

Global E-Commerce, Digital Trade Policies, and Tribal Livelihoods: An Empirical Study on NTFP Market Integration

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Abstract: *The entry of Non-Timber Forest Products (NTFPs) into the global e-commerce is a radical approach to improving the livelihoods of the tribes especially those living in isolated and forest-reliant areas. This research paper examines how digital trade policies and cross-border e-commerce models can help the tribes involved in the production of NTFP to gain access to the market, value addition, and empowerment through the economy. The study adopted a mixed-methodology based on combining structured questionnaires on the NTFP producers, interviews with the stakeholders in e-commerce, and secondary policy analysis to determine the impact of regulatory frameworks on the level of the market participation, prices, and competitiveness of tribal enterprises. The results show that the impact of successful policies in digital trade combined with capacity-building efforts is a considerable increase in the capacity of tribal producers to enter the international market, which has positive effects in terms of income stability, skill acquisition, and economic stability in general. Nevertheless, the issues like poor digital literacy, lack of infrastructures, and complicated regulatory needs still remain as obstacles to full participation. The paper provides practical policies that can be adopted by policy makers, online marketplaces, and development agencies to enable tribal people to have good participation in world NTFP markets without compromising on the management of such resources. This study will fill the existing gap between the traditional NTFP production and the modern digital trade systems and contribute to the further discussion of the inclusive economic growth, empowerment of tribes and sustainable integration into the market.*

Keywords: Non-Timber Forest Products (NTFPs), Global E-commerce, Digital Trade Policies, Digital Literacy

1. Introduction

The fast growth of international e-commerce has radically changed the structure of global business, market penetration and value chain integration. Digital platforms have now provided an opportunity to producers, consumers, and intermediaries to reach geographical boundaries more efficiently than ever before by Global Trade (2024). The digital trade according to World Trade Organization (WTO) has become one of the most rapidly developing sectors of global trade redefining the conventional production and distribution frameworks by WTO library (2023). Nonetheless, with cities and the industrial community experiencing the greatest gains with this digital transformation, incorporation of the marginalized communities, especially tribal producers, into global e-commerce environments, is not even.

India, a developing nation, has tribal people who rely on Non-Timber Forest Product (NTFP) as source of livelihood in terms of food insecurity and cultural belonging. Sal leaves, mahua flowers, lac, tamarind, honey and medicinal plants are NTFPs that make up a large portion of domestic revenue in forest-related territories by Business Standard (Jan15-2025). Through government programs like TRIFED (Tribal Cooperative Marketing Development Federation of India) and programs in the Ministry of Tribal Affairs have tried to market tribal products via online marketplace like Tribes India. However, the successful attempts to overcome these obstacles still remain not within the professional scope of the structural barriers, which are the lack of digital literacy, weak internet connectivity, unconnected supply chains, insufficient policy alignment.

In India it's a new opportunities and challenges to small-scale producers have emerged as a result of the "Introduction of digital trade policies", which include the data governance, data flows across borders, protection of intellectual property, electronic payments, consumer protection, and electronic marketplaces. The global negotiations in policy frameworks, such as negotiations in the World Trade Organization, and regional trade agreements, are seen to have a greater influence on the operation of the digital platforms. However, their policies tend to be structured with large scale business in mind, and tribal producers are at the periphery of digital value chains.

NTFPs marketed by means of e-commerce have transformative potential. Digital platforms can enhance income generation and bargaining power by minimizing intermediaries by cutting prices and boosting price transparency, direct-to-consumer sales, and branding of indigenous products. Besides, sustainable e-commerce models can also help encourage environment friendly harvesting activities such that economic development will not contradict with conserving forests. Nevertheless, little empirical evidence has been made on how digital trade policies translate to livelihood achievements by tribal communities.

The research will be fulfilled and refilled the gap by analyzing the interface of global e-commerce and digital trade regulations and tribal livelihood systems in the NTFP market. It aims at testing empirically the degree to which the digital platforms can support market access, income increase, value addition, and sustainable resource management among tribal producers. The study also assesses the policy consistency of international digital trade practices and their application at the grassroots in the tribal regions.

Placing of tribal NTFP markets in the context of the wider concept of digital globalization, this paper contributes to the discussion of inclusive digital economies, sustainable development, and fair-trade integration. The results are meant to advise policy makers, development practitioners, and digital platforms designers to develop more inclusive e-

commerce systems that can empower tribal communities without sacrificing the ecological sustainability.

