

**Problems and Prospects of Electronic National Agriculture Market Faced by Stakeholders in Bareilly UP****Nayna Raj<sup>1\*</sup>,**Research Scholar, Department of Regional Economics,  
Mahatma Jyotiba Phule Rohilkhand University, Bareilly, India.  
Email: nrs091994@gmail.com**Ashutosh Priya<sup>2,</sup>**Professor, Department of Regional Economics,  
Mahatma Jyotiba Phule Rohilkhand University, Bareilly, India.

Abstract:

The Electronic National Agricultural Market (e-NAM) was launched to address structural inefficiencies in India's agricultural marketing system such as price opacity, fragmented markets, and excessive intermediation (Acharya, 2006; Chand, 2016; Bisen & Kumar, 2018). As part of the 'One Nation, One Market' initiative, e-NAM integrates Agricultural Produce Market Committees (APMCs) into a unified digital platform (Ministry of Agriculture and Farmers' Welfare [MoAFW], 2023). This study analyses the adoption and performance of e-NAM in Bareilly district using secondary data from government dashboards and institutional reports (e-NAM Dashboard, 2025; NABARD, 2021; NIAM, 2020). The findings indicate low adoption due to digital illiteracy, infrastructure gaps, and resistance from traditional intermediaries (Uttar Pradesh Mandi Parishad, 2022).

**Keywords:** E-Nam, Agricultural Marketing, Digital Agriculture, APMC**1. INTRODUCTION**

Agriculture remains central to India's economy, employing nearly 54.6% of the workforce and contributing about 18.4% to Gross Value Added (Census of India, 2011; MoAFW, 2023). Despite its importance, agricultural marketing is constrained by poor infrastructure, information asymmetry, and dependence on intermediaries, which weakens farmers' price realization (Acharya, 2006).

To address these challenges, the Government of India launched e-NAM in 2016 to facilitate transparent price discovery and inter-state market integration (Chand, 2016). Aims to provide an integrated electronic marketplace, e-NAM facilitate transparent online trading and selling, real-time price discovery, and direct farmers-buyers linkages through interlinking Agricultural Produce Market Committees (APMCs) at the national level. Till April 2025, the platform has interconnected 1,522 APMC mandis in 23 states and 4 union territories, including 162 in Uttar Pradesh, thus facilitating trade in 193 commodities.

Uttar Pradesh, a major agricultural state, makes significant contributions to the development of e-NAM. Bareilly district in the agriculturally rich western belt of the state is famous for growing sugarcane, food grains, and horticulture produce. Despite the inclusion of major mandis like Bareilly City and Bhojipura in the e-NAM initiative, the take-off of the platform is poor. Government reports as well as independent estimates reflect that very few agricultural transactions in the district are made through e-NAM. Obstacles such as absence of digital literacy, continued dominance of traditional intermediaries, inadequate grading and assay facilities, and poor internet connectivity impede successful adoption. These obstacles reflect the need for a general stakeholder-level evaluation and strategic policy initiatives to enhance e-NAM's performance in Bareilly.

**Table 1: E-NAM Process Flow Chart**

Steps	Process Description
1. Gate Entry	Farmer Registration- Lot Generation
2. Assaying	Sampling- Quality Assaying
3. Online Trading	Bid Management- Auction
4. Weighment & Invoicing	Weighbridge Use- Weighing Scale- Sale Agreement
5. Online Payment	Payment via Cheque, Challan, Internet Banking, RTGS/NEFT
6. Gate Exit	Post-Trade Activities (Goods Return, Gate Pass/Permit)

Source: e-NAM official website

**1.1. Objective**

- To identify and analyse the key challenges faced by various stakeholders (farmers, traders, and mandi officials) in the implementation and adoption of the Electronic National Agriculture Market (e-NAM) in Bareilly district.
- To assess the potential benefits and future prospects of e-NAM in enhancing agricultural marketing efficiency, price transparency, and market access for stakeholders in the region.

**2. METHODOLOGY**

The study adopts a descriptive qualitative methodology based on secondary data sources. Data were collected from the e-NAM Dashboard for mandi-level statistics (e-NAM Dashboard, 2025), Annual Reports of the Ministry of Agriculture (MoAFW, 2023; MoAFW, 2025), and institutional studies by NABARD and NIAM (NABARD, 2021; NIAM, 2020). Policy context was drawn from reports by NITI Aayog and OECD (NITI Aayog, 2021; OECD, 2023).

