Strengthening E-NAM in India: Way Forward

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PREFACE

Agricultural commodities markets in India are regulated by the Agricultural Produce Markets Regulation Acts (APMRA), enacted by most the states during the Sixties and Seventies. All primary wholesale assembling markets were brought under the ambit of these Acts. It was made compulsory to sell the agricultural produce only at designated regulated markets (mandis) through registered intermediaries governed by the Agricultural Produce Market Committee (APMC). Though, the APMC Act has played profound roles in bringing order in agricultural markets and had several reforms in the past. However, of-late, these regulated markets seem to fail in evolving its functioning matching to changing dynamics of agricultural products and value chain. Presently, there are 7,190 regulated wholesale markets and 22,505 rural periodical markets in India. To bring greater efficiency in the present system, the government of India launched a national agriculture market in 2016 by integrating all the existing APMCs markets in the country through a common electronic platform called e-NAM (http://www.enam.gov.in). It intends to benefit the farmers by better price realization and reduced transaction costs, reducing the roles of middlemen and price manipulation by them.

The present study examined the preparedness of APMC mandis in adopting the e-NAM, the extent and pattern of participation by the smallholders in the new market system, benefits arising out from the participation in the ongoing transformation in the APMC markets in 4 major states (Madhya Pradesh, Maharashtra, Rajasthan, and Telangana), and suggest plausible interventions to make the initiative inclusive for the country as a whole. The research team conducted field surveys in these states and interacted with farmers, traders, commission agents, and mandi officials, besides used secondary data from published sources and market platforms to understand the activities and process. The study suggests that to extend the full benefits of the e-NAM, an innovative marketing model viz. Smart Micro-Mandi has been suggested in the interest of smallholder farmers in India.

The study team thank all the mandi officials and officials from agricultural universities in helping us in getting the required data and information from the APMCs. We also thank all the respondents (farmers & traders) who participated in the survey. We also put on record the contribution of all the field investigators and PGDMA students of NAARM who helped in collecting the data. Last but not the least, the team acknowledges the Director, NAARM for approving this study and guiding the progress throughout.

ICAR-NAARM, Hyderabad **PROJECT TEAM**
May 2020

Executive Summary

Agricultural markets in India are regulated by the Agricultural Produce Markets Regulation Acts (APMRA) which was enacted by most of the states during the Sixties and Seventies. The APMRA made it compulsory to sell the agricultural produce only at designated regulated markets (mandis) through registered intermediaries governed by the Agricultural Produce Market Committee (APMC). Presently, there are 7,190 regulated wholesale markets in India, which falls under the ambit of the Act. Although the Act has served its purposes during the past several decades in bringing certain order in agricultural markets, off-late, complacency and rigidness in evolving to match to the current needs, led huge dissatisfaction among farmers. Over the years, several reforms have been introduced in the APMC Act, one of the recent and important being the APMC Model Act (2003). However, the adoption of these reforms has been uneven by the states. The National Commission on Agriculture (1976) and the National Commission on Farmers (2004) have recommended that the regulated market should be available to the farmers within a radius of 5 Km. The Committee constituted by the Government of India (GoI) in 2013 for bringing reforms in agricultural markets also highlighted several challenges in existing agricultural marketing systems, which are against the interest of smallholder farmers.

Although agriculture and agricultural marketing is a state subject, the GoI decided to create a national agriculture market (NAM) by integrating all the existing APMCs markets in the country through a common electronic platform named e-NAM. The e-NAM was launched in July 2016 and by end of the year, 250 APMC mandis across 10 states were integrated to the e-NAM platform, the number further increased to 1000. The e-NAM is a compulsory delivery based trading platform, which enables the farmers to realize the best possible price. The idea is that such an option may help to reduce the cost of intermediation and to enhance farmers' price realization by enhancing marketing efficiency and bringing transparency in agriculture marketing.

In order to understand the effectiveness of e-NAM, particularly on the smallholders' participation and price realization due to e-NAM, this present study was conducted during 2017-2020 in 4 major states (Madhya Pradesh, Maharashtra, Rajasthan and Telangana). The data was collected during field survey from the farmers, traders, and mandi officials in these states. Besides, secondary data about transactions, live trading on e-NAM, and prices of the commodities were collected from the websites, https://agmarknet.gov.in/ and https://www.enam.gov.in/. The field survey was conducted in two stages- first in 2017 and second in 2019. Specifically, the process flow that happens at mandis starting from entry to sampling, assaying, auction, weighing, sale agreement, payment type, and final exit from the market in all the selected e-NAM mandis were observed.

