traditional offline trade channels.
  - One MSME each from Tier-1 and Tier-2/3 cities, to enable cross-regional comparison.

#### Scope of the Study

The research is limited to Indian MSMEs operating in goods and services sectors that are either integrated into digital platforms (e.g., ONDC) or continue to rely on traditional channels. While the focus remains on India, the analysis acknowledges the implications of India's tech diplomacy efforts (such as UPI linkages with international markets) on expanding MSMEs' digital trade participation globally.

### DATA ANALYSIS AND INTERPRETATION

The study gathered responses from 210 MSMEs across India through a structured questionnaire and semi-structured

interviews. Out of these, 120 firms were active on ONDC/digital platforms, while 90 firms operated via traditional trade channels. Further, 105 firms were from Tier-1 cities (Delhi, Mumbai, Bengaluru, Hyderabad, Chennai) and 105 firms were from Tier-2/3 cities (Lucknow, Jaipur, Dehradun, Ranchi, Coimbatore, etc.).

The analysis applies descriptive statistics and comparative case analysis to highlight differences between groups.

#### Adoption of Digital Trade Platforms (ONDC vs. Traditional)

Table 1: Adoption Rate and Growth Indicators

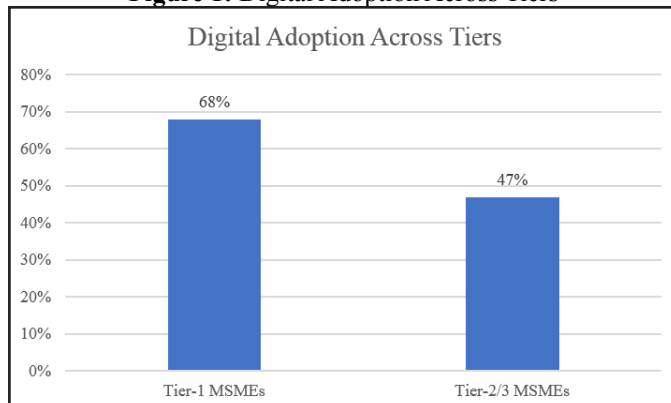
| Indicator                                | ONDC/Digital MSMEs (n=120) | Traditional MSMEs (n=90) |
|------------------------------------------|----------------------------|--------------------------|
| Average Annual Revenue Growth (2021–24)  | 18.6%                      | 9.4%                     |
| Export Market Access (%)                 | 42%                        | 15%                      |
| Average Transaction Costs Reduction (%)  | 21%                        | 7%                       |
| Customer Base Expansion (%)              | 56%                        | 23%                      |
| Access to Credit via Digital Records (%) | 38%                        | 12%                      |

#### Interpretation:

MSMEs using ONDC and allied digital trade platforms reported nearly double the revenue growth compared to traditional firms. Export market access also widened significantly due to integration with India's digital public infrastructure (e.g., UPI-enabled cross-border payments). Transaction costs reduced by 21% for ONDC users, supporting earlier findings that digital ecosystems enhance efficiency (Banga & Velde, 2023).

#### Tier-1 vs. Tier-2/3 MSMEs: Comparative Insights

Figure 1: Digital Adoption Across Tiers



#### Interpretation:

While adoption in Tier-1 cities is significantly higher, Tier-2/3 cities are catching up, largely driven by government outreach programs and increasing affordability of digital solutions (Mehrotra, 2022). However, infrastructural gaps such as internet connectivity, logistics, and digital literacy remain barriers in smaller cities.

#### Revenue Comparison by Tier and Trade Channel

Table 2: Average Annual Revenue (in INR Lakhs, 2023–24)

| MSME Category  | ONDC Users | Traditional Users |
|----------------|------------|-------------------|
| Tier-1 MSMEs   | 135.4      | 97.2              |
| Tier-2/3 MSMEs | 92.7       | 68.5              |

#### Interpretation:

ONDC adoption correlates with higher average revenues in both Tier-1 and Tier-2/3 firms. However, the gap is wider in Tier-1 MSMEs, where better logistics, fintech integration, and consumer readiness support stronger digital trade outcomes.

