ELECTRONIC NATIONAL AGRICULTURE MARKET (E-NAM) A NEED OF THE HOUR FOR INVENTORY AND SUPPLY CHAIN MANAGEMENT OF AGRICULTURAL CROPS.

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ABSTRACT

A national market for agricultural commodities was created by connecting the current APMC mandis through the pan-Indian electronic trading platform known as the National Agriculture Market (e-NAM). e-NAM was launched under the theme of "One nation, one market". According to data provided by the Government of India, as of June 2020, 1000 Mandis were connected under e-NAM throughout 18 States and 3 Union Territories, of which 81 are in the state of Haryana. The e-NAM market has listed 193 commodities, such as food grains, oilseeds, fruits and vegetables, spices, etc. e-NAM platform helps in supply chain management of these commodities. E-NAM has a large number of stakeholders. These include farmers, middlemen and government officials etc. To fully benefit from e-NAM, these stakeholders must be able to do their business with ease.

An attempt has been made in this research paper to analyse whether Electronic National Agriculture Market (e-NAM) A Need of the Hour for Inventory and Supply chain Management of agricultural crops. The study covers 100 farmers, 100 intermediaries and 20 mandi officials of Haryana who were selected using judgement sampling. Results reveal that according to intermediaries activities like Transaction, Bidding process, Selection of highest bidder, Announcement of final bid winner have not been digitalized properly. More seriousness required in digitalization process. All the mandi officials and 65 per cent intermediaries were agree that e-NAM is the better system of trade than traditional system, study also reveals that there was a significant impact of education level of intermediaries on choice of intermediaries on system of trade. Majority of mandi officers were agreed that activities like Quality based bidding, Queue management system at gate, Transparency in overall system, electronic bidding, Time management, Transparency in price discovery mechanism etc. contributed to the overall convenience and simplicity of the e-NAM platform, making it easier for farmers and traders to conduct business transactions. The study concludes that supply chain management of crops can be improved through e-NAM platform.

Keywords: e-NAM, Better System, Digitalization, Education, Supply Chain Management, Intermediaries, Mandi Officials.

1.   INTRODUCTION

Achieving self-sufficiency in agriculture has been the major objective for Indian policymakers since the severe droughts of the mid-1960s. To reduce dependence on imports, a comprehensive approach combining input subsidies, output price support and trade restrictions was effectively implemented. Notable institutions such as the Agricultural Prices Commission (now known as CACP), the Food Corporation of India (FCI) and the National Dairy Development Board (NDDB) were established during this period. Furthermore, substantial investments were made in agricultural research and development (R&D). These policy measures yielded remarkable results and by the mid-1970s, India had achieved virtual self-sufficiency in food grain production (Nuthalapati et al.,2020). However, agricultural marketing did not receive commensurate attention, with limited focus on post-harvest management and the development of efficient markets and supply chains in policymaking. Nevertheless, recent policy trends aim to rectify this gap through significant initiatives. The present policy thrust, centred around doubling farmers' income can only achieve its desired objectives through substantial improvements and extensive reformation of the existing marketing system in the country. The regional Agricultural Produce Marketing (Regulation) Acts in various States and union territories govern the marketing of agricultural products in India. A huge network of regulated markets has been built under this framework. The APMC Act's main goal is to guarantee accurate price discovery through the interaction of supply and demand forces. But as time went on, these markets grew monopolistic and restrictive, which prevented the development of an effective supply chain and prevented farmers and buyers from integrating seamlessly. As a result, these markets failed to accomplish their fundamental goals.