Status of e-NAM implementation in India

As of 15th May 2020, total 1000 APMC mandis across 18 states and 3 Union Territories (UTs) have been integrated to the-e-NAM. Among different stakeholders, 1.28 lakhs traders and 70,969 commission agents are registered in these e-NAM mandis to help the transaction of 1005 registered FPOs and 1.66 crore registered farmers on the e-NAM platform. A total of 150 commodities have been identified to be traded through e-NAM that includes 25 types of cereals and pulses, 13 types of oilseeds, 29 types of fruits, 40 types of vegetables, 14 types of spices, and the remaining 29 types of commodities under the miscellaneous category. The list includes almost all types of agricultural commodities- from green leafy vegetables to tender coconut and flowers like gladiolus and carnation. On the other hand, more than 5 quality parameters have been identified as essential to be assayed to categorize the commodity into 3 different grades before trading on e-NAM. Although, the corresponding infrastructure, facilities, and manpower could not be created in any of the e-NAM mandis.

Preparedness of e-NAM mandis

The level of preparedness in implementing various components of e-NAM in the states of Madhya Pradesh, Maharashtra, Rajasthan, and Telangana were studied. These components were the generation of Unique Lot ID at entry gate, sampling from heap/lot, e-auction, assaying, best price-SMS sent to the farmers, electronic weighments, generation of sale receipt, online payment and permit/ gate exit, etc. The salient observations are:

(i) ***Unique lot ID:*** It was observed that the farmers are not issued permanent ID in any market selected in the study. When a farmer enters the market, it is regarded as a fresh entry. Therefore, it is not possible to trace the details of all transactions made by the farmer. Although unique lot ID is generated in most of the cases.

(ii) ***Sampling & Assaying:*** It was found that only in few cases, sampling of individual lot is being done. Similarly, these mandis are not well equipped with assaying equipments and technical manpower to conduct assaying of all the lots. Further, assaying is done manually, which at present takes 20-30 minutes for one sample. Hence, it is very difficult to assay all the lots even during the normal season and enter the information in the portal before online bidding starts.

(iii) ***Online trading:*** All the markets studied except Nizamabad, were continuing with open auction method in 2017, while the traded price and quantity were entered after the transactions completed offline. However, during the second stage of the survey in 2019, traders were bidding on the e-NAM platform after personally verifying the lots of major commodities only in the mandis.

(iv) ***Online payment:*** Most of the farmers and traders are not in favour of online payment. However, on the insistence of market authorities, traders/commission agents are routing some of the payment through the online system by NEFT/RTGS/IMPS. Cash transaction is still predominant in all markets.

Despite of above operational challenges, when the daily transaction on e-NAM platform in the year 2017 were analyzed for the 4 states, some interesting trend was observed. It was found that 58 e-NAM mandis in Madhya Pradesh (MP) traded 48 different types of commodities (including different varieties of the same commodity) through e-NAM. Top 15 e-NAM mandis handled about 61% of total transactions by volume in the state on e-NAM. In Maharastra, 44 e-NAM mandis reported transactions of 38 different types of commodities, while the top 10 transacted 84% of the total commodities in the state. In Rajasthan, 25 e-NAM mandis handled 56 types of different commodities, while the top 10 mandis handled about 61% of total commodity in the state. Similarly, in Telangana, 44 registered e-NAM mandis reported transaction of 202 types of different commodities (including 36 different varieties of paddy alone), while the top 12 mandis handled about 61% of total commodity by volume. Two commodities, viz. paddy and turmeric constituted more than 50% of total transactions on e-NAM in the state.

Above all, there was a huge variation in the average daily prices within each month in these markets for the same commodity, which indicates the absence of inter-mandi trade of the commodities. Further, the peak transacted volume of the same commodity in a month also varied across the mandis within the state. The reported data on the e-NAM portal were also inconsistent in terms of arrival and traded quantity, prices of traded commodities (minimum, maximum & modal values), etc. Therefore, it can be said that these e-NAM mandis has been computerized, but still are far away from its full implementation.

Live trading on e-NAM

The e-NAM is contemplated to streamline the uniform procedures across the integrated markets, removing information asymmetry between buyers and sellers and promoting real-time price discovery, promoting transparency in the auction process, and access to a nationwide market for the farmer, with prices commensurate with the quality of his/her produce. Therefore, for e-NAM to be in operation in a true sense, it is necessary to have live trading through e-NAM platform for which few aspects are pre-requisites: i) uploading of detailed information (quality and quantity without seller's name) of each lot of the commodities on the e-NAM portal, ii) specific pre-defined timing of opening and closing of each e-NAM mandi, iii) intra-mandi trading licenses for the buyers/traders, iv) guarantee for quality disclosed on the trading platform, v) warehouses for pre- or post-trade stocking of the commodity, etc. However, when live trading information in selected mandis were observed during April 2020, a mismatch was found between the number of mandis shown as trading live on a particular day and actual mandis showing live trading in realtime. Such mismatch in information and non-availability of all the mandis simultaneously on the live trading platform may defeat the purpose of e-NAM of providing a uniform national trading platform. Different mandis within state and in some cases, different commodities within the same mandi showed different trading timing. Besides, there was no information available on the portal to indicate about opening and closing time

of these mandis, which operate in different timings. This might be causing huge inconveniences/entry barriers for the buyers/traders who are not physically available in particular mandi.