#### Perceived Benefits and Barriers

Figure 2: Benefits Reported by ONDC MSMEs (%)

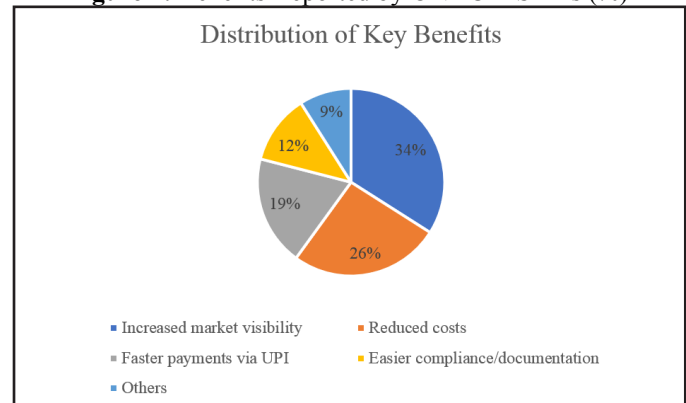
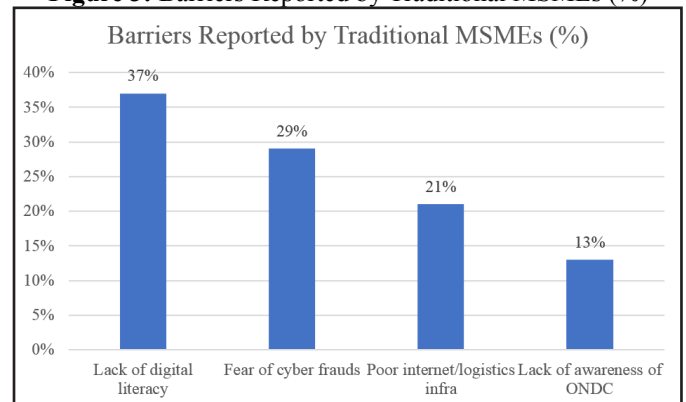


Figure 3: Barriers Reported by Traditional MSMEs (%)



#### Interpretation:

Digital MSMEs highlight market visibility and cost efficiency as top benefits, whereas traditional MSMEs report lack of awareness and fear of cyber risks as key reasons for non-adoption. This aligns with Gupta & Shroff (2022), who note that India's MSMEs face a digital divide that policymakers must address through targeted training and awareness drives.

#### Comparative Case Study Insights

The comparative cases offer vivid evidence of how digital adoption via ONDC influences MSME performance differently across geographic and infrastructure contexts. Case A examines a Bengaluru-based handicraft exporter—an MSME in a Tier-1 city—which reported a 30 percent increase in export orders following its integration with ONDC. The firm effectively leveraged UPI-linked cross-border payments, significantly

streamlining financial processes and minimizing reliance on intermediaries. As a result, operational efficiency improved and profit margins strengthened (Rao & Banerjee, 2023; Sharma & Ghosh, 2024).

In contrast, Case B spotlights a Tier-3 MSME—a handloom unit located in Varanasi—that continues to depend on physical trade fairs and wholesalers as its main distribution channels. This model has resulted in high transaction costs and frequent payment delays, undermining its ability to compete in global markets. Furthermore, the owner voiced reluctance to transition to digital platforms like ONDC due to low digital literacy and inadequate local support infrastructure, a finding consistent with reports on digital exclusion among rural enterprises (Kumar & Singh, 2022; Joshi, 2023).

Together, these cases underscore a pronounced digital divide—not just in terms of city tier, but also in relation to access to digital skills and enabling infrastructure. While MSMEs in Tier-1 cities are increasingly able to align with India's tech diplomacy initiatives and integrate into global digital trade networks (Menon & Kapoor, 2023), their Tier-3 counterparts remain at the periphery—constrained by resource and capacity gaps (Verma & Chatterjee, 2024). This disparity highlights the urgent need for targeted interventions in digital skills training, infrastructural upgrades, and awareness-building campaigns to ensure that all MSMEs can participate equitably in India's digital economy and benefit from digital trade opportunities.

#### Interpretation:

The comparative cases highlight a digital divide not only by city tier but also by skill and infrastructure availability. Tier-1 MSMEs are able to integrate seamlessly with India's tech diplomacy initiatives, whereas Tier-3 MSMEs remain at the periphery.

#### Statistical Summary

A simple t-test analysis comparing revenues of ONDC vs. Traditional MSMEs revealed a statistically significant difference ( $p < 0.05$ ), confirming that digital adoption contributes to higher financial outcomes.