The Indian government has implemented various programs to enhance sustainable agricultural yields. One such initiative is the electronic National Agriculture Market (e-NAM) platform, launched on April 14, 2016. e-NAM aims to address challenges in the agricultural marketing system by creating a nationwide virtual market platform that connects domestic markets across state borders (https://www.enam.gov.in). e-NAM integrates physical mandis (market areas) into its online network, eliminating the need for parallel marketing organizations. It tackles issues like multiple market areas managed by different Agriculture Produce Marketing Committees (APMCs), licensing requirements, infrastructure deficiencies, limited technological integration, information asymmetry, and monopolistic practices. The platform streamlines the agricultural supply chain, reduces wastage, and establishes a unified national market. It provides comprehensive APMC-related information and services, including commodity arrivals, prices, bids, and offers. Key benefits of e-NAM include enhanced accessibility for farmers to a unified agricultural market, real-time price discovery, transparency, reduced transaction costs, up-to-date information on prices and arrivals, quality-based bidding, online payment systems, and facilities for cleaning, sorting, grading, and weighing commodities. Integration with the central farmer database simplifies registration processes and improves operational efficiency. The platform offers live trading in multiple languages, enhancing accessibility for farmers nationwide (Bara, 2018). Overall, e-NAM facilitates efficient and transparent agricultural trading, benefiting farmers and the entire supply chain. Silent features of e-NAM inclues i) The e-NAM platform aims to achieve transparent sales, price discovery, and structured dealings in agricultural markets. States should enact suitable provisions in their APMC acts to promote e-trading. ii)Traders/buyers and commission agents/mediators should be granted liberal licenses without any requirement of physical presence, as determined by state authorities. iii) A single trading license should be applicable across all markets in any state, allowing traders to operate nationwide. IV) Quality standards and infrastructure for quality assaying should be established to facilitate informed bidding by buyers and ensure quality assurance of agricultural produce. V) Market fees should be levied at a single point, specifically at the wholesale purchase stage from the farmer. VI) Provision for soil testing labs should be made within or near certain mandis to enable farmers to access this facility conveniently. VI) The e-NAM scheme operates on an all-India basis, without any specific state-wise allocation under the scheme. The objective of fostering uniformity in agricultural marketing in India has been advanced through the successful integration of 1,000 mandis across 18 states and 3 Union Territories. 193 commodities including food grains, oilseeds, fruits & vegetables, spices, etc. are listed in the e-NAM market (https://www.enam.gov.in).

2.   REVIEW OF LITERATURE

Bara (2018) advocated that agricultural marketing infrastructure must be promoted in India to reduce the use of middlemen and minimise post-harvest losses. Ranchi, Koderma, Lohardaga, Simdega, Jamshedpur, Chatra, Dhanbad, Bokaro, Hazaribagh and Ramgarh were among the ten districts chosen for this research. Administrative buildings, stores and godowns were discovered to be the only infrastructures available with the rest all were lacking behind. The APMC Act was passed in Jharkhand on 27th April 2015, removing the APMC's power over farmers and dealers. Because the market fee was eliminated as a result of the repeal of the act, APMC's primary sources of revenue were rent from stores and godowns. Previously, the APMC used to receive one per cent of charge on every transaction. Although a large number of farmers and traders were registered with e-NAM, just two per cent of them used it to do business. The reason for this was that traders would not buy produce from farmers because they lacked both quantity and quality. Other reasons were that the APMC did not provide basic infrastructure facilities to both merchants and farmers and that the APMC was located far away from the field, causing farmers to incur huge transportation costs and payment delays. e-NAM is a fairly uncommon acronym. Farmers chose to sell their goods in neighbourhood markets. As a result, the APMC urgently needed to build basic infrastructure and hire staff to enhance online trade.

Sekhar and Bhutt (2018) studied that implementation of e-NAM (National Agriculture Market) system in Haryana and examined its performance and prospects. The system was introduced in April 2016 across eight states in India, and as of October 2017, 54 mandis in Haryana were connected through e-NAM. Of these, 37 were connected in the first phase, with the remainder connected in subsequent phases. Prior to the implementation of e-NAM, commission agents were the most preferred medium of crop sale for farmers. However, when selling their crops in the post-e-NAM period, practically all the respondent farmers favoured the e-NAM platform. Farmers obtained greater prices for paddy during the post-e-NAM period, despite the fact that the price per quintal for wheat remained in the same range as the pre-e-NAM phase. 72 per cent of traders and 75 per cent of farmers used e-NAM for all three activities, including price monitoring, sale, and online payment. In terms of overall benefits, the majority of traders from various mandis did not think e-NAM was a superior option, although both farmers and traders concurred that e-NAM resulted in higher price realization. Additionally, farmers regarded e-NAM to be more practical in terms of online payments, better quality assessment tools, a simpler sale process, and higher transparency.

