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ELECTRONIC NATIONAL AGRICULTURAL MARKET (E-NAM): A REVIEW OF PERFORMANCE, PROSPECTS AND CONSTRAINTS FACED BY FARMER'S (WITH SPECIAL REFERENCE TO RAIPUR, CHHATTISGARH, INDIA)

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ABSTRACT

The e-NAM (National Agriculture Market) platform was launched in 2016 to address market fragmentation, reduce intermediation costs and benefit farmers. A study was conducted to examine the impact of e-NAM on farmer's income of Raipur, Chhattisgarh. The study found that specifically in Nawapara APMC after e-NAM unification to average daily arrival of paddy increased by 75.08% and the modal price of paddy increased to Rs. 191.67 per quintal. The major source of income in Nawapara APMC was market fee, accounting for more than 90% of total income. However, the study has identified several constraints faced by farmers and traders, including time-consuming auctions process multiple bank visits, lack of awareness and difficult to understand the e-NAM system. To address these challenges, the study recommended that organizing awareness campaigning and training programs, enhancing assaying and grading facilities, improving software and network connectivity, displaying the content in local languages, offering 25-50% cash payment for immediate cash requirements and establishing a regulatory body for smooth functioning of e-NAM. Overall, the study suggested that e-NAM has significantly impacted to the farmer's income in Nawapara APMC of Raipur, but there is still a need to address the aforesaid identified challenges to ensure its smooth functioning of e-NAM.

Keywords : e-NAM, Performance, Prospects and Constraints Faced by Farmer's

Introduction

The electronic trading platform for National Agriculture Market (e-NAM) was launched on 14th April 2016. During the launch, 21 APMCs there were 25 commodities (onion, potato, apple, wheat, pulses, coarse grains and cotton) from eight states were connected to the unified portal. Ministry of Agriculture, Government of India, reported that 585 markets from 18 states have been integrated with e-National Agriculture Market (e- NAM) and the target has been achieved. In Chhattisgarh, marketing and trading of the agriculture produce has been done by Krishi Upaj Mandis (Regulated Market). There has been special contribution of Krishi Upaj Mandis in well planned marketing of agricultural production. The mandis are classified in different categories on the

basis of total arrivals. *i.e.*, Grade 'A' (>40 lakh t), Grade 'B' (>20 lakh t), Grade 'C' (>10 lakh t) and Grade 'D' (>5 lakh t). The maximum mandis and sub-mandis were noticed of grade 'C' (49) followed by 'B' (37), 'A' (31) and 'D' (17) grades. Out of these total APMCs only 5 APMCs were integrated with e-NAM in the first phase on 19 October, 2016 and 9 APMCs were integrated in the second phase on 8 Aril, 2017. These are Baloda Bazaar (Bhatapara), Kurud (Dhamtari), Kawardha (Kabirdham), Rajnandgaon and Nawapara (Raipur). The total 14 APMCs of Chhattisgarh state have been connected to the e-NAM platform. Looking to the potential enormous impact of e-NAM on income and price discovery of the farmers and traders in the state, it is imperative to undertake the economic investigation of the same.

Status of Krishi Upaj Mandi (Regulated Market):

In Chhattisgarh, marketing and trading of the agriculture produce has been done by Krishi Upaj Mandis (Regulated Market). There has been special contribution of Krishi Upaj Mandis in well planned marketing of agricultural produce. The state consisted of 73 APMCs and 112 sub-mandis (Mishra, 2011). The main purpose of KUM is to provide the safeguard to the farmers from exploitation and provide fair prices of their agricultural produce with in time and furnish all the facilities of marketing. The arrival of agricultural produce was 73 lac MT (2011) in the State with income of Rs. 16413.46 lac (2010-11). Mandi fees received was the prime source of income to KUM.

Objectives of the study

- To study the market profile and assess the status of e-NAM of selected APMCs in the study area.
- To examine the arrival and prices of major commodities before and after e-NAM in study area.
- To identify the constraints during trading through e-NAM farmers, traders & APMCs and suggested the remedial measures.

Methodology

Selection of APMCs (Mandis)

Chhattisgarh state consisted of 73 mandis and 112 sub-mandis out which there are only 14 APMCs in Chhattisgarh which are enrolled with e-NAM till 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 was unified with e-NAM system in second phase on 8 April 2017. For the study purpose Nawapara (Raipur) APMCs was selected purposively.

Method of enquiry and data collection

The data required for the present study were collected from both primary and secondary sources.

Primary data: The primary data required for the present study were collected using separate specifically designed and pre-tested schedules for farmers, traders and APMCs officials.

Secondary data: Secondary data related to the selected APMCs were collected from various government sources including the various departments such as Directorate of Economics and Statistics, Directorate of Marketing, APMCs head office and also from the various published sources and online. Data related to the arrivals and prices of the commodities were collected from the APMCs profile, APMCs head office and from the selected APMCs office.

Analytical framework and analytical tools

The collected data were tabulated in the view of the cited objectives and were interpreted by absolute change, relative change, average (mean), standard deviation, coefficient of variation and Garrett's ranking technique as below:

Absolute change: It explained the overall variation after unification of e-NAM trading platform with selected APMCs. It was worked out as under:

Relative change: Since, absolute change does not explain the comparative change between pre and post-unification hence, relative change was used.