This study employs a descriptive and qualitative approach, primarily based on secondary data sources to examine implementation and impacts of the Electronic National Agricultural Market (e-NAM) in Bareilly, Uttar Pradesh. Data were gathered cautiously from authentic governmental, institutional, and academic sources to ensure reliability and comprehensiveness. Key quantitative information in the form of mandi-level activity, user registrations, and transaction volumes was obtained from the original e-NAM dashboard (www.enam.gov.in). These parameters allowed for an initial understanding of trading trends online and infrastructure integration at district and state levels. In placing policy frameworks and institutional progress, the government reports specifically, the Annual Reports of the Ministry of Agriculture and Farmer's Welfare were thoroughly reviewed. These reports offered a clear overview of the strategic vision, milestones, and operational issues of e-NAM implementation. Secondary data were supplemented by studies conducted by NABARD and the National Institute of Agricultural Marketing (NIAM), with a particular emphasis on agricultural market reforms, rural infrastructure development, and digital technology integration. These organizational reports helped determine infrastructural gaps, institutional impediments, and the broader economic impacts of digital agricultural platforms.

Scholarly journals such as Economic and Political Weekly, Agricultural Economics Research Review, and Kurukshetra offered carefully tested views on the integration of digital marketing platforms in the Indian scenario. The above references contributed to the research by providing theoretical models, empirical facts, and localized case studies. Further, policy reports and documents published by NITI Aayog and the Ministry of Electronics and Information Technology (MeitY) were examined to assess the emerging digital infrastructure, e-governance systems, and rural connectivity initiatives relevant to the uptake of e-NAM.

Lastly, more recent developments were tracked through news reports, expert opinion articles, and stakeholder interviews featured in national and local newspapers. These gave the research street-level insight into the stakes, aspirations, and mind-sets of stakeholders most especially in the context of Bareilly district.

**2.1. Overview of e-NAM in Uttar Pradesh and Bareilly**

According to official e-NAM statistics (2025), Uttar Pradesh is among the leading states in the nationwide rollout of the Electronic National Agricultural Market, having registered 162 Agricultural Produce Market Committee (APMC) mandis on the platform. Nationally, e-NAM has registered over 2.5 crore farmers and 1.5 lakh traders, reflecting rising institutional trust and stakeholder interest in digital agriculture marketing. In case of the Bareilly district, two big agriculture markets of Bareilly City and Bhojipura have been covered under the e-NAM program. These markets deal with a range of crops, from sugarcane, wheat, and paddy to seasonal vegetables, which serve both local farmers and consumers from other districts. However, even after this infrastructural coverage, the real usage of the e-NAM platform in the district is highly limited. As per the 2022 assessment report released by the Uttar Pradesh Mandi Parishad, the e-NAM portal is used for less than 5% of total agricultural transactions in Bareilly. This wide gap between the availability of digital resources and their utilization is a pointer to deep-rooted structural problems ranging from thin digital literacy to inadequate grading and testing facilities, low e-NAM benefits awareness, and resistance from deep-rooted intermediaries. All these factors put together point towards the need for inclusive and targeted interventions in bridging the digital divide and boosting e-NAM adoption at the grassroots level.

**2.2. The Position of e-NAM in Agricultural Market Reforms****2.2.1. Price Inefficiencies Resolution**

- **Transparent Price Discovery:** The e-NAM platform provides real-time access to prices across different markets, empowering farmers with the most important

information to make market-based decisions. Such transparency significantly reduces the traditional intermediation role and reduces the risk of price exploitation and manipulation.

- **Greater Market Access:** Since the online link between producers and consumers across state boundaries and even nationally, e-NAM offers access to markets beyond the local mandis. Market decentralization reduces the monopolistic practices common in isolated local markets; it becomes more competitive and allows for improved price realization.
- **Encouraging Competitive Market Forces:** Adding more traders and buyers through e-NAM supports strong competition. The competitive market promotes efficiency, promotes honest pricing habits, and assists in establishing a more equitable marketing system for farm producers.