Kalamkar et al. (2019) concluded that informational impediments need to be removed farmers' lack of awareness of the e-NAM, limited knowledge of the e-tendering process, lack of awareness of the benefits of the e-NAM and

farmers' fear of receiving a lower price for their produce as a result of sub-standard quality on assaying fragmented agricultural markets make a perfect case for a unified platform like the National Agricultural Market (NAM). Despite initial implementation challenges and a lower penetration of e-NAM throughout existing wholesale regulated markets, there was enormous room for additional expansion and upgrading. The shared agricultural platform, which will be integrated with modern technology, will be a vital catalyst for ensuring the best price for producers' output and a range of high-quality items for consumers. The increased volume of trade on the e-NAM platform will be supported by improved back-end infrastructure for the whole value chain of produce. As a result, efforts should be directed toward the development and upgrading of scientific warehouses, cold storage, refrigerated vans for perishables, awareness and training to the participants in the marketing process, high-speed internet access to markets and among different market components. The advantages of e-NAM will become apparent after it is completely implemented in the manner that it has been conceptualised.

Chaudhary and Suri (2020) examined the adoption of e-NAM platform for transforming agricultural marketing in India. The concepts "Performance Expectancy", "Effort Expectancy", "Social Influence", "Facilitating Conditions", "Behavioural Intention", "Trust", and "Cost" of the adoption outline applicable to the Indian agriculture sector were debated with the backing of an experimental study. The connection amongst the adoption factors and intent to adopt is analysed using analysis of data collected through an opinion survey lead in the Meerut wholesale market in Uttar Pradesh (UP). It is estimated that the study supports in understanding the online conduct of adopters and help fetch more and more participants to the National Agricultural Marketing B2B (business-to-business electronic commerce) platform for its ultimate success.

Kaur et al. (2021) studied that how prices and market arrivals changed before and after e-NAM was installed as well as the problems that stakeholders faced when using this technology. Data were obtained from randomly selected farmers and dealers cum commission agents, and committee officials based on the facilities gained from the designated APMCs linked with e-NAM through personal interviews. In order to reach this purpose, several users were interviewed about the numerous obstacles faced by e-NAM stakeholders while participating in the process of selling and buying through the e-NAM site. Farmers in the selected APMCs faced significant challenges due to the complicated and time-consuming method of trading in the e-NAM system, a lack of knowledge about e-trading (farmers frequently do not understand the meaning displayed in the machine) and frequent bank visits for payment realisation.

Singh (2021) study was conducted in three agro-climatic zones of Punjab to investigate the issues with e-NAM and its future possibilities in agricultural marketing. The 90 farmers were chosen using a multistage random sampling approach. According to the report, most registered farmers' farms were located between 11 and 15 kilometres from the e-NAM market. Mandi officials primarily used the Aadhaar card submission technique to register farmers. Over the two-year period from March 2018 to March 2020, farmers in Punjab adopted e-NAM at a rate of around 65 per cent. Farmers in e-NAM marketplaces experienced substantial issues such as a lack of awareness, staff, machinery, testing labs and platforms, as well as increased technical illiteracy, high payment insecurity, a small number of e-NAM linked markets, and a complicated method. According to the report, an increase in the number of e-NAM markets and experienced staff, guaranteed payment of produce by the government to farmers and improved market infrastructure can all contribute to enhanced e-NAM market functioning in Punjab.