Standard deviation (σ): SD was used to quantify the amount of variation or dispersion of a set of the data value in the study.

Coefficient of variation (CV %): Coefficient of variation was used to measure the magnitude of variability in each of the selected variables from 2013-14 to 2017-18.

Garrett's Ranking Technique: For ranking both motivational factors of the farmers and constraints faced by both farmers and traders in the e-NAM system, Garrett Ranking technique was used.

There are some more factors which are important to understand before the conduction of present investigation are being discussed as follows:

Storage and warehousing: The head Quarter of Chhattisgarh State Warehousing Corporation is in Raipur. The maximum warehouses were found in Raipur (14) followed by Jagdalpur (11), Durg (10), Bilaspur (9), Kanker (8), Sarguja (8), Rajgarh (8), Dantewara (7), Janjgeer (6), Mahasamund (5), Rajnandgaon (5), Jashpurnagar (4), Koriya (4), Dhamtari (3), Kawardha (2) and Korba (2). There were found 106 warehouses with a capacity of 1044851 tons in which 51.11 % related to hired basis and 48.89 % owned in Chhattisgarh state. The warehouse capacity of Raipur was shown in table 6 and it was observed that 78 % of the ware house capacity was owned storage capacity in Raipur district and 62.37 % were hired storage capacity in the case of Dhamtari district.

(Source: Department of Agriculture Chhattisgarh.)

Agricultural marketing: The regulated market in different districts of Chhattisgarh was shown in the table 1 and it was observed that Baster district consisted a greater number of regulated markets under grade A (25.85 %) followed by Dhamtari district (22.58 %) and Bilaspur district (12.90 %). Under grade B a greater number of regulated markets was found in Mahasamund district (27.27 %) followed by Bemetra

district (18.18 %) and Dhamtari district (15.15 %). It was observed that a greater number of regulated markets under grade C was found in Kongadagaon district (18.37 %) followed by Kanker district (16.33

%) and Rajnandgaon district (12.24 %) and under grade D a greater number of regulated markets was found in Janjgir-Champa district and Jashpur (17.65 %).

Table 1: Regulated markets in different district of Chhattisgarh

S. No.	Districts Name	Grades of APMC			
		A	B	C	D
1	Raipur	2 (6.45)	3 (9.09)	2 (4.08)	-
2	Balodabajhar	1 (3.23)	2 (6.06)	2 (4.08)	-
3	Gariaband	-	1 (3.03)	2 (4.08)	-
4	Mahasamund	-	9 (27.27)	3 (6.12)	-
5	Dhamtari	7 (22.58)	5 (15.15)	-	-
6	Durg	3 (9.68)	-	-	-
7	Balod	3 (9.68)	-	-	-
8	Bemetra	-	6 (18.18)	-	-
9	Rajnandgaon	1 (3.23)	-	6 (12.24)	-
10	Kabirdham	-	1 (3.03)	1 (2.04)	-
11	Bilaspur	4 (12.90)	-	2 (4.08)	2 (11.76)
12	Mugeli	-	1 (3.03)	1 (2.04)	-
13	Jajgir-chmpa	1 (3.23)	1 (3.03)	2 (4.08)	3 (17.65)
14	Ktgora	-	-	1 (2.04)	-
15	Raigarh	1 (3.23)	3 (9.09)	1 (2.04)	1 (5.88)
16	Sarguja	-	-	5 (10.20)	1 (5.88)
17	Surajpur	-	-	1 (2.04)	1 (5.88)
18	Balrampur	-	-	-	2 (11.76)
19	Jaspur	-	-	1 (2.04)	3 (17.65)
20	Korea	-	-	-	2 (11.76)
21	Bastar	8 (25.85)	-	-	-
22	Kongadav	-	-	9 (18.37)	-
23	Kanker	-	-	8 (16.33)	-
24	Dantewada	-	-	1 (2.04)	-
25	Sucomma	-	-	1 (2.04)	-
26	Narayanpur	-	1 (3.03)	-	-
27	Bijapur	-	-	-	2 (11.76)
Total regulated market		31 (100)	33 (100.00)	49 (100.0)	17 (100.00)

Note: Figure in parentheses indicate percentage to the total

Source: Annual Reports of APMCs, 2011 (<http://www.samb.cg.gov.in>).

Objectives of e-NAM

A national e-market platform for transparent sale transactions and price discovery initially in regulated markets. Willing States to accordingly enact suitable provisions in their APMC Act for promotion of e-trading by their State Agricultural Marketing Board/APMC.

Liberal licensing of traders/buyers and commission agents by State authorities without any pre-condition of physical presence or possession of shop /premises in the market yard.

One license for a trader valid across all markets in the State.

Harmonisation of quality standards of agricultural produce and provision for assaying (quality testing)

infrastructure in every market to enable informed bidding by buyers. Common tradable parameters have so far been developed for 61 commodities.

Single point levy of market fees, *i.e.* on the first wholesale purchase from the farmer.

Provision of Soil Testing Laboratories in/ or near the selected mandi to facilitate visiting farmers to access this facility in the mandi itself. M/s. Nagarjuna Fertilizers and Chemicals Ltd. is the Strategic Partner (SP) who is responsible for development, operation and maintenance of the platform. The broad role of the Strategic Partner is comprehensive and includes writing of the software, customizing it to meet the specific requirements of the mandis in the States

willing to integrate with NAM and running the platform (www.enam.gov.in).

