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Digital Transformation in Agricultural Marketing in India: Roles of E-NAM, Agri-Tech Startups, and Blockchain

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Abstract

India's agricultural marketing landscape has undergone profound transformation over the past decade with the rapid integration of digital platforms. Traditional marketing channels were historically dominated by fragmented mandis, information asymmetry, and multiple intermediaries, resulting in low price realization for farmers. Since 2016, the launch of the National Agriculture Market (e-NAM) and the emergence of agri-tech startups have initiated a new era of digitally enabled agricultural marketing. As of June 2025, e-NAM integrates over 1,500 mandis across 25 states and union territories, with 1.79 crore farmers registered, 4,518 farmer producer organizations (FPOs) onboarded, and cumulative trade value exceeding 4.39 lakh crore. Private agri-tech firms such as DeHaat and Ninjacart have strengthened market linkages, improved last-mile logistics, and enabled faster and more transparent transactions (Ninjacart, 2024). Blockchain pilots—such as APEDA's upgraded GrapeNet, the Spices Board–UNDP interface, and Assam's proposed blockchain tea auctions—demonstrate the potential for enhanced traceability, quality assurance, and export compliance (Business Standard, 2025). While digital transformation holds promise for inclusive growth, persistent challenges remain, including infrastructural bottlenecks, digital literacy gaps, uneven state adoption of reforms, and data governance concerns. This short communication provides an updated synthesis of developments, highlights achievements, and suggests policy directions to deepen the impact of digital agricultural marketing in India.

Keywords: e-NAM; agricultural marketing; agri-tech; blockchain; traceability; India

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1. INTRODUCTION

Agricultural marketing is the backbone of India's agrarian economy, which supports nearly half of the population. Historically, farmers sold produce through regulated markets or APMC mandis, where multiple intermediaries captured a significant share of consumer prices. Limited transparency, poor infrastructure, and lack of bargaining power often left smallholders vulnerable to price fluctuations. Since the mid-2000s, successive governments have prioritized market reforms. However, real change accelerated in 2016 with the launch of the National Agriculture Market (e-NAM), designed to unify fragmented mandis into a single electronic trading platform. The aim was to empower farmers with transparent price discovery, reduce information asymmetry, and enhance interstate trade (NAARM, 2020).

Simultaneously, India witnessed the growth of "Agri-tech startups" firms leveraging ICT, mobile apps, AI, and data-driven logistics to connect farmers directly with markets, retailers, and exporters. Their interventions have complemented government platforms by focusing on last-mile delivery, quality assurance, and demand-driven linkages.

Adding another layer, **blockchain technology** is being piloted to ensure traceability of agricultural produce for both domestic and international markets. In export sectors like grapes, spices, and tea, blockchain promises to strengthen quality control and meet global standards.

This communication provides an integrated perspective on these three drivers of digital transformation—**e-NAM, agri-tech startups, and blockchain pilots**—with evidence from recent data and case studies.

1. Introduction and Vision of e-NAM

e-NAM (National Agriculture Market) was launched on April 14, 2016, by India's Ministry of Agriculture & Farmers' Welfare to unify fragmented agricultural wholesale markets (APMCs) through a single electronic trading portal (Press Information Bureau, 2024). Its vision is to create a "One Nation, One Market" by providing a single-window platform for agricultural commodities, integrating processes such as assaying, weighing, quality certification, and digital payments (Press Information Bureau, 2024). The platform aims to increase price transparency and reduce the inefficiencies caused by multiple state-level mandi regulations (Indian Business Trade, 2023).

2. Growth and Coverage of e-NAM

The scale of e-NAM has grown substantially since its launch. In 2019–20, 1,000 mandis were integrated with a trade value of 99,387 crore; this rose to 1.3 lakh crore in 2020–21, when 1.7 crore farmers were onboarded (Press Information Bureau, 2025). By 2021–22, trade value crossed 1.87 lakh crore, and in 2022–23 it reached 2.61 lakh crore across 1,389 mandis (Press Information Bureau, 2024). As of June 2025, 1,522 mandis, 1.79 crore farmers, and 4,518 Farmer Producer Organizations (FPOs) were integrated, with a cumulative trade value of 4.39 lakh crore (Press Information Bureau, 2025). More recent data from January 2026 shows that total trade value has reached 4.82 lakh crore, with over 13.22 crore metric tonnes of produce traded (Press Information Bureau, 2025).