**2.2.2. Deepening Market Integration**

- **Creation of a Single National Market:** e-NAM is an innovative tool to bring together previously fragmented agriculture markets, almost eliminating regional and inter-state trade barriers. By consolidating them, liquidity is added to the market, resource allocation is optimized, and price stabilization is promoted across geographies of diversity.
- **Transaction Cost Reduction:** Digitalization of trading procedures and documentation simplified via e-NAM significantly lowers producers' and traders' transaction costs. By removing wasteful intermediaries and minimizing physical transactional needs, market operations are made simpler, resulting in enhanced overall profitability.
- The post-harvest logistics are optimized through the platform being linked with logistics services and storage facilities, allowing for efficient and timely transportation of farm produce, thereby reducing post-harvest losses. Also, improved logistical coordination enhances the reliability of supply chains and the timely availability of farm products to market consumers.
- This combined analysis based on empirical realities in Bareilly and informed by the functional assessment of e-NAM captures both the reform potential and the operational constraints of digital market reforms in the Indian farm economy.

**2.3. Break up of Stakeholders in e-NAM**

Stakeholders Registered Under e-NAM in India and Stakeholders Registered Under e-NAM in Uttar Pradesh is explained in table 2 and table 3.

**Table 2: Stakeholders Registered Under e-NAM in India**

State	27
Traders	2,67,050
Commission Agents (CAs)	1,15,853
Service Provider	79
FPOs	4,481
Farmer	1,79,29,074
Total	1,83,16,537

Source: e-NAM official website

**Table 3: Stakeholders Registered Under e-NAM in Uttar Pradesh**

State	UTTAR PRADESH
Traders	40,051
Commission Agents (CAs)	8,574
Service Provider	2
FPOs	395
Farmer	33,05,144
Total	33,54,166

Source: e-NAM official website

**2.4. Problems and Challenges faced by Stakeholders**

Despite continued developments in infrastructure and policy-level interventions, operationalization and functional working of the Electronic National Agricultural Market (e-NAM) in Bareilly remain plagued by various systemic, technical, and socio-economic challenges. These challenges continue to limit the working of the platform to essentially revolutionize agricultural marketing in the region.

**2.4.1. Low Farmer Awareness and Low Digital Literacy**

A significant number of marginal and small-scale farmers in Bareilly lack the fundamental digital competencies to properly exploit the online platform of e-NAM. The second All India Rural Financial Inclusion Survey (NAFIS) by NABARD (2021) shows that as low as 24.1% of Uttar Pradesh smallholders had basic digital literacy (Press Information Bureau, 2023). Consequently, most farmers still depend on commission agents (arthiyas) to carry out their transactions. Poor outreach programs and the lack of localized digital training programs have also widened the gap, limiting direct farmer engagement and appreciation of the platform's potential advantages.

**2.4.2. Inadequate Infrastructure and Absence of Quality Test Facilities**

Most of the Agricultural Produce Market Committee (APMC) mandis in Bareilly, the Bareilly City Mandi and the Bhojipura Satellite Mandi are lacking in basic infrastructural components like grading facilities, quality testing laboratories, storage godowns, and electronic weighing machines. A report by the National Institute of Agricultural Marketing (NIAM) published in 2020 depicted that only 20% of Uttar Pradesh mandis possessed quality infrastructure. This lack diminishes quality-based pricing mechanisms and erodes buyer confidence, thereby limiting long-distance and high-value transactions on the e-NAM platform.

**2.4.3. Resistance from Traditional Market Intermediaries**

Commission agents, who have long controlled procurement and price negotiation activities, naturally perceive e-NAM as a direct challenge to their traditional roles. This has led to aggressive resistance in most mandis in Bareilly, where agents are reported to discourage farmers from registering or trading on the platform. In few cases, agents have tampered with trading records or assumed control of operations at the mandi level in efforts to hold on to their control. Such actions are counter to the objectives of transparency and farmer empowerment that e-NAM seeks to advance.

**2.4.4. Connectivity and Technical Issues**

Persistent technical issues i.e., portal crashes, delays in transaction processing, and weak system integration have undermined user experience on the e-NAM platform. Unpredictable internet connectivity in the rural parts of Bareilly adds to the issue. Farmers have reported delay in payment intimation, e-transaction errors, and user interface bugs, all of which undermine trust and discourage repeated usage of the platform. Additionally, most state agricultural departments lack technical know-how and trained staff to address such issues in a timely and efficient manner.