Results and Discussion

In this section, an attempt has been made to present the results of statistical analysis of collected primary and secondary data and discuss under the following headings.

Market profile and status of e-NAM in selected APMCs Arrival and prices of major commodity before and after unification with e-NAM

1. Market profile and status of e-NAM in Nawapara (Raipur) APMCs

Nawapara APMC is located in Abhanpur block of Raipur district. The APMCs was established in the year 1970. Nawapara APMC spread over 3.5 acres. It served the population of around 125591 from 57 villages. The nearest village to the mandi was Tarri village and the farthest was Banjari village. The produces procured by the market was sent to the other

markets viz., Raipur, Dhamtari, Kurud, Bhatapara, Rajnandgoan, Durg, Nevra, Bagbahara, Sinnar and Kharora. This APMC was unified with e-NAM in the first phase of unification on 19 October 2016 along with Baloda Bazaar (Bhatapara), kurud (Dhamtari), Kawardha (Kabirdham), Rajnandgaon (Rajnandgaon) and Nawapara (Raipur).

Basic characteristics of the selected APMC

Basic characteristics of the two selected APMC is presented in table 2. It can be seen that the APMCs was regulated APMC and it was regulated in the year 1970. The selected APMC is based on market legislation of Chhattisgarh Mandi Act 1972. The major commodity brought to these markets was mainly paddy including varieties like common paddy, IR 64, Mahamaya, MTU-1010, HMT and Swarna. Post-unification of this APMC with e-NAM 4422 farmers and 83 traders had been registered with the e-platform in Nawapara APMC.

Table 2: Basic characteristics of selected APMC

Sl. No.	Particulars	Units	Nawapara APMC
1	Regulated/ unregulated	-	Regulated
2	Year of regulation	Year	1970
3	Name of market legislation	-	C.G. Mandi Act 1972
4	Whether elected/ nominated/ superseded APMC	-	Superseded
5	Market holiday	-	Sunday
6	Market hour	Hours	8 hrs
7	Time at which sale begin in the market	AM	9:30
8	Time at which sale end at the market	PM	5:30
9	Peak trading hours	AM to PM	10:00-12:00
10	Name of the nearest railway station	-	Rajim
11	Distance of the railway station from the market	Km	1
12	Nearest national/ state highway		NH-130-C
13	Mode of transportation of commodity to mandi		Pick up, tractor, truck
14	Major commodity brought to market		Paddy (1008, IR 64, Mahamaya, MTU-1010, Swarna Masuri
15	Minimum daily arrivals of Paddy to Mandi	In Qtl	4800
16	Maximum daily arrivals of Paddy to mandi	In Qtl	150420
17	Average daily arrivals to mandi	In Qtl	7340
18	Farmers coming to market per day	Number	250-300
19	Traders coming to market per day	Number	80-100
20	Registered farmers with e-NAM	Number	4422
21	Registered Traders with e-NAM	number	83

Source: Nawapara APMC

Nawapara APMC is situated at distance of 1 km from the Rajim railway station and 44.4 km from the state capital of Raipur via NH 30 and NH-130C.

Staffing pattern in selected APMCs

The staffing pattern of the selected APMCs is presented in table 3. The staffing pattern and the strength of the staff in the selected APMCs was almost the same, this may due to the rule and regulation that

must be followed by the regulated APMCs in the selection process and number of posts to be filled except in the number of peon, watchman and computer operators which were variable.

Table 3: Staff strength in selected APMC

Sl. No	Particulars	Units	Nawapara APMC
1	Mandi secretary	Number	1
2	President	Number	1
3	Assistant supervisors	Number	13
4	Accountant	Number	1
5	LDC	Number	4
6	UDC	Number	1
7	Peon	Number	2
8	watchmen	Number	2
9	Computer operator	Number	4
Total		Number	29

Facilities and services available in selected e-NAM APMCs

Following were the facilities and services available in the e-NAM APMCs:

- The main feature of these e-NAM APMCs is spot cash payment to the farmers. Payment was usually done by cash or by cheque and after the unification of these APMCs with e-NAM; payment was also done by direct cash transfer to bank accounts of the farmers.
- There was adequate supply of electricity and water with in the Mandi yard.
- Farmers were provided with rest houses during the selling period.
- For traders, godowns and sheds are available for storage the purchased materials by traders.
- Drinking water facility and canteen were available within the APMC.
- Adequate parking space for tractors, trucks etc. were available.
- Covered shed area was present in the Mandi for the sale of agricultural commodities.
- There was a concrete road in the yard.
- Public address system was available and loudspeaker has been used for the same in the selected APMCs.
- Market office was present within APMC yard only.
- Grading and analysing laboratory were available in the APMC for checking the quality of the commodities brought to the APMC before auction in e-NAM platform.
- Electronic display board and notice board were available for displaying various information and prices of the commodity.

- Internet connectivity with overall 5-10 Mbps speed, depending on the number of systems deployed and users were available.
- Bidding room was available in e-NAM auction for online bidding.
- In e-NAM auction projector screen were used by the selected APMCs for online display of prices and auction result.

