IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 9, September 2026

DOI: 10.17148/IJARCCE.2026.15926

Identification and Analysis of Problems Faced by Stakeholders in the Existing Grain Market System

Parteek Singh[1], Dr. Harish Rohil[2]

Department of Computer Science and Engineering, Chaudhary Devi Lal University, Sirsa, Haryana, India[1,2]

Abstract: Agriculture markets remain essential interfaces between farmers, intermediaries, buyers and public market authorities, yet their operational performance is often constrained by manual handling, congestion, uneven infrastructure and incomplete use of digital trading services. This study identifies and compares the problems experienced by three stakeholder groups in the existing grain market system in Haryana and Punjab, India. A structured questionnaire survey produced 290 usable responses: 200 farmers, 60 commission agents/traders and 30 grain-market office staff. Responses were summarized through frequencies, percentages and cross-stakeholder comparisons. Strong agreement was observed on labour dependence (86.50–100.00%), time-consuming weighing and packing (90.50–100.00%), and congestion associated with inadequate storage and transportation (96.50–96.67%). Awareness of e-NAM was also widely viewed as a barrier to adoption (75.00–83.34%). Perceptions diverged on the complexity of the e-NAM sale process and online-payment delays: farmers and traders reported greater difficulty, whereas office staff largely rejected these concerns. Infrastructure and resource-management gaps were visible in responses concerning electricity, connectivity, quality-testing facilities, lighting and water management. The findings show that digitizing auction and payment alone does not remove physical-process bottlenecks in the market yard. The paper contributes a stakeholder-aligned problem taxonomy and identifies operational priorities for market modernization: mechanized handling, transparent digital weighing and assaying, queue and logistics management, assisted digital services, and monitored infrastructure. Because the study uses non-probability field access and aggregated self-reports from two states, the results should be interpreted as diagnostic rather than nationally representative.

Keywords: agricultural marketing; grain market; e-NAM; stakeholder analysis; farmers; commission agents; market infrastructure; digital agriculture

1. INTRODUCTION

Agriculture markets perform more than a price-discovery function. They coordinate the arrival, registration, unloading, weighing, sampling, assaying, auction, payment, storage and onward movement of produce. When any of these activities is delayed, the effect travels through the entire market process. A queue at the gate can become congestion at the unloading platform; slow weighing can delay auction and dispatch; inadequate storage can force produce and vehicles to occupy circulation space; and poor information can weaken a farmer's ability to make informed selling decisions.

India's regulated-market framework created designated places and rules for agricultural trade, but market performance continues to vary with local infrastructure, staffing, competition and the quality of implementation. The Electronic National Agriculture Market (e-NAM), launched in 2016, was intended to connect physical Agricultural Produce Market Committee markets through an online trading platform. It supports electronic bidding, quality-linked trade, wider buyer participation and digital settlement. Importantly, e-NAM is not a substitute for the physical market: its effectiveness depends on the market yard's operational capacity, assaying facilities, connectivity, transaction discipline and stakeholder participation (Chand, 2016; Department of Agriculture and Farmers Welfare [DA&FW], 2023).

Research on digital agricultural markets often concentrates on adoption, prices, platform benefits or farmers' awareness. Less attention is given to the way physical bottlenecks and digital constraints are experienced simultaneously by farmers, commission agents/ traders and market office staff. These groups occupy different positions in the same process. Farmers encounter waiting, information asymmetry and payment uncertainty; intermediaries coordinate handling and transactions; and office staff supervise records, infrastructure and compliance. Comparing their responses can distinguish broadly shared operational failures from role- specific perceptions.

International Journal of Advanced Research in Computer and Communication Engineering
Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 9, September 2026
DOI: 10.17148/IJARCCE.2026.15926

The present study therefore examines stakeholder-reported problems in existing grain markets and their use of e-NAM. It does not evaluate a new technical system. Instead, it establishes an empirical baseline that can guide subsequent market-process redesign and technology selection.