**2.4.5. Restraints on Private Sector Involvement and Dominance of Non-Digital Transactions**

The limited interaction of e-NAM with private sector buyers has dampened competitive pressures and prevented proper price discovery for farm producers. A high proportion of e-NAM transactions go offline and then continue with retrospective manual data entry, which ends up defeating the very purpose of enabling real-time, transparent, and traceable trading cycles. This disparity between the electronic intentions and the continuance of conventional methods erodes the credibility and trustworthiness of e-NAM as a fully electronic marketplace.

**2.4.6. Payment Delays and Logistical Shortfalls**

The lack of integrated logistics support varied from transportation linkages to supply chain management has disadvantaged smooth distribution of produce from farms. In addition, payment transaction delay has adversely affected farmers' confidence in the system. Timely payments and logistics are critical in building farmer confidence in electronic platforms; however, these issues still remain significant weaknesses in Bareilly's e-NAM system. The multi-pronged challenges therefore highlight the imperative for comprehensive, stakeholder-sensitive transformations ranging from digital capacity building and infrastructure development to policy compliance and private sector engagement. As long as these structural and operational impediments are not eliminated, the wider potential of e-NAM as an instrument for inclusive and efficient agri-marketing will remain relatively under-achieved, especially in the experience of districts such as Bareilly.

**2.5. Prospects of e-NAM**

In spite of the commonly encountered issues of Electronic National Agricultural Market (e-NAM) rollout in Bareilly, the intersection of policy reform, infrastructure investment, and institutional strengthening presents promising avenues for its transformation into an efficient and inclusive digital agricultural market system. The newly launched programs, based on empirical evidence from national and state governments, can potentially correct systemic inefficiencies and improve the use of the platform in the region.

**2.5.1. Financial Inclusion and Digital Integration through PM-Kisan and Digital India**

Government initiatives such as Digital India and PM-Kisan have expanded rural internet access and familiarized farmers with digital platforms (IAMAI, 2022; PIB, 2023). The Digital India programme, launched in 2015, has aggressively increased internet penetration in rural India. Indeed, rural India is now ahead of urban India, with the former having more than 351 million internet subscribers, according to the Internet and Mobile Association of India (IAMAI, 2022). The Agriculture Infrastructure Fund has supported investments in post-harvest and market infrastructure essential for effective e-NAM operations (Kumar, Meena, & Sharma, 2024; MoAFW, 2025). On the other hand, the PM-Kisan Samman Nidhi Yojana has succeeded in enrolling more than 11 crore farmers online (Ministry of Agriculture, 2023), thus making them acclimatized to online platforms through Aadhaar-linked bank credit transfers and mandatory electronic Know Your Customer (e-KYC) processes. This large-scale outreach through digital platforms, along with stringent identity verification processes, not only improves the security and inclusiveness of e-NAM services but also reduces the occurrence of spurious registrations while consolidating the confidence of market participants.

**2.5.2. Enhancing Farmer Producer Organizations (FPOs)**

Farmer Producer Organizations (FPOs) have also emerged as important aggregators, enhancing market access and price realization (Kumar, Kataria, & Rane, 2025). Government has accorded high priority to developing FPOs under the Central Sector Scheme (2020) to establish 10,000 FPOs by 2024. Over 8,000 FPOs have been formed up to 2022, of which 18 are in the city of Bareilly alone (Kumar et al., 2025). They are the major intermediaries in the e-NAM system by:

- Preparing farm products for batch listings on the website,
- Facilitating quality assessment and marking
- Enabling last-mile logistics, and
- Individual farmer training and education program organization.

As per the NITI Aayog Report on FPOs and Agri-Tech (2021), farmers connected with FPOs have been getting 20–30% more market prices, which indicates the strength of collective action in digital agriculture.

**2.5.3. AIF and Mandi Modernization for Infrastructure Upgradation**

Union Budget 2022–23 has allocated 10,200 crores to the Agriculture Infrastructure Fund (AIF) to enhance post-harvest infrastructure, which supports the e-NAM functionalities directly. It covers:

- Grading and assay laboratory setup,
- Building of cold stores and warehouses
- Setting up electronic kiosks and e-NAM trading terminals,
- Construction of core processing facilities.