Method of sale

In the main gate of market one check post Centre is established and the market employee fills up the details like farmers and traders name, address including tehsil and district, commodity (s) to sell, vehicle types and vehicle number excepting bullock cart. In the selected APMCs, the sale of agricultural produce was done through open auction and e-NAM auction.

Open auction process is shown in fig. 1; in this process sale is carried out under the supervision by an official of the market (*i.e.* Assistant deputy supervisor) in presence of at least 5 to 6 traders or more. In this system the produces are kept in heaps and traders bid and final count 1-2-3 is announced by market employee and the produce is then offered to the highest bidder. The sellers has the option to refuse or accept the sale even at the highest bid, if he/she so desires. As per the rule, for sale cancellation the sellers have to pay Rs.1 only to the mandi as a mandi charge. It was observed that in this system, the buyers purchased more lots and the payment is done partly to the sellers.

The method of sale in e-NAM system is shown in the fig 2. In this system the sample of the commodity provided with lot number were taken to the assaying lab for grading purpose. After the grading activity is

done the farmers, lot is registered in e-NAM website for bidding. Soon after bidding is over the price of the commodity and auction results are displayed in the projector screen before the farmers. The farmers have the option to refuse the price offer by the buyers during the bidding process, if they so desire. It was observed that due the computerisation and complexity of trading in e-NAM auction process the e-NAM sellers and traders was not able to understand the process which some time discourage them to trade their produce in this auction. So, in order to make e-NAM system more effective for the sellers and traders, more training programmes should be organised within the APMC or in the villages about e-NAM.

Weighment of produce

For the weighing of agricultural produce, the standard weights and a platform have been used by the licenced weighmen in the APMC.

Market news

In the mandi, there was an arrangement for a proper and correct dissemination of the minimum

price, average price and maximum price of different agricultural commodities, through various media such as notice boards and loudspeakers and in e-NAM auction prices and arrival of commodities is disseminated through projector.

Market charges

The market charges for different functions are presented in table 4. From the table it was observed that Krishi Upaj Mandi has fixed the market charges. In the selected APMCs 2% of market fee has been fixed for paddy and 1% for brokerage. Market charges like licensed registration for the commission agent, wholesale traders, weigh men and small traders has been charged based on the number of years the licensed has been registered for. Licensed charge for commission agents was Rs. 5000 for 5 years, whole sale traders Rs. 5000 for 5 years, weighmen Rs. 20 for 1 year and for small traders Rs 100 for 1 year. Other charges like vehicle entry fee were also charges by the mandi; for tractor Rs. 20, truck Rs. 30 and for small vehicle Rs.10.