2. LITERATURE REVIEW AND RESEARCH GAP

2.1 Physical and institutional constraints in agricultural markets

Agriculture marketing efficiency depends on market access, competition, information, grading, storage, logistics and credible settlement. Fragmented supply chains and excessive intermediation can increase transaction costs and reduce producers' bargaining position (World Bank, 2008; NITI Aayog, 2017). In wholesale yards, the condition of roads, auction platforms, weighbridges, laboratories, warehouses and transport links directly affects throughput. Post-harvest handling and storage deficiencies also raise the risk of quantitative and quality losses (Food and Agriculture Organization of the United Nations [FAO], 2019).

Manual handling creates additional coordination risks. Heavy reliance on labour can slow unloading, movement, cleaning, bagging and dispatch during peak arrivals. Analog or non-integrated weighing and paper-based records may be difficult for farmers to verify and can generate disputes. Likewise, inadequate assaying reduces the credibility of quality-linked bidding. These problems are not isolated: they jointly affect waiting time, transaction transparency and the marketability of produce.

2.2 Digital agricultural marketing and e-NAM

Digital platforms can reduce search costs, widen access to price information and create auditable transaction records. e-NAM seeks to combine the physical infrastructure of mandis with an online trading portal rather than establish a parallel market structure (Small Farmers' Agribusiness Consortium [SFAC], n.d.). Its operational model requires stakeholder registration, lot entry, assaying where available, bidding, sale agreement and payment. The revised operational guidelines emphasize digitized supply-chain management, interoperability, quality assurance, logistics and electronic settlement (DA&FW, 2023).

However, platform availability does not guarantee meaningful adoption. Digital capability, trust, awareness, connectivity, local facilitation and the perceived usefulness of the service influence whether farmers and traders engage with an electronic market. Studies of agricultural information and mobile services similarly show that skills, access and institutional support shape adoption (Aker, 2011; Nakasone, Torero, & Minten, 2014). A digital front end cannot compensate for congested yards, slow material handling, missing laboratories or weak last-mile assistance.

2.3 Research gap and questions

Existing studies provide valuable evidence on e-NAM and agricultural marketing, but many treat market infrastructure, operational processes and platform adoption as separate questions. A cross-stakeholder baseline is needed to show where perceptions converge and where they diverge. This study addresses that gap through three research questions:

- RQ1: Which operational, infrastructural and digital problems receive the strongest agreement within each stakeholder group?
- RQ2: On which problems do farmers, commission agents/traders and office staff show convergence?
- RQ3: Where do stakeholder perceptions diverge, and what do these differences imply for grain-market modernization?

3. MATERIALS AND METHODS

3.1 Study design and setting

A cross-sectional, descriptive survey design was used. The study focused on stakeholders associated with grain-market operations in Haryana and Punjab. These states were selected because grain procurement and regulated-market activity are important components of their agricultural economies. Data were collected through separate Google Forms and field-supported circulation for farmers, commission agents/traders and grain-market office staff. The questionnaires shared a core set of statements but included role-specific items where necessary.

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 9, September 2026

DOI: 10.17148/IJARCCE.2026.15926

3.2 Participants and instrument

The final baseline sample comprised 290 respondents: 200 farmers, 60 commission agents/traders and 30 office staff. The farmer, trader and staff instruments contained 18, 19 and 20 questions, respectively, including demographic items. Problem statements covered the e-NAM sale process, labour dependence, weighing and packing, analog weighing, sample collection and assaying, congestion, storage and transport, payment, awareness, electricity and Internet availability, quality-testing facilities, infrastructure, lighting and water management. Response choices were Yes, No, No Comment and Other.