Uttar Pradesh is one of the top five states sanctioned for AIF projects (Ministry of Agriculture, 2023), a good indicator of the institutional support. The RKVY and State Mandi Modernization Program projects are also modernizing the conventional mandis of Bareilly, i.e., Bhojipura and Bareilly City, by incorporating ICT facilities, e-auction halls, and online quality check facilities.

**2.5.4. Greater Transparency with e-KYC and Electronic Authentication**

Aadhaar-based e-KYC application in e-NAM utilization of PM-Kisan's digital backbone has improved the registration process immensely. The digital identity system eliminates repetitive registration, erases fake ones, and enhances accountability. As per the Ministry of Agriculture's Annual Report (2022–23) for e-KYC, mandis using e-KYC saw on boarding time falling by 40%, leading to better data quality and enhanced stakeholder confidence.

**2.5.5. Enhancing Private Sector Engagement and Agri-Tech Innovations**

The establishment of a robust digital ecosystem, supported by Farmer Producer Organizations (FPOs) and incentives from the government, has appealed to increased interest from the private sector for the e-NAM platform. Agri-tech startups, fintech firms, logistics firms, and certification companies are making greater use of the platform. Initiatives such as the Open Network for Digital Commerce (ONDC) are being redirected towards the agri-commerce sector, which could make synchronization with e-NAM feasible for:

- Real-time inventory management,
- Traceability of produce end-to-end,
- On-demand quality control and logistics.

Private sector participation in online agri-markets will grow at a CAGR of 15%, particularly in high-potential places like Bareilly, where institutional readiness and FPO density are growing at a rapid rate, according to NABARD's Agricultural Digital Report (2023).

**2.5.6. Interoperability between Platforms for an Integrated Agricultural Framework**

Efforts are underway to link e-NAM with other farmer-centric digital platforms and thus create an over-arching agricultural data infrastructure. These include: Soil Health Card Portal makes crop and nutrient planning easier. The Kisan Credit Card (KCC) associated digital products enable credit access, while the PM Fasal Bima Yojana (PMFBY) offers crop insurance cover. Additionally, Agri-Stack is a digital repository that aggregates farmer information. As the Vision 2030 report developed by the Ministry of Agriculture shows, the convergence is intended to create one digital ecosystem, enabling farmers to trace the life of crops from sowing to post-harvest marketing through interlinked government portals. The new opportunities imply that, with policy stability assured, coupled with building institutional capacities and improved infrastructure, the e-NAM platform is sure to make a significant contribution to Bareilly's agricultural market dynamics. Additionally, strategic integration into integrated digital and financial frameworks will be critical to ensure its maximum contribution towards empowering farmers and improving market efficiency. e-NAM Coverage is explained in table 4.

**Table 4: e-NAM Coverage**

S.No.	Name of State/UT	Mandis registered on e-NAM	Registered Traders on e-NAM	No. of Unified licenses issued by State
1.	ANDAMAN AND NICOBAR ISLANDS	1	4	0
2.	ANDHRA PRADESH	33	3,870	3,870
3.	ASSAM	3	8	0
4.	BIHAR	20	1,002	0
5.	CHANDIGARH	1	121	0
6.	CHHATTISGARH	20	3,692	75
7.	GOA	7	975	975
8.	GUJARAT	144	10,269	10,269
9.	HARYANA	108	17,547	39
10.	HIMACHAL PRADESH	38	2,331	0
11.	JAMMU AND KASHMIR	17	2,747	587
12.	JHARKHAND	19	2,545	58
13.	KARNATAKA	5	832	832
14.	KERALA	6	442	60
15.	MADHYA PRADESH	139	25,916	1,100
16.	MAHARASHTRA	133	23,290	0
17.	NAGALAND	19	181	181
18.	ODISHA	66	10,052	10,052
19.	PUDUCHERRY	2	231	0

20.	PUNJAB	79	3,539	1
21.	RAJASTHAN	173	86,679	86,679
22.	TAMIL NADU	213	12,410	8,926
23.	TELANGANA	57	6,369	6,369
24.	TRIPURA	19	64	0
25.	UTTAR PRADESH	162	40,051	40,051
26.	UTTARAKHAND	20	6,186	6,186
27.	WEST BENGAL	18	5,697	54
	Total	1,522	2,67,050	1,76,364