Vivek et al. (2021) studied the perception of farmers, commission agents and traders about e-tendering system for arecanut in Karnataka. During the academic year 2019-20, the present study was carried out in two major Agricultural Produce Market Committees (APMC) in Karnataka, namely, Shivamogga APMC in Shivamogga district and Bheemasamudra APMC in Chitradurga district. The primary data were obtained at random from 50 farmers, 10 dealers, and 10 commission agents from each of the designated APMCs who were participated in Arecanut e-tendering. The overall sample size was thus 140. The study also tries to identify the limits that stakeholders encounter as well as their proposals for improving the system. The study found majority of farmers (65%), traders (60%) and commission agents (50%) who had a favourable opinion of the e-tendering system. Farmers faced frequent price fluctuations and traders and commission agents faced difficulty in correcting inaccuracies after quoting the price. Most of farmers urged that the practical aspects of the e-tendering system be made more widely known, whereas traders demanded that mistakes be corrected after the price has been quoted. The findings of this study could help researchers better understand the effectiveness of the e-tendering system and its inherent difficulties.

Kumar et al. (2023) analysed the perception of farmers of Haryana on the problems and intricacies faced in operating through e-NAM. The study covered 100 farmers of Haryana who were selected using judgement sampling. To gather information from the stakeholders, a well-structured questionnaire comprising both close-ended and open-ended questions was employed. The questionnaire was administered through personal contact with the respondent farmers. Mostly farmers face problem while trade on e-NAM. Educational level of the farmers had a significant impact on problems faced while operating through e-NAM while age of the farmers had a non-significant impact. According to farmers, the most challenging factors in using e-NAM included lack of training programmes and poor understanding of the concept and limited numbers of commodities covered under

e-NAM. The study concluded that the identification of the problems in operating through e- NAM and resolving them timely is required in bearing full fruits of e-NAM.

3. MATERIALS AND METHODS

3.1 Participants
The study was conducted in 20 e-NAM Mandis located in 13 districts of Haryana. Haryana was chosen for the study because 81 out of 113 APMC mandis being operated through e-NAM. Some e-NAM Mandis in Haryana have been operational since the initial phase of the platform's launch in 2016. A sample of 100 farmers from Haryana was selected for the study using judgment sampling.

3.2 Measure
A well-structured questionnaire, comprising both close-ended and open-ended questions, was employed to collect information from the stakeholders. Data was collected using Likert scale respondents are asked to indicates their degree of agreement or disagreement with each statement using a numerical rating scale. The rating scale typically ranges from -2 to +2 or 1 to 5 or 7, with -2 indicating "strongly disagree" and +2 indicating "strongly agree." The questionnaire was administered through personal contact with the respondent farmers.

3.3 Statistical analysis
The collected data were analyzed using appropriate statistical tools and techniques. Like Likert scale, Likert scale score, ranking, Chi-Square test and some hypotheses were developed. The data collection took place during the period of 2021-22.
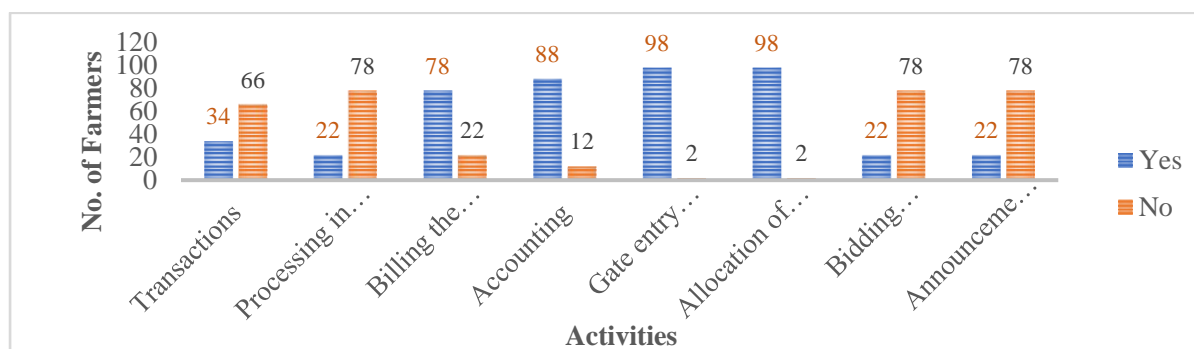
4. RESULTS AND DISCUSSION