Table 1. Sample composition

Stakeholder group	n	Share of sample
Farmers	200	68.97%
Commission agents/traders	60	20.69%
Grain-market office staff	30	10.34%
Total	290	100.00%

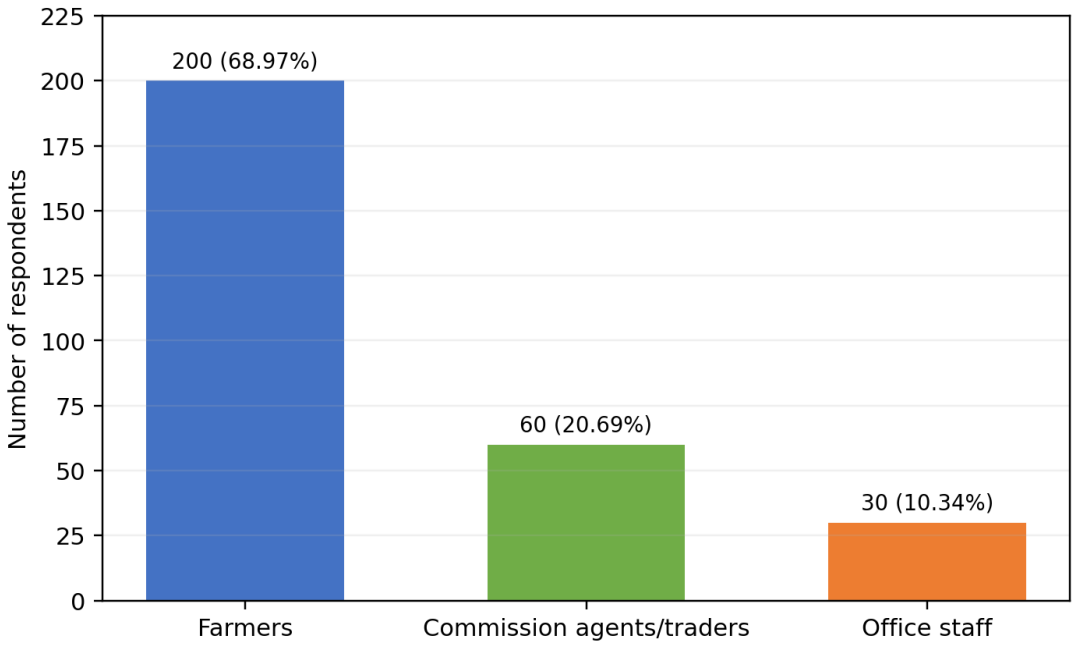

Figure 1. Distribution of respondents by stakeholder group.

3.3 Data analysis

Responses were analyzed using frequency and percentage distributions. Because the available research record contained aggregated percentages rather than respondent-level microdata, the analysis was intentionally descriptive. No chi-square tests, regression models or reliability coefficients were reported, since reproducing such statistics without the original row-level response matrix would be methodologically inappropriate. Cross-stakeholder comparisons were used to identify: (i) convergence, where all three groups recorded high agreement; (ii) divergence, where stakeholder groups reported substantially different views; and (iii) role-specific problems.

3.4 Research ethics and data integrity

Participation was voluntary, and findings were analyzed and presented only in aggregate form. Names and contact information were not used in the analysis reported in this paper. Before journal submission, the authors should insert the applicable institutional ethics approval or waiver reference and confirm that the consent wording used in the original survey meets the selected journal's policy. Percentages in this manuscript were checked against the finalized chapter

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 9, September 2026

DOI: 10.17148/IJARCCE.2026.15926

summaries; items whose captions and explanatory text were inconsistent were excluded from comparative claims unless their values were independently consistent.

4. RESULTS

4.1 Respondent profile

Farmers formed 68.97% of the sample, commission agents/traders 20.69%, and office staff 10.34%. Farmer respondents represented a wide educational range: 22.00% were illiterate, 31.50% had completed matriculation, 30.00% were graduates and 16.50% were postgraduates. Most farmer respondents were aged 31–60 years. Among commission agents/traders, 71.67% had matriculation, 25.00% graduation and 3.33% postgraduate education; 73.33% were aged 40–60 years. Among office staff, 56.67% were graduates and 43.33% matriculates.

4.2 Shared operational bottlenecks

The clearest result was cross-stakeholder agreement on physical and process constraints. Labour dependence was identified as a major problem by 86.50% of farmers, 100.00% of commission agents/traders and 96.67% of office staff. Similarly, 90.50%, 91.67% and 100.00%, respectively, agreed that weighing and packing were time-consuming. Congestion associated with inadequate storage and transportation received near-unanimous agreement: 96.50% among farmers and 96.67% in each of the other two groups. These patterns show that the most severe problems are located in the physical flow of produce, vehicles and records through the market yard.