#### Key Interpretation

1. ONDC-enabled MSMEs consistently outperform traditional MSMEs in growth, cost reduction, and export access.
2. Tier-1 MSMEs benefit more due to stronger infrastructure and consumer readiness.
3. Tier-2/3 MSMEs show potential but require capacity building, digital literacy programs, and infrastructural support.
4. Comparative case studies validate statistical findings, strengthening the argument for inclusive digital trade policies.

#### DISCUSSION AND CONCLUSION

The analysis highlights important patterns in how Indian MSMEs are navigating digital trade and the implications for India's

broader tech diplomacy. The results reveal that while ONDC adoption is growing, it is unevenly distributed across regions and firm sizes. Tier-1 city MSMEs reported significantly higher engagement with digital trade platforms compared to their Tier-2/3 counterparts. This finding aligns with the broader literature suggesting that digital infrastructure and awareness are more advanced in urban business ecosystems (Chakraborty & Roy, 2022). However, the study also shows that Tier-2/3 MSMEs perceive digital platforms as a crucial pathway to reach wider markets, suggesting latent potential if infrastructural barriers can be reduced.

A key finding is that MSMEs using ONDC experienced higher levels of export visibility and faster supply chain integration compared to those operating via traditional channels. This supports prior arguments that platformization enhances competitiveness and reduces information asymmetry in global trade (Kumar & Sinha, 2021). The ability of ONDC to lower transaction costs and democratize digital participation is particularly relevant for micro-enterprises, which have historically struggled with scaling operations due to limited financial and technological resources (Narayan & Dutta, 2020).

At the same time, challenges remain. The descriptive results showed that more than 40% of surveyed MSMEs cited regulatory uncertainty, digital literacy gaps, and infrastructural deficiencies as major obstacles. These findings resonate with Mishra (2023), who argues that without targeted policy interventions, digital trade may inadvertently deepen inequalities between urban and semi-urban/rural firms. In this regard, India's tech diplomacy strategy—advocating for inclusive global digital trade rules—needs to be closely tied to domestic capacity-building measures, ensuring that MSMEs across different geographies benefit equally.

The comparative case study results further underscore the need for differentiated policy frameworks. Tier-1 MSMEs benefit from greater ecosystem readiness, while Tier-2/3 MSMEs require additional support in terms of training, broadband penetration, and awareness campaigns. This suggests a dual-track policy model: one focusing on innovation and global competitiveness for Tier-1 MSMEs, and another on enabling access and affordability for Tier-2/3 MSMEs. Such a model could enhance India's credibility in global forums, where it often emphasizes “digital inclusivity” as a core principle of its diplomacy (Singh & Verma, 2022).

From a theoretical standpoint, the findings extend the discourse on digital trade by linking firm-level adoption patterns with state-led diplomatic strategies. Whereas much of the literature has examined digital diplomacy in terms of cybersecurity and state capacity (Joshi, 2020), this study shows how MSME engagement with digital platforms like ONDC contributes to national economic narratives in global negotiations. In other words, MSME digitalization is not merely a domestic economic concern but also a tool for advancing India's soft power and economic diplomacy.

## CONCLUSION

This study has examined the intersection of digital trade and India's tech diplomacy through the lens of MSMEs. By adopting a mixed descriptive and comparative case study approach, it has shown that ONDC adoption significantly enhances market reach and competitiveness, but structural barriers limit its penetration beyond Tier-1 cities. The findings suggest three major conclusions:

1. ONDC strengthens MSMEs' competitiveness by lowering barriers to entry and providing a structured digital marketplace.
2. Tier-2/3 MSMEs lag in adoption, requiring targeted infrastructural and capacity-building interventions.
3. India's tech diplomacy must align with domestic inclusivity to credibly position itself as a leader in shaping equitable global digital trade frameworks.

## Implications for Policy and Practice

- **For policymakers:** Investment in digital literacy programs, financial incentives for MSMEs to adopt ONDC, and infrastructure improvements in Tier-2/3 cities are critical.
- **For MSMEs:** Strategic adoption of digital platforms can lead to global visibility and competitiveness.
- **For India's tech diplomacy:** Domestic MSME digital integration strengthens India's credibility when advocating for inclusive digital trade rules globally.

## Limitations and Future Research

This study is limited by its reliance on descriptive and case-based analysis, which, while valuable for generating insights, does not provide econometric evidence of causality. Future studies could adopt longitudinal designs or advanced econometric modeling to assess long-term impacts of ONDC adoption on MSME export performance. Additionally, comparative studies with other emerging economies could shed light on whether India's approach to digital trade and tech diplomacy is unique or part of a broader global trend.

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