Fig. 1: Open auction process in selected APMC

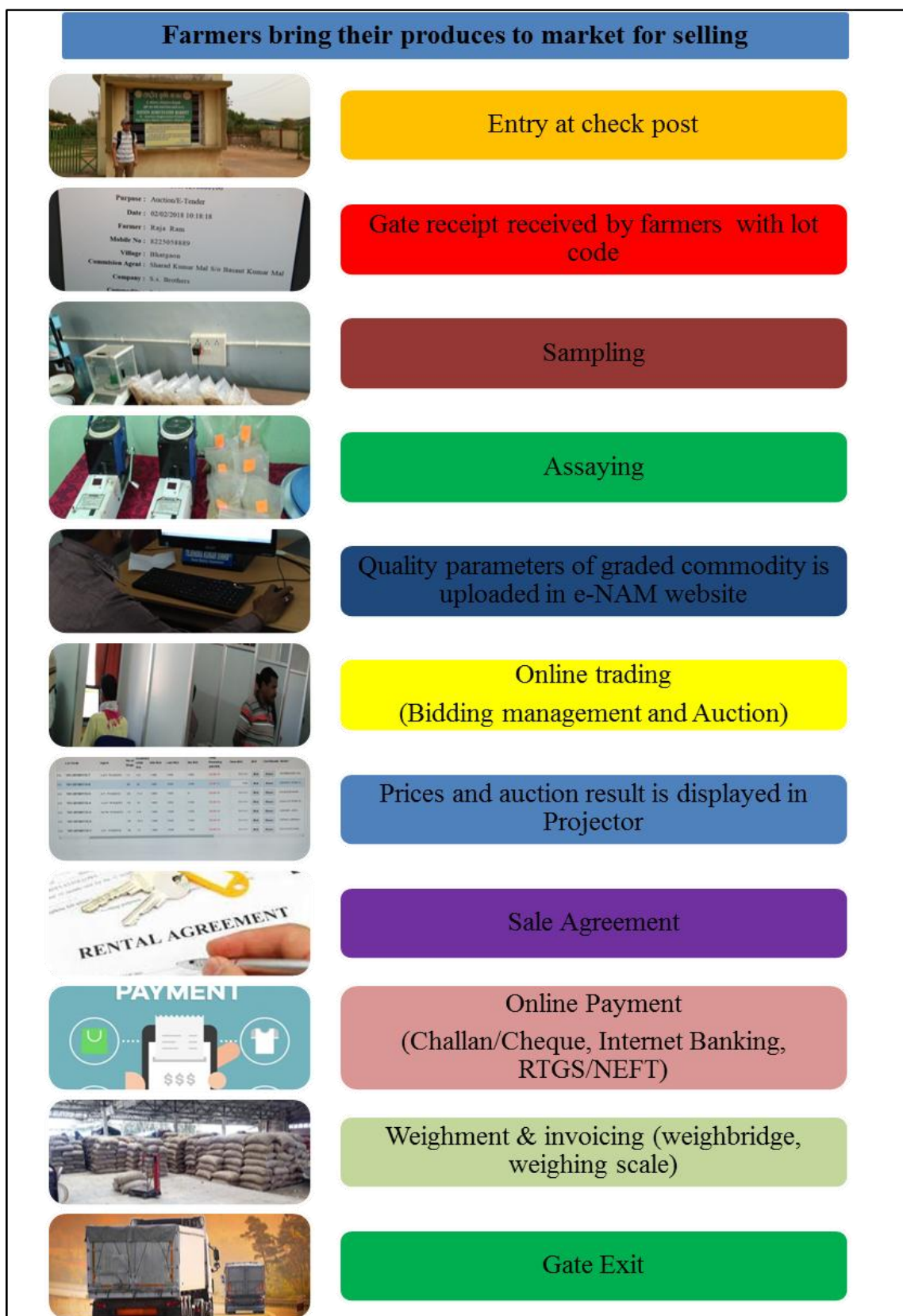


Fig. 2: e-NAM auction process in selected APMC

Table 4: Market charges for different functions

S. No.	Market intermediary	Charges	For year
1.	Market fee	2 % for paddy and 1 % for brokerage	-
2.	Licensed registration for Commission agents	Rs. 5000	5
3.	Licensed registration for whole sale traders	Rs. 5000	5
4.	Licensed registration for weighmen	Rs. 20	1
5.	Licensed registration for small traders	Rs. 100	1
6.	Other charges like vehicle entry	For tractor- Rs. 20, for truck –Rs. 30 and for small vehicle- Rs. 10	-

Source: Nawapara APMC, 2017.

Table 5: Income and Expenditure of Nawapara and Dhamtari APMCs from 2013-2018 (in Rs. crore)

Sl. No.	Particulars	Nawapara APMC				
		Income				
		2013-14	2014-15	2015-16	2016-17	2017-18
1	Market fee	2.91 (95.41)	3.41 (90.93)	4.49 (94.13)	5.92 (90.80)	5.20 (94.89)
2	Registration fee	0.01 (0.33)	0.01 (0.27)	0.04 (0.84)	0.01 (0.15)	0.01 (0.18)
3	Other income	0.13 (4.26)	0.33 (8.80)	0.23 (4.82)	0.59 (9.05)	0.27 (4.93)
Total income		3.05 (100.00)	3.75 (100.00)	4.77 (100.00)	6.52 (100.00)	5.48 (100.00)
Sl. No.	Particulars	Expenditure				
		2013-14	2014-15	2015-16	2016-17	2017-18
		2013-14	2014-15	2015-16	2016-17	2017-18
1	Establishment expenditure	1.28 (23.66)	1.36 (29.06)	1.42 (30.02)	1.51 (31.01)	1.14 (28.50)
2	Developmental work	1.74 (32.16)	1.04 (22.22)	0.11 (2.33)	-	-
3	Other expenditure	2.39 (44.18)	2.28 (48.72)	3.20 (67.65)	3.37 (69.20)	2.86 (71.50)
Total expenditure		5.41 (100.00)	4.68 (100.00)	4.73 (100.00)	4.87 (100.00)	4.00 (100.00)
Net surplus/Net deficit		-2.36	-0.93	3.04	1.65	1.48

Income and expenditure of Selected APMC

Note: Figures in parentheses indicate percentage to the total.

Income and expenditure of Nawapara APMC is presented in table 5. From this table it can be seen that in the selected APMC more than 90 per cent of their income source came from market fee. In Nawapara APMC, e-NAM system was unified during 2016-17 session and it was observed that income exceeded the total expenditure which was more compared to the other study years (2013-14 to 2015-16). This may be

due to the fact that more number of farmers and traders were registered with the APMC at the time of unification of e-NAM.

From fig. 3 and fig. 4 it can be clearly seen that the expenditure of the Nawapara APMC exceeded the income during the year 2013-14 and 2014-15 which may be due to the fact that lots of developmental work within the APMCs was carried out during these years.

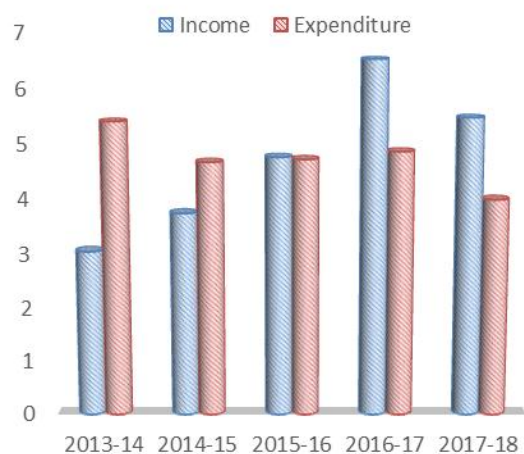


Fig. 3: Income and expenditure of Nawapara APMC

Arrival and Prices of Major commodity before and after unification of selected APMCs with e-NAM

Arrival and prices of major commodity before and after unification of selected APMCs with e-NAM platform have been analysed from the collected data. Month wise arrival and prices for the year from 2013-14 to 2017-18 was analysed.