Source: e-NAM official website

### 3. FINDINGS

The analysis of e-NAM implementation in Bareilly district based on secondary official government websites (eNAM Dashboard, Ministry of Agriculture), institutional reports (NABARD, NIAM), and academic research points out some of the following findings:

#### 3.1. Restricted Usage Despite Extensive Incorporation

Although Bareilly district has two e-NAM-enabled mandis, less than 5% of total agricultural transactions are conducted through the platform (Uttar Pradesh Mandi Parishad, 2022). Despite being a leader in the rollout of e-NAM infrastructure in Uttar Pradesh, with 162 Agricultural Produce Market Committees (APMCs) onboard by April 2025 and over 40,000 registered traders, usage of the platform in Bareilly is suboptimal. Just 4.8% of total mandi transactions at the district level were conducted using the usage of e-NAM, according to the Uttar Pradesh Mandi Parishad (2022).

The observed gap between use and integration suggests that infrastructural advancement alone cannot guarantee uptake. Bareilly City and Bhojipura are among the cities that are still dependent mainly on offline, conventional business practices.

#### 3.2. Inconsistencies between Digital Literacy and Agricultural Awareness

Low digital literacy among farmers is a major constraint, with only 24.1% of small farmers possessing basic digital skills (NABARD, 2021; Press Information Bureau [PIB], 2023). Even farmers themselves are not familiar with how e-NAM works and the majority of them continue to use commission agents (arthiyas) for transactions. This lack of knowledge and skill reduces the direct involvement in agriculture and constrains the intended empowerment using online platforms.

#### 3.3. Inadequate Physical and Technical Infrastructure

Infrastructure gaps such as absence of grading laboratories, cold storage, and unreliable internet connectivity further limit adoption (NIAM, 2020; Kumar, Meena, & Sharma, 2024). A number of infrastructural deficiencies are still hindering the operational efficiency of e-NAM in Bareilly:

- Lack of grading and assay laboratory.
- Insufficient availability of digital weighbridges and cold storage facilities.
- Unstable internet connection and ongoing portal crashes.

According to a 2020 NIAM study, just 20% of Uttar Pradesh mandis possessed the infra for quality-based e-trading. These gaps erode confidence and deter long-distance or bulk buyers (Kumar et al. 2020).

#### 3.4. Resistance of Traditional Market Intermediaries

Commission agents, who have hitherto been at the center of mandi operation, would most probably consider e-NAM to be a threat to their control. Resistance fronts can be seen:

- Deterring farmers from registering on e-NAM.
- Price discovery manipulation in favour of offline bids.
- Restricting logistic support in electronic transactions.

Rather than being possible facilitators, most of the intermediaries remain to be obstacles to reform.

#### 3.5. Operational and Technological Challenges

The e-NAM platform is also beset with various technical and operational inefficiencies:

- Slow payment processing.
- Slow user interface on low-bandwidth rural connections.
- Insufficient specialized digital support centers at mandi locations.
- They erode trust in the system and result in a lower rate of repeated use by farmers and traders.

#### 3.6. Underutilized FPO and Private Sector Potential

Bareilly has 18 FPOs, and Uttar Pradesh has more than 350 registered FPOs in total. Even so, their integration with e-NAM has been sluggish due to:

- Limited technical training and capacity-building.
- Insufficient aggregation incentives.
- Lack of logistical coordination.

Moreover, private sector players like agri-startups, fintech platforms, and logistics companies are still not integrated into the district's digital market system.

#### 3.7. Policy Ecosystem Holds Transformative Potential

In spite of the above pitfalls, other recent policy trends present encouraging avenues for reform:

- PM-Kisan and Digital India have boosted rural internet penetration and made farmers acquainted with digital platforms. More than 11 crore farmers are registered under PM-Kisan.
- The Agricultural Infrastructure Fund (AIF) has released 1,200 crore across the country to modernize mandis, grading infrastructure, and godowns. (Kumar, Meena & Sharma, 2024)
- Integration of Aadhaar-based e-KYC has saved on boarding time by 40% in certain mandis, enhancing the validity of farmer information and lowering fraud listings.