4.1 Intermediaries Opinion on Digitalization of e-NAM Activities:
The data regarding intermediaries' opinion on digitalization of e-NAM activities has been presented in the Table 1, and Fig. 1. which exhibits that 34(34%) intermediaries agreed that transaction process was done digitally while 66(66%) disagree with this. 22(22%) intermediaries agreed that bidding is done digitally while 78(78%) disagree with this. 78(78%) intermediaries agreed that billing the farmers is done digitally while 22(22%) disagree with this. 88(88%) intermediaries agreed that accounting was done digitally while 12(12%) disagree with this; 98(98%) intermediaries agreed that gate entry receipt was provided digitally while 2(2%) disagree with this; 98(98%) intermediaries agreed that allocation of commission agent was done digitally while 2(2%) disagreed with this; 22(22%) intermediaries agreed that selection of highest bidder was done digitally while 78(78%) disagree with this; 22(22%) intermediaries agreed that announcement of final bid winner was done digitally while 78(78%) disagree with this.

| Sr. No.	Activity	Yes	No	Total
Table 1: Intermediaries Opinion on Digitalization of e-NAM Activities.
1.	Transactions	34	66	100
2.	Processing in bids	22	78	100
3.	Billing the farmers	78	22	100
4.	Accounting	88	12	100
5.	Gate entry receipt	98	2	100
6.	Allocation of commission agent	98	2	100
7.	Selection of highest bidder	22	78	100
8.	Announcement of final bid winner	22	78	100

Source: Primary data (2021-2022)

Figure 1: Intermediaries Opinion on Digitalization of e-NAM Activities.

4.2 Opinion of Mandi Officials on Better System of Trade

The data regarding mandi officials' opinion on better system of trade have been furnished in Table 2. and Fig. 2 which illustrate that all mandi officials agreed that e-NAM was better system of trade than traditional.

| Table 2: Opinion of Mandi Officials Better System of Trade		
Better System	**Number of Mandi Officials**	**Per cent**
e-NAM	20	100
Traditional	0	0

Source: Primary Data (2021-2022)
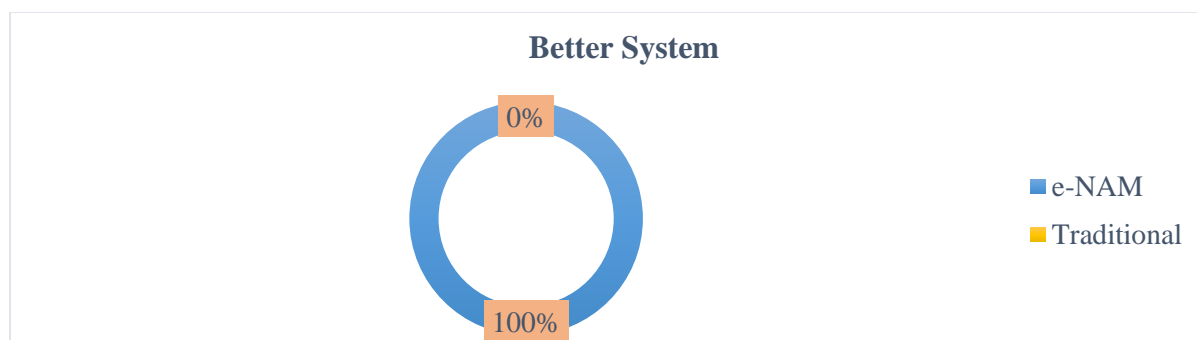
Figure 2: Better System of Trade

4.3 Opinion of Intermediaries on Better System of Trade:

The data regarding opinion of intermediaries on better system has been furnished in Table 3 and Figure 3 which reveals that 65(65%) intermediaries agreed that e-NAM is better than APMC mandis whereas 35(35%) intermediaries do not agree on this. Result reveals that majority of intermediaries agree that e-NAM is better than APMC mandis.