Nawapara APMC

In Nawapara APMC the commodity that was brought by the farmers to the market was only paddy. So, arrivals and prices of paddy have been analysed and it was observed that the total arrival of paddy in Nawapara APMC increased over the years which can be seen from table 6. When this APMC was unified with e-NAM platform in the month of October 2016 there was a slight decrease in the arrival as compared to 2015-16 in November. It has been observed that during 2017-18 when e-NAM system was functioning smoothly, the arrival of paddy to APMC was more as compared to the preceding year. It was also observed that large quantity of paddy arrived to the APMC during the months of May, June and December (Fig. 4) with more than 11 per cent in the month of May, more than 7 per cent in the month of June and it was highest during month of December with more 17 per cent to the total annual arrival in all the selected years.

After APMC was unified with e-NAM system in October 2016-17 there was a slight decrease in the arrival of paddy in the market which subsequently picked up from 2017-18 as shown in the figure.

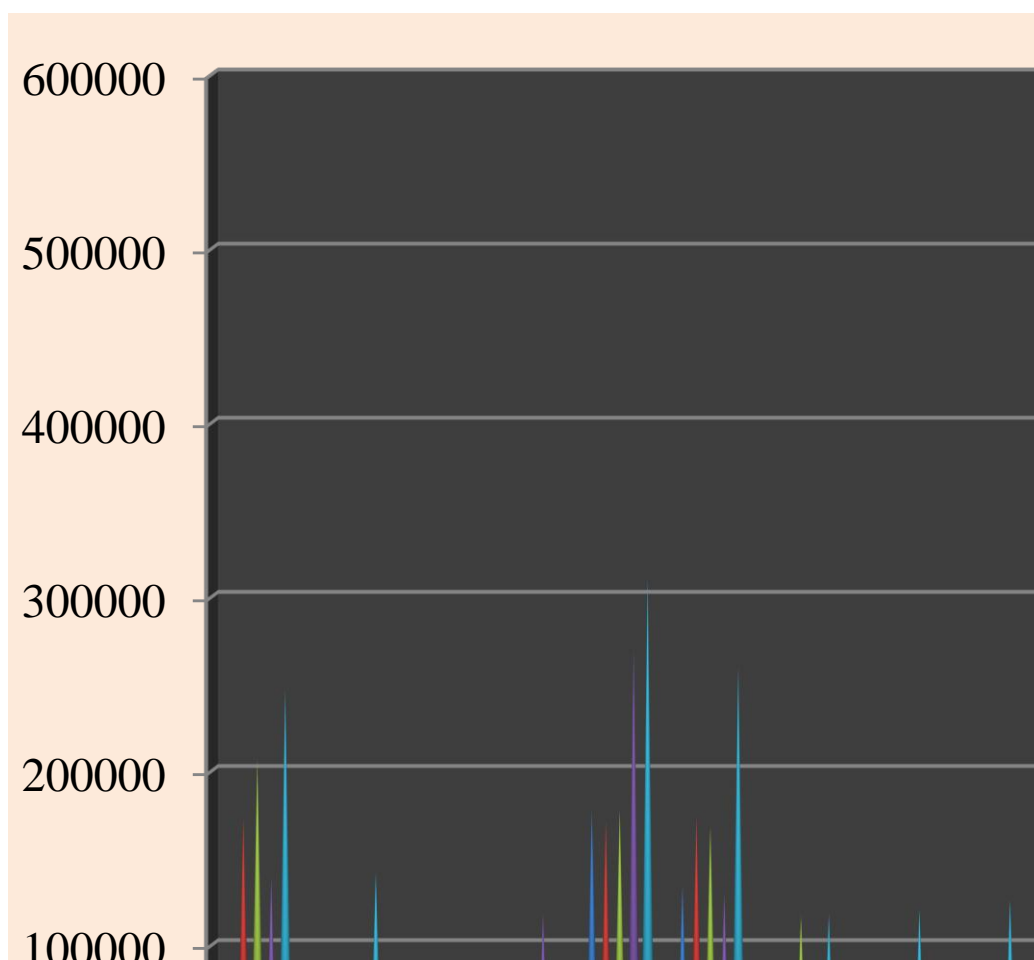


Fig. 4: Monthly Arrivals of Paddy in Nawapara APMC (Qtl)

Table 6: Month wise yearly arrival of paddy before and after e-NAM in Nawapara APMC (Qtl)