2. E-Trades and Digital Trade Policies as well as Tribal Livelihoods

Table 1 Digital Trade Policies, e-Trade and Tribal Livelihoods Analytical Framework

Dimension	Key Components	Mechanism of Influence	Expected Impact on Tribal Livelihoods	Key Challenges
E-Trade (Digital Market Platforms)	Online marketplaces, mobile commerce, digital payments, logistics networks	Reduces intermediaries, expands market reach, enables direct-to-consumer sales	Higher income, improved price realization, stronger bargaining power	Digital illiteracy, poor connectivity, logistics constraints
Digital Trade Policies	Data governance, taxation rules, cross-border data flow, consumer protection laws, IP rights	Regulates digital transactions, ensures secure payments, shapes platform operations	Increased trust, export potential, market stability	Complex compliance requirements, limited policy awareness
Value Chain Integration	Branding, quality certification, packaging, digital marketing	Upgrading NTFPs from raw to value-added products	Income diversification, premium pricing	Lack of skills, limited access to certification
Sustainable E-Commerce Models	Eco-labeling, traceability systems, sustainable harvesting standards	Incentivizes conservation-linked production	Balanced livelihood & forest conservation	Weak monitoring systems
Institutional Support Systems	Government schemes, cooperatives, tribal federations	Capacity building and financial assistance	Improved participation in digital markets	Policy implementation gaps

Source of: Amit Kumar.et al (2025)

2.1 E-Trade and Integrating the tribal mark

E-Trade is defined as the process of buying and selling of goods via electronic means, it's a allowing in national and international markets without necessarily having a physical middleman. Within the framework of NTFPs, the digital platform enables tribal producers to conduct direct-to-consumer transactions, increasing the price transparency and decreasing the exploitation of the middlemen. Digital payment systems, online marketplaces, and built-in logistics networks can drastically reduce supply chains, therefore, enhancing profit margins of the main collectors. Nonetheless, effective participation has been impeded by the structural barriers, including poor internet connectivity, poor digital literacy, and the lack of excellent logistical networks.

2.2 Online Trade Policies and Regulation

The policies of digital trade determine the ecosystem of the e-commerce platforms. These policies encompass data protection policies, the international data flow policies, taxation of online transactions, intellectual property rights, and consumer protection systems. International digital trade becomes more and more controlled by regulatory talks at the institutions such as the World Trade Organization. The policy environment can be used to promote trust in online transactions and exports and safeguard indigenous branding, which is critical to the tribal NTFP manufacturers. Nonetheless, their diffusion to the grassroots producers and the presence of complex compliance demands and lack of awareness may impede the latter to enjoy the entire benefits of digital trade reforms.

2.3 Digitalization of Value Chain Upgradation

Online platforms open the possibilities of going beyond selling raw materials to appreciate added manufacturing. By branding indigenous products, getting quality certifications and capitalizing on digital marketing opportunities, tribal

producers will capture increased value in the supply chain. An example of this is that honey, lac, tamarind and sal leaf products would fetch high prices with good packaging and branding. This has been integrated into advanced value chains encouraging livelihood diversification and stability of income.

2.4 Green E-Commerce and Green conservancy

Sustainable e-commerce model combines environment-related sustainability and economic development. Environmentally friendly harvesting practices can be promoted with the help of digital traceability system, eco-labeling and consumer education campaigns. By ensuring that the digital platforms attract sustainably sourced NTFPs at higher prices, the digital platforms create economic incentives to protect forests. This strategy puts livelihood improvement and ecological sustainability in line with each other so that commercialization does not result in overexploitation of forest resources

2.5 Policy and Institutional Support Systems

The institutional interventions are critical towards facilitating the involvement of the tribes in the digital markets. Such organizations like the TRIFED, the Ministry of Tribal Affairs offer market linkages, training, and financial assistance. Their online programs are meant to inculcate tribal products in the mainstream e-commerce platforms. However, gaps in implementation, insufficient outreach and problem of coordination tend to diminish the efficiency of such interventions.

An empirical investigation of NTFP market incorporation

The empirical research, investigates the integration of Non-Timber Forest Products (NTFPs) in the market and how the practice affects the livelihood of the tribes. Which results reflect the NTFPs are essential sources of income and cultural identity to the tribal communities, but their markets are

mainly informal and intermediary-based. The investigation understands market incorporation as organized inclusion to official, digital and value-added market systems. In India, the efforts of TRIFED and the Ministry of Tribal Affairs (MoTA) are geared towards the promotion of tribal products at organized and digital platforms. It is necessary to empirically prove how much of these efforts can enhance livelihoods. The Market access on digital participation, value chain upgradation, and institutional support is analyzed market research and evaluate the e-commerce by gauging that it lessens middlemen, improves price realization, and builds bargaining power. Through this impact of digital trade policies and international structures, such as those that are influenced by the World Trade Organization, on the market participation of the grassroots.