Table 2. Cross-stakeholder agreement on selected common problems

Problem statement	Farmers Yes	Traders/agents Yes	Office staff Yes
Labour dependence	86.50%	100.00%	
Slow weighing/packing	90.50%	91.67%	100.00%
Market crowding	96.50%	96.67%	
e-NAM awareness gap	82.00%	75.00%	83.34%
Smart-lighting gap	80.00%	100.00%	
Water-management gap	94.00%	96.67%	76.67%

Note. Percentages are stakeholder-specific. "Yes" indicates agreement that the stated issue is a problem.

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 9, September 2026

DOI: 10.17148/IJARCCE.2026.15926

Figure 2. Percentage agreeing with selected problems, by stakeholder group.

4.3 Transparency and quality-assurance concerns

Among farmers, 88.50% agreed that limited understanding of analog weighing scales could be misused, and 85.50% perceived a possibility of corruption in sample collection for assaying and in handling spoiled produce. Office staff also strongly recognized the analog-weighing concern (100.00%), but their views on corruption were divided: 30.00% answered Yes, 40.00% No and 30.00% No Comment. The contrast is substantively important. Farmers evaluated the process from the position of the seller whose payment depends on weight and quality, whereas staff evaluated it from an administrative position. A transparent digital trail should therefore address not only actual error or misconduct but also the verifiability of the process for the farmer.

4.4 e-NAM complexity, awareness and payment

Perceptions of e-NAM were not uniform. The sale process was considered complicated by 60.50% of farmers and 78.34% of commission agents/traders, but no office staff respondent selected Yes; 90.00% selected No and 10.00% No Comment. In contrast, all three groups agreed that inadequate awareness among farmers inhibits adoption: 82.00% of farmers, 75.00% of commission agents/traders and 83.34% of office staff selected Yes.

A similar divergence appeared in payment perceptions. Seventy-five per cent of farmers reported delay in online payment as a problem, whereas only 3.33% of office staff agreed and 96.67% disagreed. Office staff additionally reported low trading through e-NAM relative to the number of registered farmers (96.67% Yes) and software glitches (53.34% Yes). These findings distinguish registration or formal availability from effective use. They also suggest that administrative transaction status and the farmer's experience of receiving usable funds may not be perceived as the same event.

Table 3. Stakeholder perceptions of e-NAM-related problems

Issue	Farmers	Commission agents/traders	Office staff
e-NAM sale process is complicated	60.50% Yes	78.34% Yes	0.00% Yes; 90.00% No
Lack of awareness prevents adoption	82.00% Yes	75.00% Yes	83.34% Yes
Delay in online payment	75.00% Yes	Not used in cross-group claim	3.33% Yes; 96.67% No
Low e-NAM trading relative to registration	Not asked	Not asked	96.67% Yes
Glitches in e-NAM software	Not asked	Not asked	53.34% Yes

4.5 Infrastructure and resource-management gaps

Scarcity of electricity, computers, Internet connectivity, quality-testing facilities and skilled or unskilled staff was identified as a major e-NAM challenge by 72.00% of farmers and 70.00% of commission agents/traders. Office staff reported a different view: 10.00% agreed, 63.33% disagreed and 26.67% offered no comment. General market infrastructure was viewed negatively by 74.00% of farmers, 43.33% of commission agents/traders and 63.33% of office staff. The relatively high No Comment response among traders and staff indicates uncertainty or variation across market locations.

Resource-management problems also received strong agreement. Lack of smart lighting and avoidable daytime energy use were reported by 80.00% of farmers, 100.00% of commission agents/traders and 66.67% of office staff. Inadequate water monitoring, tank overflow and concerns about drinking-water quality were reported by 94.00%, 96.67% and 76.67%, respectively. These facilities are sometimes treated as peripheral to agricultural marketing, but the results show that stakeholders experience them as part of market performance and working conditions.