Month/ Year	2013-14	2014-15	2015-16	2016-17	2017-18
January	12776 (1.09)	173012 (12.35)	206459 (13.54)	138640 (8.06)	246821 (11.30)
February	34057 (2.91)	81146 (5.79)	72749 (4.77)	46403 (2.70)	141580 (6.48)
March	44143 (3.77)	33357 (2.38)	45413 (2.98)	75823 (4.41)	85535 (3.92)
April	31725 (2.71)	18213 (1.30)	39956 (2.62)	118459 (6.89)	76188 (3.49)
May	177753 (15.18)	171763 (12.26)	177457 (11.64)	269808 (15.69)	310568 (14.22)
June	134169 (11.46)	174267 (12.44)	167938 (11.01)	129468 (7.53)	259387 (11.87)
July	81395 (6.95)	77281 (5.51)	116693 (7.65)	81191 (4.72)	117828 (5.39)
August	51502 (4.40)	59311 (4.23)	54182 (3.55)	43029 (2.50)	120335 (5.51)
September	76004 (6.49)	47492 (3.39)	66267 (4.35)	52882 (3.07)	125987 (5.77)
October	64516 (5.51)	29752 (2.12)	12364 (0.81)	61320* (3.57)	74555 (3.41)
November	85401 (7.29)	97928 (6.99)	193599 (12.69)	191684 (11.15)	238095 (10.90)
December	377368 (32.23)	437783 (31.24)	372027 (24.39)	511068 (29.72)	387882 (17.75)
Total	1170809 (100.00)	1401305 (100.00)	1525104 (100.00)	1719775 (100.00)	2184761 (100.00)
Before e-NAM					
Average arrival (Qtl)	112287.13				
Standard Deviation (Qtl)	96301.52				
Coefficient of Variation (%)	85.76				
After unification with e-NAM					
Average arrival (Qtl)	196588.87				
Standard Deviation (Qtl)	125629.85				
Coefficient of variation (%)	63.90				
Changes After Unification with e-NAM					
Absolute Change (Qtl)	84301.73				
Relative Change (%)	75.08				

Note: Figures in Parentheses indicate percentage to the total and * indicate e-NAM unification.

The changes in the arrival of paddy in Nawapara APMC (Table 6) has been analysed and found that there was an absolute change of 84301.73 Qtl and relative change of 75.08 % after unification of this APMC with e-NAM system. This may be due to the fact that a greater number of sellers and traders' participation post-unification of APMC compared to that of pre-unification. However, regarding the variation in the arrival it was observed that coefficient of variation was more in case of pre unification with 85.76 % CV compared to post-unification of e-NAM with 63.90 % CV. Highest percentage of CV pre- unification was due to the fact that there was a large variation in the monthly arrival of paddy to the APMC.

Regarding the monthly modal prices of paddy in Nawapara APMC was presented in table 7. It can be clearly seen from the table that there was an increased in the average modal price of paddy by Rs. 191.67 per quintal after implementation of e-NAM with this APMC and also showing a relative change of 14.75 per cent over the pre-unification prices.

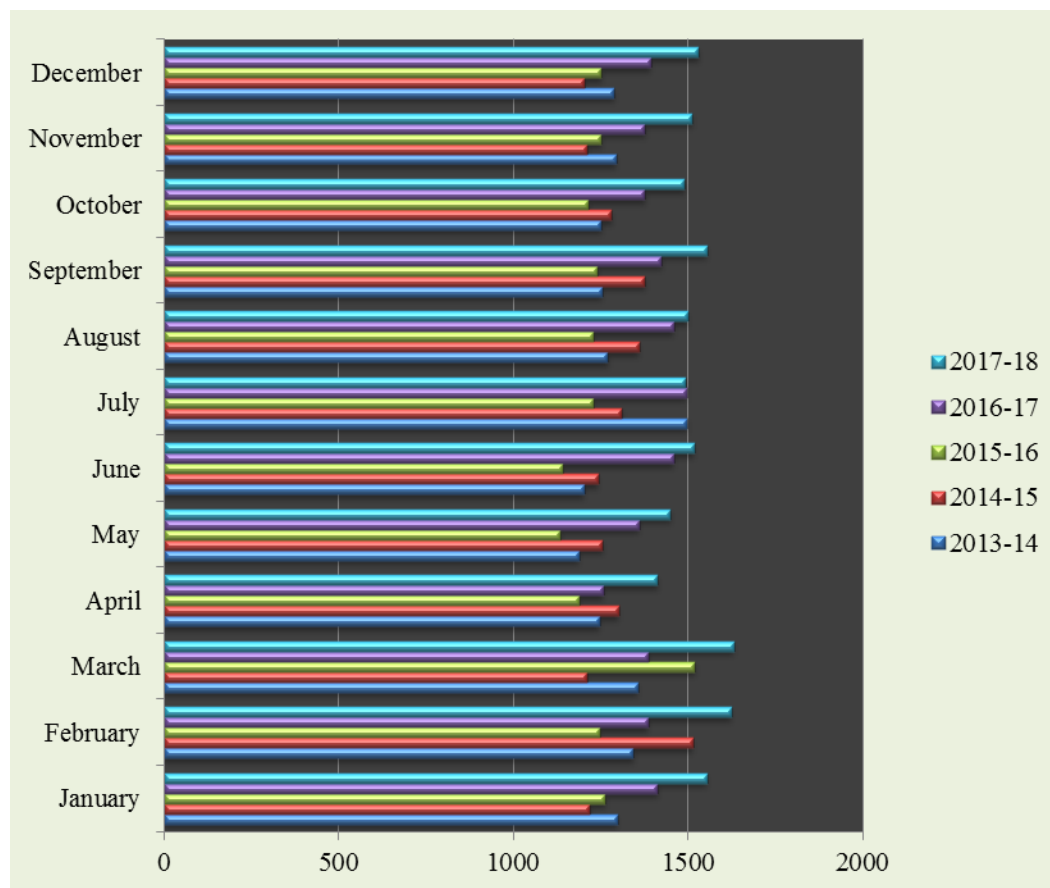


Fig. 5: Monthly modal price of paddy in Nawapara APMC (Rs. / Qtl)