Table 3.: Opinion of Intermediaries on Better System of Trade.	
e-NAM is better than APMC Mandis	**Number of intermediaries**
Yes	65(65.00)
No	35(35.00)
Total	100

Source: Primary data (2021-2022)
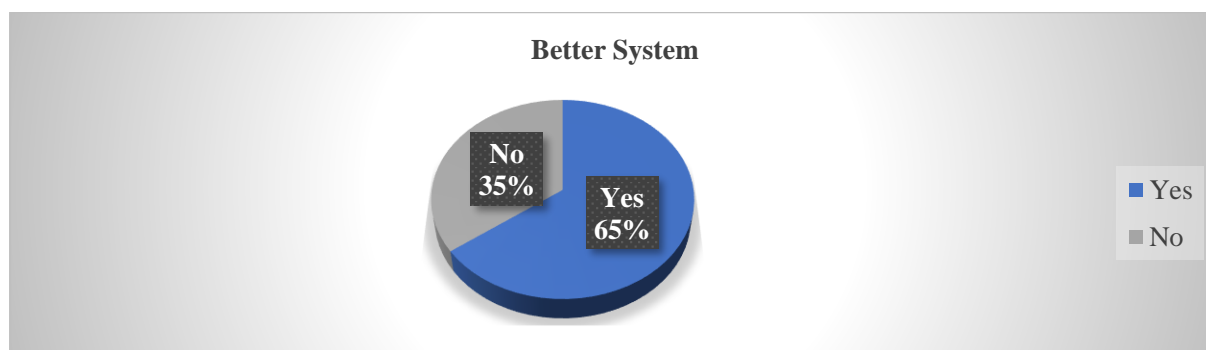
Figure 3: Opinion of Intermediaries on better system of trade.

To examine the relationship between education level of intermediaries and their opinion on better system of trade. The following hypothesis has been formulated and tested using Chi- Square test.

H₁: Education level of Intermediaries has no significant impact on choice of Intermediaries on system of trade in mandis.

Results are presented in the Table 4:

The calculated Chi-Square value comes at 8.315 whereas tabulated value 7.81 at 3 degrees of freedom. Thus, calculated value (8.315) is greater than tabulated value (7.81) at p value 0.040 < 0.05, clearly indicates that null

hypothesis has been rejected. Hence there was a significant impact of education level of intermediaries on choice of intermediaries on system of trade.

Table 4: Relation Between Education Level and System of Trade				
S. No	Education	Yes	No	Total
1	Sec. education	1	4	5
2	Senior Sec education	18	14	32
3	Graduate	43	17	60
4	Post Graduate	3	0	3
	Total	65	35	100
Chi-Square Value	8.315			
d. f.	3			
Significance	*.040			
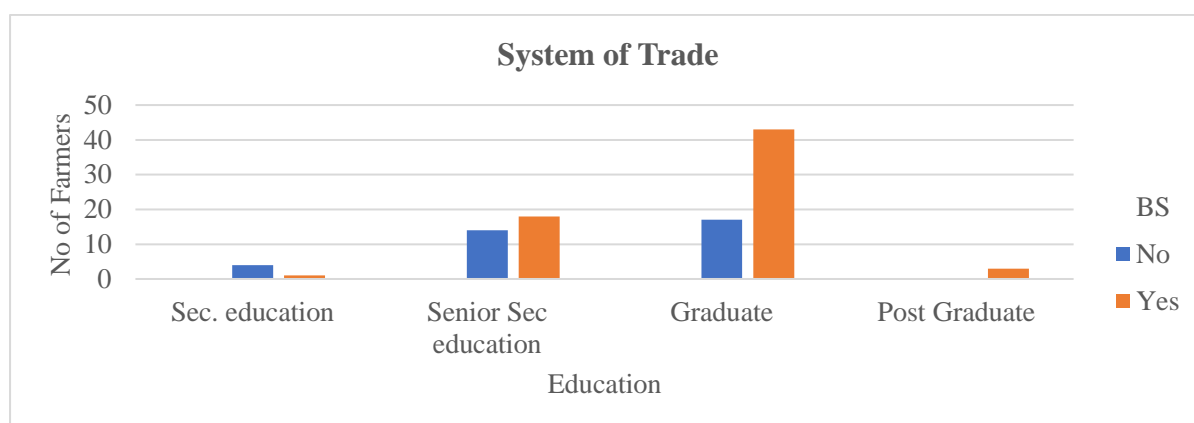
Figure 5: Relation Between Education Level and System of Trade