These policy interventions, if well-coordinated at the district level, have the ability to create a favorable environment for e-NAM to be developed.

### 4. RECOMMENDATIONS

In order to enhance the uptake and impact of the Electronic National Agricultural Market (e-NAM) in Bareilly and other similar agricultural districts, the following evidence-based, multi-faceted policy recommendations are proposed. These policy recommendations are directed towards digital inclusion, institutional transformation, infrastructure development, and stakeholder interaction.

#### 4.1. Improve Digital Literacy through Localized Capacity-Building

Establish grassroots-level digital training programs in collaboration with Krishi Vigyan Kendras (KVKs), Non-Governmental Organizations (NGOs), and agricultural universities. The programs need to focus on: Hands-on, field-based training modules, Digital learning camps, and Enlistment of women farmers and youth to become digital facilitators within their respective communities.

#### 4.2. Create Multilingual, Mobile-Centric Learning Content

Create mobile-focused e-NAM training materials and user guides in Hindi and local languages that are visually accessible and culturally relevant. Video material, speech recognition applications, and interactive lessons will enable overcoming the digital divide for new low-literacy users.

#### 4.3. Mandi Infrastructure Upgradation for Quality-Based Trading

Finance infrastructure upgradation of key infrastructure in the form of grading and assay laboratories, digital weighbridges, and electronic auction houses in key mandis such as Bareilly City and Bhojipura. Such infrastructure upgradations will enable transparent, quality-based pricing, minimize disputes, and attract distant buyers.

#### 4.4. Invest in Post-Harvest Handling Infrastructure using AIF Support

Utilize the Agriculture Infrastructure Fund (AIF) to establish cold storage facilities, warehouses, and primary processing units in different regions of Bareilly district. Storage and logistics infrastructure development will reduce post-harvest losses, facilitate the trade of perishable commodities, and enable farmers to postpone sales until optimal price conditions prevail.

#### **4.5. Integrate e-NAM with Complementary Agri-Schemes**

Facilitate cross-platform integration by using methodologies such as:

- Pradhan Mantri Fasal Bima Yojana (PMFBY) for crop insurance,
- Kisan Credit Card (KCC) for readily available working capital, and
- Soil Health Card and Agri -Stack for farm planning and input optimization.

Such integration will create an all-encompassing digital space, thus ensuring that access to the market is supported by economic stability and agricultural advice.

#### **4.6. Develop an Integrated System of Complaint Handling**

Create a digitally empowered grievance redressal system specific to the requirements of rural users. It should have toll-free helplines, local language interfaces, real-time ticket status, and in-mandi digital helpdesks. An open redressal system will create trust, accountability, and long-term usage of the platform.

#### **4.7. Reimagining the Commission Agents' Role via Motivational Incentives**

Rather than replace traditional intermediaries, encourage commission agents to facilitate registration of farmers and e-transactions. Provide them with formal certification, capacity development, and e-NAM-based sale commissions. This may turn them from obstacles to partners in pursuing agricultural market reform.

#### **4.8. Enable FPOs to carry out e-Auctions at the grassroots level**

Advertise FPO-held online auctions with the following:

- Minimum price guarantee mechanisms to mitigate risks,
- Exclusive trading terminals and dashboards, and
- Institutional credit and transportation linkages for scale attainment.

FPOs, if enabled, can act as aggregation points, take e-NAM accessibility to the grassroots, and significantly enhance price realization for smallholders. These strategic suggestions try to fill the gap between e-NAM's promise and ground reality. There is a requirement for a collaborative effort on the part of government agencies, farmer organizations, private players, and civil society in making e-NAM accessible, equitable, and efficient in rural India.

