

Research Paper

# Post-integration Effect of e-NAM in Nawapara APMC, Chhattisgarh

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## ABSTRACT

The present study was carried out in Nawapara APMC in Chhattisgarh to examine the changes brought about by the e-NAM intervention in the arrivals and prices of paddy. To identify the factors that influence farmers' participation in the e-NAM platform, several 75 farmers were selected and interviewed. F test and t-test were adopted to analyze the equality of variances and means of the market arrivals and prices of paddy before and after e-NAM adoption. The study results show that both the monthly arrivals and modal prices of paddy were higher post-e-NAM integration than before it was integrated. The percentage changes before and after e-NAM in the arrivals and prices were 29.28 percent and 24.21 percent, respectively. There is no significant ratio in variances, whereas there is a significant difference in the means of both the arrivals and prices, as shown by F and t t-test results. The factors that motivated the farmers to do trading on the e-NAM platform were found to be influenced mainly by remunerative price followed by better price than the open auction, more transparency, and absence of middlemen. This indicated that the implementation of the e-NAM platform has a positive impact on arrivals and prices. The impact may be more visible once it is implemented in the true sense of conceptualized.

## Highlights

- ① e- NAM is a virtual market platform that electronically connects existing physical *mandis*.
- ② e-NAM promotes uniformity and removes the information gap between buyers and sellers.

**Keywords:** APMC, e-NAM, integration, paddy markets

Agriculture marketing in India is carried out by a set of public-owned wholesale markets established during the colonial period under the APMC Act of 1963 (Kumar and Satish, 2020). The states manage the marketing activities for agriculture agricultural produce as per their agri-marketing regulations. The state is divided into different market areas; each is administered by an APMC market, which imposes its own marketing regulations, including market fees and permissible commission charges levied by commission agents (Reddy, 2019). The objectives in the establishment of APMC was to protect the illiterate farmers from exploitation by traders and commission agents and also to ensure fair price to

farmers, reliable market information flow, enforce rules, and build trust among different stakeholders to reduce the uncertainties and risks inherent in the market process (Reddy, 2018). Nonetheless, the implementation of APMC has an excellent intention to benefit farmers. However, fragmentation of markets even within the state hinders the free flow of agricultural commodities from one market area to another. Multiple handling of agricultural commodities and multiple market charges escalate

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the prices where its larger share goes to the middlemen without benefiting the farmers. The problem may not be pinned on the APMC itself, but also the lack of the reformation of the APMC, adopting technology, and creating competition by encouraging private investment (Aggarwal, Jain, and Narayanan, 2017). Against this backdrop, the Government of India brought market reforms through the Model Act 2003 and Agricultural Produce and Livestock Marketing (APLM) Act 2017. The model APLM Act envisaged removing restrictions on the movement of commodities, single levy of market fee, promotion of alternative marketing system, promotion of ICT, etc. The fundamental goals of all of these efforts were to implement reforms, primarily to remove barriers in agricultural commerce and create a competitive environment by increasing traders' involvement through ICT and alternative market channels (Bisen and Kumar, 2018).

The Union Budget 2014–15 recommended creating a unified common market platform, which was inaugurated on April 14, 2016, as a pan-India electronic trading portal known as the National Agricultural Market (e-NAM). It is a virtual market platform that electronically connects existing physical *mandis*, such as APMCs, with the notion of “one nation, one market” (Chand, 2016).

The integration of markets with e-NAM promotes uniformity, streamlining procedures across the integrated markets, removes the information gap between buyers and sellers, and promotes real-time price discovery based on actual demand and supply. It provides transparency in the auction process and access to a nationwide market to both parties. At present, the government of India integrated 1000 APMCs with e-NAM in 18 states and 3 UTs. There are many commodities traded under this platform, such as food grains or cereals, oilseed, fruits, vegetables, and many other crops, which sum up to 175 commodities being traded under the e-NAM platform (SFAC 2020).

There are extensive attempts have been made to study e-NAM as well as e-tendering of agricultural commodities, its mode of operation, and benefits to various stakeholders in the marketing of agricultural produce (Sharma, 2017; Dey, 2016; NIAM, 2017; Nirmal 2017; Mustaqquim 2017; Mishra and Mishra, 2017), but at the same time some of the studies have

also shed light on challenges in the implementation of e-NAM across the country (Agarwal *et al.* 2017; NIAM, 2017; Sharma 2016). Based on this backdrop, it is pivotal to shed light on the performances of APMC after it was integrated with e-NAM platform and the performances of APMC after it was integrated with e-NAM platform and examine the farmers' perception about the new platform. In this article, the objectives were framed to evaluate arrivals and prices of paddy before and after e-NAM platform was integrated with APMC and to determine the factors influencing the farmers to participate in e-NAM platform.