3. Objective of the study

The research objectives drawing the global e-commerce and digital trade policies affect the market assimilation of Non-Timber Forest Products (NTFPs) and what the research suggests about the livelihoods of the tribal populations.

- 1) To examine how e-commerce sites can enhance access to the markets, price realization and value chain integration of NTFPs.
- 2) To analyze how far the digital platforms eliminate middlemen and increase price transparency and bargaining power of tribal producers.
- 3) To evaluate how digital trade policies (data governance, digital payments, taxation, platform regulations, export rules) have had an effect on the business of NTFP marketing, and in cross-border trade.
- 4) To assess the income dynamics and the diversification of livelihood among tribal households that trade in NTFPs based on e-commerce.
- 5) A research question to address the connection between sustainable harvesting and digital market incentives to encourage the commercialization of environmentally friendly NTFP.
- 6) To determine critical issues like digital literacy, infrastructure, logistics and policy implementation to determine how tribes are able to engage in global e-commerce.
- 7) To suggest a sustainable and inclusive e-commerce framework of enhancing the integration of the NTFP markets and at the same time, conservation of forests and livelihood security.

4. Research Questions

- 1) How do e-commerce platforms improve market access, price realization, and value chain integration of NTFPs?
- 2) To what extent do digital platforms reduce intermediaries and enhance price transparency and bargaining power of tribal producers?
- 3) How do digital trade policies such as data governance, digital payments, taxation, platform regulations, and export rules affect NTFP marketing and cross-border trade?
- 4) What is the impact of e-commerce participation on income dynamics and livelihood diversification among tribal households engaged in NTFP trade?

- 5) What is the relationship between sustainable harvesting practices and digital market incentives in promoting environmentally friendly commercialization of NTFPs?
- 6) What are the major barriers such as digital literacy gaps, infrastructure limitations, logistics challenges, and policy implementation issues that affect tribal participation in global e-commerce?
- 7) How can a sustainable and inclusive e-commerce framework strengthen NTFP market integration while ensuring forest conservation and livelihood security?

5. Literature Review

5.1 NTFPs E-Commerce and Market Access

The online stores contribute to better market coverage through direct linkage of rural sellers and consumers with retail chains. The digital market spaces minimize space constraints and enhance price discovery procedures. Research has shown that online markets allow small producers to engage in larger value programs and realize higher prices than through markets dedicated to intermediaries (UNCTAD, 2021; WTO, 2020).

5.2 Intermediaries, Bargaining Power and Digital Platforms

E-trade eliminates the need to go through middlemen as it enhances transparency and direct interactions. It has been revealed that platform-based selling enhances the bargaining ability of the producers based on real-time market data and the ability of competitive pricing. Nevertheless, there are also chances that digital asymmetries can exist like the lack of literacy and infrastructure (OECD, 2019; Goldfarb and Tucker, 2019).

5.3 Regulatory Effect of Digital Trade Policies

The market participation opportunities are determined by the digital trade policies such as data governance, taxation, and cross-border e-commerce regulations. Clarity in regulations promotes trust, security of payment and international flow of trade. Nevertheless, small-scale producers may not be able to participate in digital markets due to the complexity of compliance (WTO, 2020; Aaronson, 2018)

5.4 Dynamics of income and Livelihood Diversification

Engagement in online business helps to diversify earnings and resilience in livelihoods of the rural households. Empirical observations show that the integration of markets due to the use of the technology more benefits the growth of household income and minimizes the risk of exposure to the dynamics of the local market (World Bank, 2021; Ellis, 2000).

5.5 Sustainable Harvesting and Online Market Incentives

Commercialization of forest products should be sustainable which means that conservation practices must be connected to the market. The digital traceability and eco-labeling systems promote responsible harvesting by providing high prices on certified products. Research indicates that livelihood enhancement objectives can be met with the aim of

conservation of forests in an environmentally sensitive market (Shackleton et al., 2015; FAO, 2020).

5.6 Structural Barriers and Digital Divide

Even with the digital opportunities, structural impediments, including low digital literacy, poor infrastructure and logistical inefficiencies limit the inclusion of the tribes. Remote communities still face the impact of the digital divide by not being able to enjoy the full benefits of the global e-commerce systems (Van Dijk, 2020; World Bank, 2021)

5.7 Inclusive E-Commerce Systems

Intensive digital trade would need institutional backing, models of cooperation and policy coordination in order to

make participation equal. It is identified in studies that state-funded platforms and capacity-building programs play a vital role in formatting the marginalized producers into formal markets (UNCTAD, 2021; OECD, 2019).