3. Achievements of e-NAM

e-NAM has delivered several key achievements. First, it has improved price discovery through transparent, cross-state bidding, enabling farmers to access a larger pool of buyers and report 15–20% higher returns compared to traditional mandis (Mahindra Tractors, 2024). Second, digital payment adoption has grown significantly, with nearly 65% of trades settled online, reducing payment delays and ensuring faster credit to farmers' bank accounts (Indian Business Trade, 2023). Third, the integration of over 4,500 FPOs has strengthened collective bargaining power for small and marginal farmers, allowing them to aggregate produce and sell in larger volumes (Press Information Bureau, 2025). Finally, wider participation has been achieved, with over 26 lakh traders and 1.79 crore farmers currently using the platform (Press Information Bureau, 2026).

4. Limitations of e-NAM

Despite its achievements, e-NAM faces persistent limitations. Infrastructure gaps remain a major challenge: many mandis lack assaying labs, grading equipment, and reliable internet connectivity, which hampers quality certification and seamless digital trading. Interstate barriers also hinder the vision of a unified market, as several states have not fully harmonized their APMC regulations, resulting in varying tax structures and compliance norms that discourage cross-border trade. The digital divide is another critical constraint, especially for small and marginal farmers and women, who often lack digital literacy and access to smartphones or computers (Mahindra Tractors, 2024). Lastly, logistics constraints—including weak transport networks and inadequate warehousing and cold storage—lead to high post-harvest losses and increased transaction costs (Kalyani & Thanuskodi, 2019).

3. Role of Agri-Tech Startups in Market Linkages

The last decade has seen a surge in agri-tech enterprises offering services across the agricultural value chain. Unlike e-NAM, which focuses on trading at mandis, startups address last-mile bottlenecks—aggregation, logistics, advisory, and financing.

3.1 DeHaat

Established as a full-stack digital ecosystem, serves over 1.5 million farmers in 11 states, provides input supply, crop advisory, and output marketing. Reported FY25 revenue of 3,000 crore (Economic Times, 2025), Model: Hub-and-spoke network with "DeHaat centers" run by micro-entrepreneurs.

3.2 Ninjacart

Connects farmers directly to retailers and restaurants, Works with 8 lakh farmers and 1 lakh retailers across 120 cities, Strength: Real-time demand forecasting using AI and ML, Impact: Reduction of wastage by ~20% in perishables.

Broader Impact of Startups

Reduced intermediaries: higher farmer share of consumer rupee, Improved logistics: lower post-harvest losses, financial inclusion: faster payments via digital platforms, Technology adoption: weather alerts, input advisories, credit scoring.

4. Blockchain-Enabled Traceability

Blockchain in agriculture ensures transparency, authenticity, and compliance—critical in export markets. While still nascent, India has initiated several pilots.

Table 2. Snapshot of Agri-Tech Firms

Company	Metric (as of 2025 where noted)	Primary Source
DeHaat	Serves >1.5 million farmers across 11 states; FY25 revenue ~Rs 3,000 Cr (news)	Economic Times, Jul 29, 2025; credible.com company page (2025)
Ninjacart	Impact report 2023: 8L+ farmers, 1L+ retailers; 120+ cities	Ninjacart Impact Report 2023 (published 2024)