## Methodology

### Sample and Data

The study was carried out in the Chhattisgarh (C.G.) state of India, which consisted of 75 *mandis* and 112 sub-*mandis*. Out of which only 14 *mandis* (APMCs) only 14 *mandis* (APMCs) are integrated with e-NAM to date. Out of these, 5 APMCs had been integrated with e-NAM in the first Phase i.e., on 19th October 2016, and the other 9 APMCs were unified with e-NAM system in the second phase on 8 April 2017 (Tyngkan, 2018). The present study was mainly focused on a single commodity and single APMC, i.e., Paddy and Nawapara APMC. The reason for choosing Nawapara APMC was that paddy was the only commodity traded in this APMC, and it is functioning smoothly under e-NAM Platform. The data employed for the empirical study was both primary and secondary data. The primary data was collected through direct interaction with the farmers that do trading under e-NAM platform whereas; the secondary information was for both before and after e-NAM was integrated with the sampled APMC. To identify the factors that motivated the farmers' participation in the e-NAM platform, 75 farmers were selected for the study. The data collected from 2012-13 to 2015-16 was considered before e-NAM and the data from 2016-17 to 2019-20 was considered after e-NAM. Monthly average prices and market arrivals were collected from CG state marketing board.

### Analytical tools

**F test:** An F test, as published by Snedecor and Cochran (1983) in their first edition of statistical

methods, is used to test if the variances of the two sampled populations are equal. Here, the two sampled populations are the data we consider about the arrivals and prices of paddy before and after e-NAM was integrated with the sampled APMC. F-test can be expressed as below:

$$F = \frac{S_1^2}{S_2^2}$$

Here,

$S_1^2$  = sampled variance of arrivals and prices before e-NAM was integrated with APMC (2012-13 to 2015-16)

$S_2^2$  = sampled variance of the arrivals and prices of paddy after e-NAM was integrated with APMC (2016-17 to 2019-20)

**t test:** This test was used to evaluate the means difference of the market arrivals and prices of paddy before and after e-NAM was integrated with sampled APMC. In this article we are dealing with two sample situation, the pooled t-test was used. The t statistic value is given as;

$$t = \frac{mean1 - mean2}{SP \sqrt{\frac{1}{n1} + \frac{1}{n2}}}$$

Here,

*mean1* = mean of arrivals and prices before e-NAM was integrated (2012-13 to 2015-16)

*mean2* = mean of arrivals and prices after e-NAM was integrated (2016-17 to 2019-20)

*SP* = Pooled standard deviation

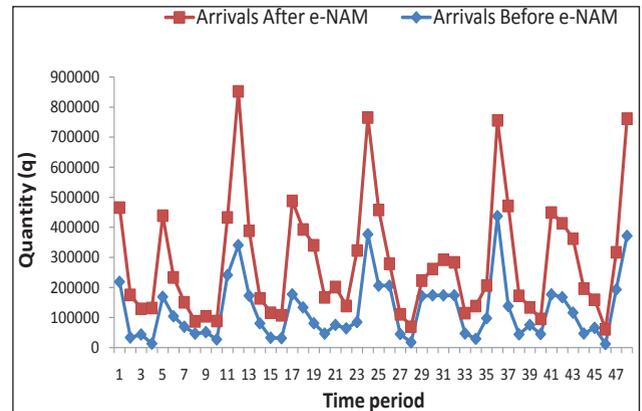
*n1* and *n2* = number of observation before and after e-NAM respectively

## RESULTS AND DISCUSSION

### Monthly arrivals and prices of paddy

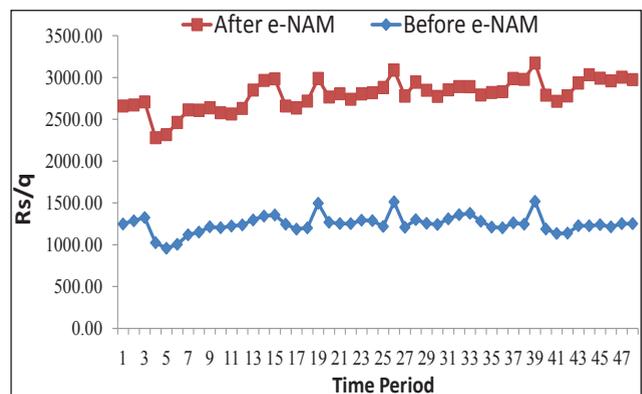
The monthly arrivals and modal prices of paddy in Nawapara APMC both before and after e-NAM was integrated with it were presented in Fig. 1 and 2. These figures show that the monthly arrivals of paddy after the integration of the e-NAM platform are higher than when the APMC operates generally without the online platform (e-NAM), and the same can be seen for monthly modal prices, indicating

that farmers are receiving a higher price for their produce when trading on the e-platform. This demonstrated that the implementation of e-NAM has a positive impact on paddy market arrivals and prices in the selected APMC. The finding was in the same line with the study of Reddy (2018), where he examined the impact of e-NAM on the prices and the market arrivals in which the results showed that e-platform played a pivotal role in augmenting the prices received by farmers and also the market arrivals of the agricultural produce to the *mandi*.