4.4 Impact on Ease of Doing Business Through e-NAM Portal in Terms of Various Parameters:

The data regarding impact on ease of doing business through e-NAM portal have been furnished in Table 5. and Figre 4. which depicts that from the given parameters "Quality based bidding" with scaled score 30 was most impacting factor in ease of doing business through e-NAM followed by "Queue management system at gate" with scaled score 28 holds the rank 2nd ; "It is human friendly system" with scaled score 27 holds the rank 3rd; "Transparency in overall system" with scaled score 26 holds the rank 4th ; "Comfortable with electronic bidding" with scaled score 23 hold the 5th rank ; "Time management" with rank score 22 hold the 6th rank; "Transparency in price discovery mechanism" with scaled score 21 holds the 7th rank; "Ease of handling commodities" with scaled score 20 holds the 8th rank; "Timing of biddings" with scaled score 19 holds the 9th rank; and "Final price acceptance by the farmers" with scaled score 14 was the least impacting factor in doing the business through e-NAM.
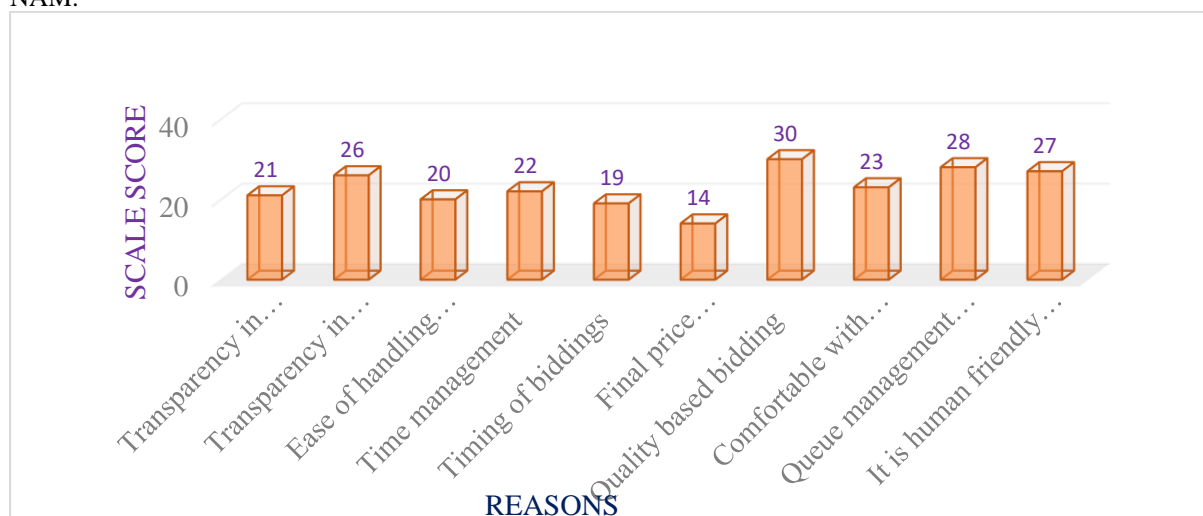
Figure 6: Impact on Ease of Doing Business Through e-NAM Portal.