6. Research Methodology

The research methodology followed the quantitative research design with some qualitative support to discuss the adoption of Non-Timber Forest Products (NTFPs) in digital markets and the effects of the intervention on the livelihoods of the tribes. The study is an empirical study and aims at quantifying the relationships between e-commerce participation and digital trade policies and livelihood outcomes.

Sl. No.	Component	Description
1	Research Design	Mixed-method (Quantitative + Qualitative); Exploratory and Descriptive in nature
2	Study Area	Four districts of North Odisha – Mayurbhanj, Kendujhar, Bhadrak, and Balasore
3	Population	Tribal households engaged in NTFP collection, processing, and marketing
4	Sample Size	600 respondents
5	Sampling Structure	4 Districts → 20 Villages (5 per district) → 30 respondents per village
6	Sampling Technique	Multi-stage sampling: Purposive (district & village selection) + Stratified Random Sampling (household selection)
7	Units of Analysis	Tribal households, SHGs, NTFP microenterprises, Government agencies (TRIFED, Forest Dept., ORMAS), E-commerce platforms
8	Primary Data Tools	Structured questionnaire, Focus Group Discussions (FGDs), Key Informant Interviews (KIIs), Field observations
9	Secondary Data Sources	FSI reports, Odisha Forest Department, TRIFED, Ministry of Tribal Affairs, District Statistical Handbooks, Academic journals
10	Questionnaire Design	Thematic sections: Demographics, NTFP livelihood, E-commerce participation, Sustainable harvesting, Government policies
11	Data Collection Method	Face-to-face interviews due to literacy constraints
12	Data Analysis Tools	SPSS, STATA, Excel
13	Statistical Techniques	Descriptive statistics (Mean, SD), Correlation, ANOVA, Regression, SEM
14	Ethical Considerations	Informed consent, voluntary participation, confidentiality maintained

7. Research Finding

The research results show that Non-Timber Forest Product (NTFPs) integration with e-commerce has positively impacted on market access, price realisation and livelihood diversification amongst tribal producers in the four districts in Odisha. The digital platforms have enhanced the bargaining power and lessened the middlemen in part, according to the respondents, especially among the Self-Help Groups that are connected with the institutional support systems. There was a high level of acceptance of sustainable harvesting practices among the many educational groups implying that they were very ecologically aware. Nonetheless, digital trade has not benefited all people because of poor digital literacy, poor infrastructure, logistical barriers, and little knowledge of digital trade policies. All in all, this research supports the argument that although NTFP e-commerce has huge potentials in terms of increasing income and ensuring environmental sustainability, it needs to be effective, which is possible through capacity building, simplifying policies and enhancing digital accessibility in tribal areas.

8. Research gap

Existing sources have also portrayed the monetary worth of Non-Timber Forest Products (NTFPs) and the rise in the

amount of e-commerce as a platform of integrating the market in the rural settings; however, there is no empirical study that examines the interaction of digital commerce, environmental sustainability, and tribal livelihoods on local scale in Odisha. Much of the earlier literature is approaching the livelihood dependency, or digital business in a vacuum, without considering the ecological sustainability, policy framework, and market dynamics, in one paradigm of analysis. Furthermore, there is a lack of evidence in the field to establish the beneficial effect of digital trade policies and the role of the e-commerce in raising the income of the tribal producers, controlling the utilization of their resources, and empowering the markets. The paper provides the answer to these gaps by presenting a descriptive and mixed-method empirical study about the integration of NTFP e-commerce and its socio-ecological implications.

9. Conclusion

This paper has explored the issue of Non-Timber Forest Products (NTFPs) integration with e-commerce and its effects on the livelihood of tribal communities and the sustainability of the environment in Odisha. The results indicate that electronic systems can increase market accessibility, price realization and decrease reliance on middlemen. The e-commerce tribal producers stated that they enjoyed increased

customer base, bargaining power and diversification of income. Respondents highly valued sustainable harvesting activities which implies that ecological understanding is still entrenched in the traditional forest-based lives.

Nevertheless, there are also major structural issues that are exposed in the study. Weak digital literacy, poor infrastructure, logistical reasons, and poor knowledge of digital trade policies limit the ability of the tribal communities to engage fully in the global digital markets. Although the government-backed programs and institutional measures have helped to make the initial steps of integration, the simplification of policies and building of the capacity is crucial to the long-term sustainability.

In general, the study proves that NTFP e-commerce is research that has a transformative potential to ensure inclusive economic growth and conservation of forests. Livelihoods of the tribes can be empowered and regenerative rural development achieved through a balanced and sustainable e-commerce system, which incorporates community empowerment, environmental protection, digital access, and institutional backing. This transition is determined by the ability to match the indigenous ecological knowledge with the technological innovation and also the fair trade.

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