Source: Government of Chhattisgarh, 2019

Fig. 1: Monthly Arrivals of Paddy before and after e-NAM



Source: Government of Chhattisgarh, 2019

Fig. 2: Modal price of paddy before and after e-NAM

The average monthly arrivals and modal paddy prices are illustrated in Table 1. The average arrival rate was 12436.50 quintals and 160785.88 quintals, with a percentage change of 29.28 percent, before and after integrating e-NAM with APMC. Analogously, the average monthly modal price before and after the e-NAM integration was ₹ 1246.90/- and ₹ 1548.83/- with a change of 24.21%.

**Table 1:** Average monthly arrivals (quintal) and Modal prices (₹/q) of Paddy

Arrivals (q)		Price (₹/q)	
Before e-NAM	After e-NAM	Before e-NAM	After e-NAM
124365.50	160785.88	1246.90	1548.83
<b>% Change</b>		<b>% Change</b>	
29.28		24.21	

Source: Computed by authors.

**F test and t-test**

The arrivals and prices were also tested applying the F test and t-test to examine the equality of their variances and means before and after starting of e-NAM platform. The result of the test presented in Table 2 and 3 shows that the ratio in the variances of arrivals and prices were not significant. In contrast, there is a significant difference in the means of quantity arrivals and prices of paddy.

**Table 2:** F test and t test for the arrival of paddy

	F test		t test
F value	0.84	t value	-1.68
p value	0.29	p value	0.04.

Note: . indicate 5% level of significance.

**Table 3:** F test and t test for the prices of paddy

	F test		t test
F value	0.72	t value	-12.61
p value	0.13	p value	0.00..

Note: .. indicates 1% level of significance.

The significant difference in the mean of arrivals and paddy prices indicated that integration of e-NAM platform with existing APMC increases the arrival and prices. The reason for increasing arrival may be due to more farmers registering with APMC post e-NAM platform. The increase in the number of farmers and traders’ participation in the e-NAM market may be one of the cause for highly significant differences in the mean of paddy prices, thereby helping e-NAM sellers realize higher prices. However, there is still scope for higher price discovery in the e-NAM system if more traders are encouraged to participate and invite aggressive bidding. This may be done by creating awareness and organized a training program for the traders

about the functions and benefits of the e-NAM system.

**Factors influencing farmer’s participation in e-NAM system**

The selected farmers were interacted and asked to identify the factors that encouraged them to register and trade in the e-NAM system. The farmers identified four major factors like remunerative price, absence of middlemen, more transparency compared to open auction sales. The farmers identified four major factors: remunerative price, absence of middlemen, and more transparency than open auction sales, and better price than open auction trading. Table 4 shows that 73.33 percent of the farmers responded that the primary factor that led them to trade in the e-NAM system was because of remunerative price followed by better price realization (54.67 percent), more transparency (41.34 percent), and the absence of intermediaries (32 percent). The result implies that e-marketing can improve farmers’ income if implemented efficiently by eliminating various bottlenecks that hindered the trading activities under the e-platform.

**Table 4:** Motivational factors influencing farmers participating in e-NAM system

Sl. No.	Factors	% of farmers responded
1	Remunerative price with e-NAM platform	73.33
2	Better price realization in e-NAM platform compared with open auction system	54.67
3	More transparency in term of transaction in e-NAM platform compared to open auction system	41.34
4	Absence of middlemen in e-NAM platform	32

**CONCLUSION**

To address the challenges of the existing agricultural marketing system, such as farmer exploitation by traders and commission agents, as well as to ensure a fair price for farmers, a reliable flow of market information, enforcing of rules, and building trust among various stakeholders in order to reduce the complexities inherent in the market process must be ensured. The e-NAM marketing initiative was implemented to offer farmers with effective

and real-time price discovery, marketing system transparency, real-time information dissemination on prices and market arrivals, reduced transaction costs, and the implementation of an online payment system to reduce payment risk and ensure timely payment to farmers.

Following the integration of e-NAM with the selected APMC, the study's empirical findings demonstrate a considerable rise in the price obtained by farmers and in the market arrival of paddy. This positive outcome suggests that the implementation of e-NAM has a positive impact on paddy arrivals and prices. The advantages of the e-NAM platform will become more apparent as it is implemented in the manner in which it was designed. With additional monetary support, an awareness campaign regarding the e-NAM platform might be ascended from village to APMC and district to popularise it. Furthermore, a regulatory zation along the Securities and Exchange Board of India (SEBI) would be instrumental in controlling the e-NAM system.

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