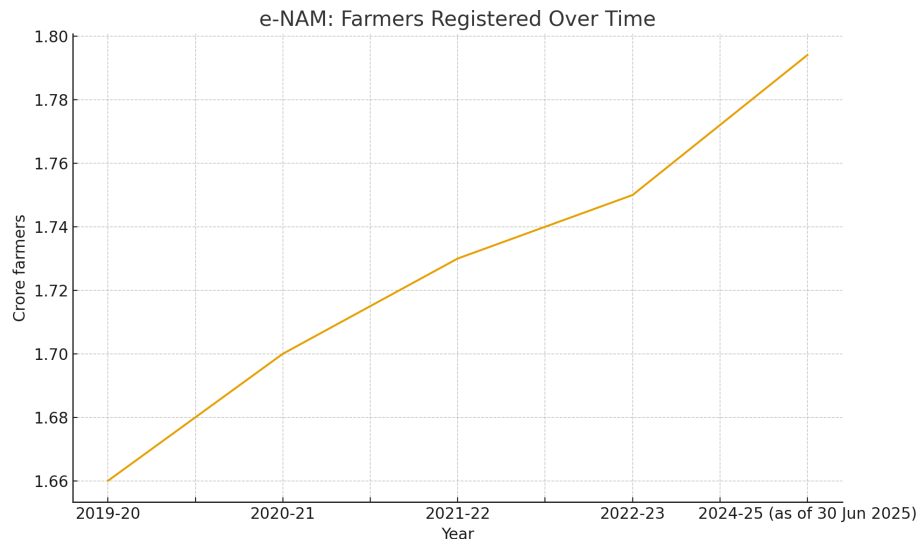


Figure 1. Cumulative trade value through e-NAM (2019–2025).

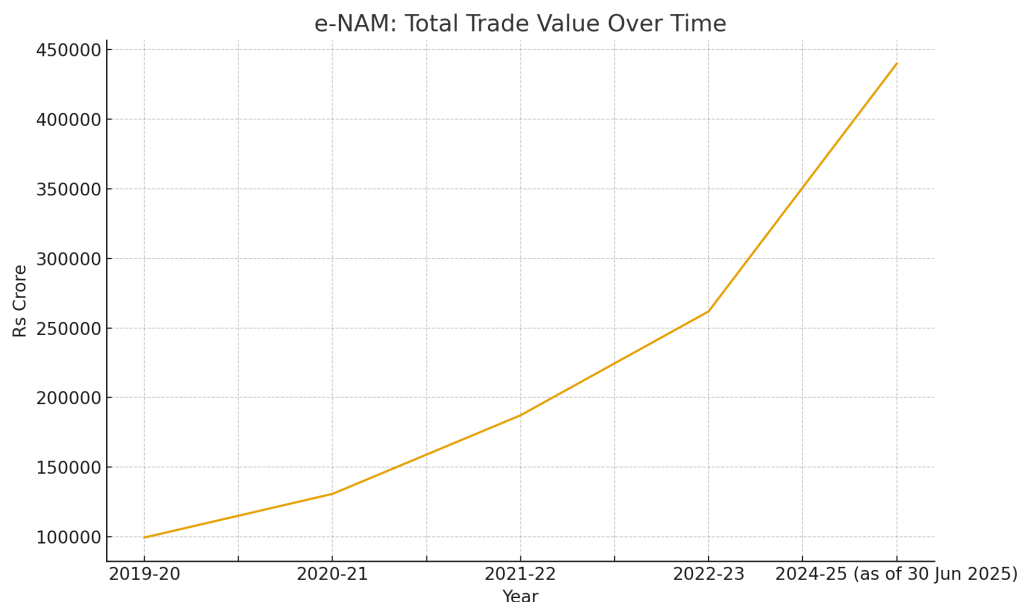


Figure 2. Farmers registered on e-NAM (2019–2025).

4.1 APEDA's GrapeNet Upgrade

Original web-based system for grape exports, upgraded with block chain “Trust Chain” for tamper-proof data, ensures traceability from vineyard to export port.

4.2 Spices Board–UNDP Collaboration

Blockchain interface linked to e-Spice Bazaar, Records farmer details, production practices, and transactions, helps exporters comply with EU/US traceability requirements (Madaswamy, 2023).

4.3 Assam Tea Blockchain Proposal

Assam government announced blockchain + AI tea auction platform, Objective: Prevent counterfeit teas, assure quality, and strengthen brand identity. Benefits are Prevents fraud and adulteration, enhances consumer trust and global competitiveness, Enables quick recalls in case

of contamination. Also, the Challenges are high cost of implementation, Limited awareness among smallholders, Need for interoperability with other digital systems (Business Standard, 2025).

5. KEY CHALLENGES AND EMERGING ISSUES

Despite progress, several systemic issues persist:

Digital Divide – Marginal farmers, women, and elderly farmers face limited access to smartphones, internet, and training.

Infrastructure Gaps – Assaying labs, grading centers, warehouses, and cold chains remain inadequate.