Table 5: Impact on Ease of Doing Business Through e-NAM Portal								
Sr. No.	Reasons	SD	D	N	A	SA	Scale Score	Rank Score
1.	Transparency in price discovery Mechanism	0	0	0	19	1	**21**	**7**
2.	Transparency in overall system	0	0	0	14	6	**26**	**4**
3.	Ease of handling commodities	0	0	3	14	3	**20**	**8**
4.	Time management	0	0	1	16	3	**22**	**6**
5.	Timing of biddings	0	1	1	16	2	**19**	**9**
6.	Final price acceptance by the farmers	1	2	1	14	2	**14**	**10**
7.	Quality based bidding	0	0	0	10	10	**30**	**1**
8.	Comfortable with electronic bidding	0	1	0	14	5	**23**	**5**
9.	Queue management system at gate	0	0	0	12	8	**28**	**2**
10.	It is human friendly system	0	2	0	7	11	**27**	**3**

SD – Strongly disagree, **D** – Disagree, **N** – Neutral, **A** – Agree, **SA** – Strongly agree
Source: Primary Data (2021-2022)

5. CONCLUSIONS

The study Results reveal that according to intermediaries activities like Gate entry receipt, Allocation of commission agent, Accounting, Billing the farmers were performed digitally while Transaction, Bidding process, Selection of highest bidder, Announcement of final bid winner have not been digitalized properly. More seriousness required in digitalization process to make the platform more functional and transparent. All the mandi officials and 65 per cent intermediaries were agreed that e-NAM is the better system of trade than traditional system, study also reveals that there was a significant impact of education level of intermediaries on choice of intermediaries on system of trade which indicates that as the education level of intermediaries increases their choice of selection of system of trade shifts from traditional system to e-NAM. Less educated intermediaries did not prefer new system of trade i.e., e-NAM. Majority of mandi officers were agreed that activities like Quality based bidding, Queue management system at gate, Transparency in overall system, electronic bidding, Time management, Transparency in price discovery mechanism etc contributed to the overall convenience and simplicity of the e-NAM platform, making it easier for farmers and traders to conduct business transactions. Easiness in the platform motivates farmers to participate in e-NAM. The study concludes that supply chain management of crops can be improved through e-NAM platform.

REFERENCE
Bara, S. (2018). Agriculture marketing infrastructure with reference to e-NAM and rural haats/mandi in Jharkhand (M. Sc. (Agri.) thesis). *Birsa Agricultural University, Ranchi, Jharkhand, India*.
Chaudhary, S., & Suri, P. K. (2020). Examining adoption of e-NAM Platform for transforming agricultural marketing in India. In transforming organizations through flexible systems management. *Springer*. 243-256. https://www.enam.gov.in.
Kalamkar, S. S., Ahir, K., & Bhaiya, S. R. (2019). Status of implementation of electronic national agriculture market (e-NAM) in selected APMCs of Gujarat. *Progress*, 112.
Kaur, B., Sharma, N., & Kundu, K. K. (2021). Constraints in the diffusion of e-NAM and the policy measures. *Asian Journal of Agricultural Extension, Economics & Sociology*, 39(11), 20-27.
Kumar, M., Dhingra, A., Ghalawat, S., Bishnoi, D., Bhardwaj, N., & Yadav, K. K. (2023). Problems and intricacies in operating through e-NAM: The perception of farmers of Haryana. 1668-1672
Sekhar, C. S. C., & Bhatt, Y. (2018). Electronic national agricultural market (e-NAM): a review of performance and prospects in Haryana. Agricultural economics research centre, University of Delhi, Delhi. http://du. ac. in/du/uploads/C entre/Report_Final_AERC_Delhi_eNAM-2018. pdf.
Singh, N. K., & Alagawadi, M. (2021). Impact of e-nam (Electronic-National Agriculture Market) in doubling farmers income. In proceedings of the International Conference on Advances in Management Practices (ICAMP 2021). 13.
Vivek, M. C., Sahana, S., Halingali, B. I., Chinnappa, B., & Amareshkumar, K. (2021). E-tendering system for arecanut in karnataka: Stakeholders' Perspective. *Current Journal of Applied Science and Technology*, 40(5), 114-121.