International Journal of Advanced Research in Computer and Communication Engineering
Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 9, September 2026
DOI: 10.17148/IJARCCE.2026.15926

5. DISCUSSION

5.1 Physical throughput is the central shared problem

The strongest convergence concerned labour dependence, slow weighing and packing, and congestion. This combination describes a throughput problem rather than a single equipment shortage. During peak arrivals, manual handling increases service time; inadequate staging and storage reduce usable space; and delayed transport prevents cleared produce from leaving the yard. The result is a reinforcing cycle of queues, crowding and longer transaction times. The findings are consistent with policy analyses that connect market efficiency to infrastructure, logistics, assaying and transaction integration rather than to an auction interface alone (NITI Aayog, 2017; DA&FW, 2023).

5.2 Digital transformation must include process redesign

High agreement on e-NAM awareness, together with divergent views on complexity, indicates that adoption cannot be addressed solely through registration drives. The user journey extends from arrival and lot creation to assaying, bidding, sale confirmation, payment and exit. A platform may appear straightforward to officials familiar with it but remain complicated for users who depend on assistance, face unclear status messages or cannot connect digital steps with physical actions in the yard. Assisted service desks, multilingual interfaces, transaction-status notifications, demonstrations and grievance channels are therefore necessary complements to software deployment.

5.3 Transparency is an observable system property

The gap between farmers and office staff on perceived corruption and payment delay should not be interpreted simply as one group being correct and the other incorrect. Perception is shaped by information access and role. A farmer may not observe how a sample was selected, how a weight was recorded or when a payment instruction was initiated. Staff may see the official record but not the farmer's full experience. Transparency improves when the process produces evidence that both sides can verify: timestamped weight slips, lot-linked sample records, accessible quality reports, bid histories, payment references and exception logs.

5.4 Supporting infrastructure affects trust and usability

Lighting, water, power, Internet access and quality-testing facilities influence safety, continuity and confidence. Their inclusion broadens the concept of market modernization beyond trading software. Automated lighting can reduce unnecessary energy use and improve safety; monitored water systems can limit overflow and support drinking-water quality checks; resilient connectivity and power can reduce transaction interruption; and accessible assaying can make quality-linked bidding credible. These priorities align with the e-NAM operational emphasis on physical-market readiness and quality infrastructure (DA&FW, 2023; CCS NIAM, 2020).

6. MANAGERIAL AND POLICY IMPLICATIONS

The findings support a phased improvement programme driven by the severity and cross-stakeholder reach of each problem.

- Prioritize flow and queue management: map vehicle arrival, parking, unloading, weighing, auction and dispatch as one end-to-end process; monitor waiting time at each stage.
- Improve material handling: introduce appropriately scaled mechanized unloading, conveyors, cleaning and packing where volume and safety assessments justify them.
- Create verifiable weighing and assaying: connect digital weighbridges and laboratory results to a unique lot identifier and provide immediate receipts to farmers.
- Treat awareness as continuing support: provide multilingual demonstrations, assisted e-NAM counters, helplines and simple transaction-status messages rather than one-time registration campaigns.
- Integrate payment visibility: distinguish bid acceptance, payment initiation, bank processing and final credit, and communicate each status with a reference number.
- Strengthen market-yard infrastructure: assess storage, traffic circulation, power backup, connectivity, quality-testing capacity, lighting and water as prerequisites for reliable digital trade.

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 9, September 2026

DOI: 10.17148/IJARCCE.2026.15926

- Use stakeholder dashboards: publish service indicators such as average waiting time, lots assayed, payment turnaround and unresolved grievances to build shared accountability.