Table 7: Monthly Modal Prices of paddy in Nawapara APMC (Rs. / Qtl)

Month/Year	2013-14	2014-15	2015-16	2016-17	2017-18
January	1296.29	1218.24	1261.75	1412.18	1554.32
February	1342.74	1513.03	1246.02	1384.92	1622.62
March	1355.98	1208.45	1519.4	1384.1	1629.7
April	1246.14	1300.17	1187.86	1256.68	1412.78
May	1186.58	1255.48	1134.83	1358.52	1450.02
June	1201.12	1241.96	1139.32	1457.78	1516.79
July	1496.08	1309.19	1227.44	1494.16	1492.33
August	1269.18	1358.89	1226.84	1458	1498.92
September	1253.48	1375.8	1239.89	1423.96	1552.98
October	1252.07	1280.62	1213.83	1376.08*	1488.64
November	1293.24	1211.2	1251.93	1340.22	1512.2
December	1287.71	1202.27	1251.63	1392.89	1530.19
Before e-NAM					
Average Modal Price (Rs. / Qtl)				1299.71	
Standard Deviation (Rs. / Qtl)				100.08	
Coefficient of Variation (%)				7.76	
After Unification with e-NAM					
Average Modal Price (Rs. / Qtl)				1491.37	
Standard Deviation (Rs. /Qtl)				84.72	
Coefficient of Variation (%)				5.68	
Before and After unification with e-NAM					
Absolute Change (Rs. / Qtl)				191.67	
Relative Change (%)				14.75	

Note: * indicates when e-NAM was started in Nawapara APMC

In term of variation in prices, before e-NAM was implemented in the selected APMC it was observed that coefficient of variation was more (7.76%) compared to unification of APMC with e-NAM (5.56). Increase in the prices of paddy post-unification may be due to more numbers of farmers and trader's participation in the e-NAM system thereby, helping e-NAM sellers realised 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 organised training programme for the traders about the functions and benefits of e-NAM system.

Fig 5 shows that the modal price of paddy for the year 2017-18 was highest in the month of February and

March as during these months there was less quantity of paddy brought to the market yard by the farmers or sellers.

Constraints faced by farmers in e-NAM system in selected APMC

From the table 8, it is observed that in both the selected APMCs the major problems faced by the farmers were due to lengthier process of trading in e-NAM system followed by multiple visits to bank for payment realisation, lack of awareness about e-trading, farmers do not understand the context displayed in the computer and projector screen and grading inconsistent. This may be due to the fact that the e-NAM was newly introduced to the selected APMCs and the farmers do not have much idea about the system.

Table 8: Farmers constraints in e-NAM system of both the selected APMC

Sl. No.	Particulars	Factors	Rank
			Nawapara APMC
1.	Lack of awareness about e-NAM system	F1	3
2.	Time consuming in e-NAM auction	F2	1
4.	Sometime e-NAM price was less compared to open auction	F3	7
5	Farmers do not understand the context displayed in the computer and projector screen	F4	4
6	Lack of training about e-NAM system	F5	6
7	Multiple visits to bank for payment	F6	2
8	Grading inconsistent	F7	5
9	Sometime whole quantity of paddy was not able to sell through e-NAM platform	F8	9
10	Shortage of labour in marketing activities	F9	10
11	Server problem	F10	8

However, to overcome these constraints, awareness campaigns and training programmes should be organised from village level to APMCs and district level and the results displayed should be made available in local languages also.

Suggestions for the improvement of e-NAM system based on the finding of this study

Suggestions for the improvement of e-NAM system based on the finding of this study were given below:

Since most of the sellers use to bid their produce at the last minutes only; the initial bidding price should start with 5% higher price over the previous successful bid and bidding time should be increased to at least 30 minutes.

Sometime e-NAM sellers faced cancellation of their lots even after successful bidding due to poor

quality of produce brought by them for sale. So, to reduce rejection of lots farmers need to bring good quality products for sale in the e-NAM platform.

Context displayed in the projector screen should be in local language and also should be in farmers' friendly manner. The display should be visible from a distance and of good quality as it was observed that the displayed was not visible from behind.

Traders and farmers may be incentivized to participate in e-NAM system by way of reduction in APMC fees by 0.25-0.50% and grant of bonus by 0.50% of the gross value of produce sold respectively.

It was observed that when more numbers of farmers trade their produce in the e-NAM auction, it leads to the time consuming as the farmers has to wait for their turn to bid individually in the bidding room. Thus, it is important to increase the bidding room and

computers to reduce the time consuming of the e-NAM auction.

Establishment of an apex body is advocated to control and regulate the activities of e-NAM.

APMCs should start providing small loans to encourage the farmers to participate in e-NAM and this will in turn also help them to get rid from the hand of moneylenders who use to exploit them.

Since most of the farmers who are participating in e-NAM auction was marginal and small farmers which required immediate cash after sale for their urgent needs. So, to reduce this inconvenience in the e-NAM system up to 25-50% payment may be made in cash by the APMCs and the rest through the digital mode.

Frequent training programmes should be organised within the APMC or at the village level for better understanding about e-NAM system.

Bank branches should be open on the premises of APMCs which in turn will help the farmers to get instant payments and reduce the transaction cost.

Local traders' nexus needs to be broken and more trader's participation should be encouraged in e-NAM.

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