Regulatory Barriers – State-specific APMC rules restrict free flow of commodities.

Trust and Adoption – Farmers hesitate to rely on digital

price discovery over traditional practices.

Data Governance – Issues of privacy, ownership, and platform monopoly need policy safeguards.

Inclusion – Women farmers and marginalized groups are underrepresented in digital platforms and startups.

6. POLICY IMPLICATIONS AND WAY FORWARD

To realize the potential of digital agricultural marketing in India, multifaceted and coordinated interventions are needed at various levels. As a first step, serious investment in physical infrastructure such as warehouses, cold chains, and logistics at local market yards (mandis) is essential to ensure agricultural products reach consumers without loss of quality. Simultaneously, enhancing farmers' digital literacy through practical training within producer organizations, self-help groups, and cooperatives will pave the way for effective use of these platforms. Furthermore, establishing interoperability standards using open application programming interfaces (APIs) for seamless data exchange among national systems like e-NAM, startups, and blockchain technology, along with strengthening public-private partnerships between government platforms and private companies, are other key pillars of this path.

On the social and legal front, providing incentives such as subsidies or support schemes to encourage blockchain adoption in the export sector will make supply chains more transparent and traceable, thereby gaining the trust of international consumers. At the same time, policies must be designed to ensure the inclusive participation of all groups, including women, farmers from marginalized communities (SC/ST), and smallholders, while preventing the creation of a new digital divide. Finally, establishing a transparent framework for data governance—encompassing rules for informed consent, privacy, and farmers' ownership of their digital records—will solidify the foundations of trust and sustainability in this digital transformation and prevent informational exploitation.

7. CONCLUSION

India's agricultural marketing is at a critical juncture. e-NAM has expanded scale and transparency, agri-tech startups are bridging last-mile gaps, and blockchain pilots are building traceability and consumer trust. Together, they represent a hybrid ecosystem where public platforms and private innovation complement one another.

Yet, inclusivity, infrastructure, and governance will

determine whether digital transformation can truly deliver higher incomes and resilience for farmers. Policymakers must now focus on scaling successful pilots, investing in physical-digital integration, and ensuring equitable participation. If implemented effectively, India's experience could serve as a global model for digital agricultural marketing.

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Author Contributions

The sole author was responsible for the conceptualization, methodology, data collection, analysis, and manuscript preparation

Conflict of Interest

The authors declare that they have no conflict of interest.

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REFERENCES

- APEDA. (2021). *GrapeNet blockchain upgrade* \[Press release]. (<https://apeda.gov.in>)
- Business Standard. (2025). *Assam AI- and blockchain-based tea auction proposal*.
- Economic Times. (2025). *Agritech DeHaat's FY25 revenue up 11% to 3,000 crore*.
- Kalyani, K. S., & Thanuskodi, S. (2019). Usage of Library Resources Among the Civil Service Exam Aspirants. *Pearl: A Journal of Library and Information Science*, 13(4), 371-381. <https://doi.org/10.5958/0975-6922.2019.00045.7>
- Kredible. (2025). *DeHaat company profile*. (<https://thekredible.com/company/dehaat>)
- Madaswamy, M. (2023). Spices informatics network and value chain for open innovation and value creation network. In *Handbook of Spices in India: 75 Years of Research and Development* (pp. 1147-1191). Singapore: Springer Nature Singapore.
- NAARM. (2020). *Strengthening e-NAM in India: Way forward*. ICAR-National Academy of Agricultural Research Management. (https://naarm.org.in/wp-content/uploads/2021/07/2020_eNAM_Report.pdf)
- Ninjacart. (2024). *Impact report 2023*. (<https://www.ninjacart.com/wp-content/uploads/2024/04/NinjacartImpactReport2023.pdf>)
- Press Information Bureau. (2025). *Registration of FPOs, farmers and traders on e-NAM platform*. Government of India. (<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2148525>)
- Press Information Bureau. (2024). *Implementing of National Agriculture Market (e-NAM) platform*. Government of India. (<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2086484>)
- Press Information Bureau. (2026). *eNAM: Transforming agricultural trade into a seamless experience*. Government of India. (<https://www.pib.gov.in/FactsheetDetails.aspx?Id=149061>)