Table 4. Evidence-linked modernization priorities

Priority	Evidence from survey	Suggested indicator
Market throughput	>90% agreement on slow weighing/ packing and congestion	Median gate-to-exit time; queue length
Labour /process redesign	86.50–100% agreement on labour dependence	Handling time per tonne; safety incidents
Transparency	High farmer concern over analog weighing and sampling	Digitally receipted weights; traceable samples
e-NAM adoption	75–83.34% cite awareness gap	Active traders/farmers; completed trades
Infrastructure	Power, connectivity, assaying and general infrastructure concerns	Uptime; lots assayed; service interruptions
Resource management	66.67–100% lighting and 76.67–96.67% water concerns	Energy use; overflow events; water-quality checks

7. THEORETICAL CONTRIBUTION

This study contributes a socio-technical view of agricultural-market performance. It shows that market problems can be classified into four interacting layers: physical flow (arrival, handling, storage and transport), transaction integrity (weight, sample, quality and payment), digital access (awareness, usability, software and connectivity), and civic infrastructure (lighting, water and working conditions). Failure in one layer can reduce the value of improvements in another. For example, electronic bidding has limited effect if a lot is delayed in weighing or lacks credible assaying. The cross-stakeholder comparison also demonstrates that administrative completion and user-experienced completion may differ, especially for payment and digital processes.

8. LIMITATIONS AND FUTURE RESEARCH

The study has five limitations. First, respondents were drawn from grain-market contexts in Haryana and Punjab; the findings are not nationally representative. Second, field access and online circulation produced a practical sample rather than a probability sample. Third, the groups were unequal in size, particularly the office-staff group. Fourth, responses represent perceptions and were summarized from aggregated data; they were not linked to observed waiting times, transaction logs or respondent-level predictors. Fifth, several questionnaire statements combined more than one issue, which can make the source of agreement ambiguous.

Future research should preserve anonymized respondent-level data, validate multi-item constructs, assess reliability, and use inferential models to test how age, education, market role and digital experience affect perceptions. Multi-state studies should combine surveys with time-and-motion observations, weighbridge and payment logs, infrastructure audits and qualitative interviews. A subsequent intervention study could measure conditions before and after introducing selected process and monitoring technologies.

9. CONCLUSION

The existing grain market system is constrained by a combination of physical, informational and institutional problems. Across farmers, commission agents/traders and office staff, the most consistent concerns were dependence on labour, time-consuming weighing and packing, and congestion associated with inadequate storage and transportation. Stakeholders also identified low e-NAM awareness and weaknesses in lighting and water management. At the same time, sharply different views on e-NAM complexity, payment delay, infrastructure scarcity and corruption show why a single-

DOI: 10.17148/IJARCCE.2026.15926

group assessment is insufficient. Effective modernization should begin with common operational bottlenecks while designing transparent records and assisted digital services that address differences in information and experience. The central implication is straightforward: a digital marketplace becomes effective only when the physical market, transaction process and supporting infrastructure function as an integrated system.

Declarations

Funding: The authors should insert the applicable funding statement before submission. If no external funding was received, state: "This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors."

Conflict of interest: The authors should confirm the final declaration before submission. Suggested wording where applicable: "The authors declare no conflict of interest."

Data availability: Aggregated data supporting the findings are reported in the article. Availability of anonymized respondent-level data should be stated only after confirming consent, institutional requirements and the condition of the original dataset.

Ethics statement: Insert the institutional approval/waiver body, reference number and consent procedure applicable to the original survey before journal submission.

Author contributions (CRediT): Confirm roles before submission. Suggested fields: Conceptualization; Methodology; Investigation; Data curation; Formal analysis; Writing—original draft; Writing—review and editing; Supervision.