### **5. CONCLUSION**

The Electronic National Agricultural Market (e-NAM) initiative is an important stepping stone towards Indian agricultural marketing modernization through digital integration, greater transparency, and farmer empowerment. Built to create an integrated national platform through digital connectivity of physical mandis, e-NAM is most amenable to price discovery and market efficiency. In the case of Bareilly a prominent agricultural district of western Uttar Pradesh the rollout of e-NAM has been stalled by infrastructural shortcomings, poor digital literacy, resistance from conventional intermediaries, and farmers' lack of awareness. But foundations for substantial change are being established with national programs like Digital India, PM-Kisan, and Agriculture Infrastructure Fund (AIF). Having 18 operational Farmer Producer Organizations (FPOs) in the district presents a strategic opportunity to enhance collective marketing, reduce transaction costs, and enhance price realization for marginal as well as small farmers. Drawing inferences from secondary data, government publications, and scholarly articles, this study emphasizes the need for multi-party, collective approach to overcome the deep-rooted barriers related to the deployment of e-NAM. Key recommendations include targeted investment in market infrastructure, capability development through Krishi Vigyan Kendra's (KVKs), incentivizing commission agents to assist in a facilitation instead of an adversarial role, and harmonious integration of e-NAM with complementary agri-schemes like PM-Fasal Bima Yojana and the Kisan Credit Card (KCC). To realize the full potential of the e-NAM initiative in Bareilly and, by extension, in other agricultural important regions it is crucial to have a holistic strategy that mixes technological innovation with the support of grassroots institutions. With an unflinching commitment on the part of government machinery, civil society, and the private sector, e-NAM may not only be a pillar of inclusive agricultural marketing in Uttar Pradesh but also a model that could be replicated in the direction of rural agricultural market reforms for all of India.

The study concludes that while e-NAM has strong institutional backing, its effectiveness in districts like Bareilly depends on targeted digital literacy initiatives, infrastructure modernization, and stakeholder incentives (Acharya, 2006; NITI Aayog, 2021). Coordinated policy implementation and institutional convergence can transform e-NAM into a robust and inclusive agricultural marketing system (OECD, 2023; World Bank, 2020).

### **DECLARATIONS:**

#### **Funding**

On Behalf of all the authors, the corresponding author states that they did not receive any funds for this project.

#### **Conflicts of Interest**

The authors declare that we have no conflict of interest.

#### **Competing Interests**

The authors declare that we have no competing interest.

#### **Data Availability Statement**

All the data were collected from the simulation reports of the software and tools used by the authors. The authors are working on implementing this using real-world data with appropriate permissions.

### **REFERENCES**

1. Acharya SS (2006). Agricultural Marketing Reforms: Status and Road Map. National Institute for Agricultural Marketing, Jaipur.
2. Bisen J, Kumar R (2018). Agricultural marketing reforms and e-national agricultural market (e-NAM) in India: a review. *Agricultural Economics Research Review*. 31(conf):167-76.
3. Census of India (2011). Primary Census Abstract. Government of India.
4. Chand R (2016). e-Platform for national agricultural market. *Economic and Political Weekly*. 15-8.
5. e-NAM Dashboard (2025). State-wise and commodity-wise statistics. National Agriculture Market Portal. Retrieved from <https://www.enam.gov.in>
6. IAMAI (2022). Internet in India Report 2022.
7. Kumar A, Kataria K, & Rane S (2025). Role of FPOs in Agricultural Digital Market Integration: A District-Level Analysis. *Agricultural Economics Research Review*. 38(1): 88-102.
8. Kumar S, Meena HR & Sharma (2024). Agricultural Infrastructure Fund and market modernization. *Journal of Rural Development*. 43(20): 221-238.
9. Ministry of Agriculture and Farmers' Welfare (2023). Annual Report 2022-23. Government of India.
10. Ministry of Agriculture and Farmers' Welfare (2025). Annual Report 2024-25. Government of India.
11. NIAM (2020). e-NAM Progress Review Report.
12. National Bank for Agriculture and Rural Development (NABARD). (2021). NABARD All India Rural Financial Inclusion Survey (NAFIS). NABARD
13. NITI Aayog (2021). Evaluation of Agricultural Marketing Reforms in India. Government of India.
14. Organisation for Economic Co-operation and Development (OECD). (2023). *Agricultural Policy Monitoring and Evaluation 2023: India Chapter*. OECD Publishing.
15. Press Information Bureau (2023). Rural India Internet and PM-Kisan Implementation Update. Retrieved from <https://pib.gov.in/PressReleasePage.aspx?PRID=2106913>
16. World Bank (2020). *Agricultural Value Chain Development in South Asia*. World Bank Publications.
17. Uttar Pradesh Mandi Parishad (2022). Assessment report on e-NAM.