REFERENCES

[1]. Acharya, S. S., & Agarwal, N. L. (2020). Agricultural marketing in India (7th ed.). Oxford & IBH Publishing.
[2]. Aker, J. C. (2011). Dial "A" for agriculture: A review of information and communication technologies for agricultural extension in developing countries. Agricultural Economics, 42(6), 631–647. https://doi.org/10.1111/j.1574-0862.2011.00545.x
[3]. Chand, R. (2016). e-Platform for national agricultural market. Economic & Political Weekly, 51(28), 15–18.
[4]. Chand, R., & Singh, J. (2016). Agricultural marketing and farmer friendly reforms across Indian states and UTs. NITI Aayog.
[5]. Chand, R., Prasanna, P. A. L., & Singh, A. (2011). Farm size and productivity: Understanding the strengths of smallholders and improving their livelihoods. Economic & Political Weekly, 46(26–27), 5–11.
[6]. Chaudhary Charan Singh National Institute of Agricultural Marketing. (2020). Benefits of eNAM process to farmers: A study. https://www.ccsniam.gov.in/img/Benefit-of-eNAM-process-to-Farmer-A-Study.pdf
[7]. Department of Agriculture and Farmers Welfare. (2023). Operational guidelines for promotion of National Agriculture Market (NAM) through digitisation of agri supply chain management. Ministry of Agriculture and Farmers Welfare, Government of India. https://agriwelfare.gov.in/sites/default/files/Revised_eNAM_guidelines_Oct2023.pdf
[8]. Food and Agriculture Organization of the United Nations. (2019). The state of food and agriculture 2019: Moving forward on food loss and waste reduction. FAO. https://doi.org/10.4060/CA6030EN
[9]. Food and Agriculture Organization of the United Nations. (2022). The state of food and agriculture 2022: Leveraging automation in agriculture for transforming agrifood systems. FAO. https://doi.org/10.4060/cb9479en
[10]. Gulati, A., Kapur, D., & Bouton, M. M. (2020). Reforming Indian agriculture. Economic & Political Weekly, 55(11), 35–42.
[11]. Jensen, R. (2007). The digital provide: Information (technology), market performance, and welfare in the South Indian fisheries sector. The Quarterly Journal of Economics, 122(3), 879–924. https://doi.org/10.1162/qjec.122.3.879
[12]. Minten, B., Reardon, T., & Chen, K. Z. (2017). Agricultural value chains: How cities reshape food systems. In 2017 global food policy report (pp. 42–49). International Food Policy Research Institute. https://doi.org/10.2499/9780896292529_05
[13]. Nakasone, E., Torero, M., & Minten, B. (2014). The power of information: The ICT revolution in agricultural development. Annual Review of Resource Economics, 6, 533–550. https://doi.org/10.1146/annurev-resource-100913-012714
[14]. NITI Aayog. (2017). Three year action agenda, 2017–18 to 2019–20. Government of India.
[15]. NITI Aayog. (2018). Strategy for New India @ 75. Government of India.

DOI: 10.17148/IJARCCE.2026.15926

[16]. Small Farmers' Agribusiness Consortium. (n.d.). FAQs of e-NAM. National Agriculture Market. Retrieved September 4, 2026, from https://enam.gov.in/resources/FAQs-of-eNam

[17]. Small Farmers' Agribusiness Consortium. (n.d.). National Agriculture Market: APMCs. Retrieved September 4, 2026, from https://enam.gov.in/stakeholders-Involved/Apmcs

[18]. World Bank. (2008). World development report 2008: Agriculture for development. World Bank. https://doi.org/10.1596/978-0-8213-6807-7

[19]. World Bank. (2017). Enabling the business of agriculture 2017. World Bank. https://doi.org/10.1596/978-1-4648-1021-3

Appendix A. Core Survey Statements Used in the Comparative Analysis

1. The sale process through e-NAM is complicated for farmers.

2. Dependency on labourers is a major problem in the grain market system.

3. Crop weighing and packing are time-consuming processes.

4. Limited farmer understanding of analog weighing scales can enable unfair practices.

5. There are chances of corruption in sample collection for assaying and handling/packing spoiled produce.

6. Grain markets remain crowded because of inadequate storage and transportation.

7. Delay in online payment is a problem.

8. Lack of awareness of e-NAM prevents farmers from adopting it.

9. Scarcity of electricity, computers, Internet, quality-testing facilities and staff challenges e-NAM implementation.

10. Inadequate grain-market infrastructure negatively affects farmers and traders.

11. Lighting is used without smart control, causing avoidable energy consumption.

12. Lack of water-monitoring technology contributes to overflow and drinking-water concerns.

Response categories: Yes / No / No Comment / Other.