Benefits from participation of smallholders in e-NAM

The participation of smallholders in e-NAM mandi and the benefits realized in terms of a better price for their produce was examined from field survey as well as through comparing the modal price of the commodities reported on the e-NAM portal and that on AGMARKNET portal for the April 2020 month. To achieve this objective, a total of 446 farmers were randomly selected within a radius of about 50 kilometers from one major mandi selected in each state. These mandis were APMC Jabalpur in Madhya Pradesh, APMC Parbhani in Maharashtra, APMC Shadnagar (Rangareddy district) in Telangana, and APMC Kota in Rajasthan.

There was a clear difference in the selling pattern of the commodities after harvest by the smallholder farmers vis-à-vis large farmers in Madhya Pradesh state. The majority of smallholder farmers were found selling their major produce in the e-NAM mandi, which might be due to the vicinity of the mandi to the farmers. In contrast to this, the majority of large farmers were selling paddy and wheat outside the mandi. Another important observation was that on average farmers realized better prices when they sold their produce in the mandi, barring few exceptions like paddy. In Maharashtra, the proportion of smallholder farmers selling major commodities in e-NAM mandis was significantly lower than that of large farmers. The smallholder farmers realized better farm gate prices outside the mandi. In Rajasthan, all the farmers, irrespective of farm size category, were found selling most of their harvest in APMC mandi only, except for some green vegetables. In some commodities, the average selling price was higher for smallholder farmers, while in commodities like paddy and wheat, large farmers got a better price. Smallholder farmers in Telangana realized better prices for their produce in the mandi as compared to that of large farmers, who got better prices outside mandi due to their better bargaining power. Among all the major crops, cotton was found sold outside the mandi by the majority of the farmers in the state, while mandi was the main market place for paddy and maize.

The comparison of the same commodity traded in the same APMC mandis through non-e-NAM (data collected from Agmarknet) and e-NAM portals indicated that the expected price advantage through e-NAM was not significant in all the states under study. It is also observed that still significant number of smallholder farmers could be out of this structural change in the marketing system in the country, as they are unaware of the incentives and benefits being offered through e-NAM trade. Therefore, to extend the full benefit of the structural changes introduced in the agricultural market in terms of e- NAM, there is a need for revisiting the implementation process as well as bringing some more additional features into the system in the interest of smallholder farmers.

Policy recommendations for improving the effectiveness of e-NAM

A. Strategic level

1. The e-NAM should be managed completely as a separate business which shall be responsible for managing the unified electronic trading platform without any glitches, while each mandi should be treated as one of its clients on the pattern of hospitality aggregators such as OYO hotels or Ola/Uber taxi service.
2. Each e-NAM mandi should act as Strategic Business Unit (SBU) i.e. profit center which focuses on product offering and market segment. All the seller-farmers may be made a shareholder in this SBU according to their contribution in sale or share purchase. These mandis should be encouraged to create product differentiation & offering, and marketing plan.
3. All efforts should be made to reduce the role of traders and commission agents (CAs), who take away a major chunk of the values from the farmers and the mandis. The roles offered by the traders and CAs should be performed by the respective mandi itself.
4. Each e-NAM mandi should start with 100% online transaction with only 1 or 2 major commodities initially, and after gaining experience & expertise, it should expand to high value and perishable commodities.
5. All e-NAM mandis shall have essentially own or linked with WDRA accredited warehouses/cold storages according to the major commodities transacted in the mandi.
6. The **e-NAM mandi should allow any bulk buyer with proper KYC without having a trading license** as well to have efficient price discovery in favour of farmers.
7. The e-NAM should be fully integrated with Artificial Intelligence and the Internet of Things (IoT) to provide real-time information as well as analytics to different stakeholders when and wherever s/he wants.
8. In the medium to long run, as the government intends to integrate 22,000 mandis including rural markets and APMC mandis, the strategy should be to create new mandis in the line of Smart Micro-Mandi* (brief about it is given at the end).
9. All the unit level (lot-wise) transaction data should be made accessible for academic and research purposes with proper registration.

B. Tactical level

1. Efforts should be made to develop a mobile app in the vernacular language which can be used by the farmer-sellers. Specific slot may be given to the farmers through the app, who intends to sell their commodities. The farmers may input the details of the lot on the mobile app well in advance before coming to the mandi.

2. All information related to mandi timing, online trading timings- opening and closing (commodity-wise, if it is different) should be standardized and well-publicized.
3. All e-NAM mandis should be LIVE at a specific time on all working days, even if there is no seller on a particular day. Prior notification shall be mandatory for the closure of the mandi.
4. Within the state, all e-NAM mandis should have the same opening and closing timing. However, to manage the arrivals, different commodities may be given different opening and closing hours for trade on e-NAM platform.
5. The e-NAM mandi should start a campaign for registration of all the prospective farmer-sellers during lean season.

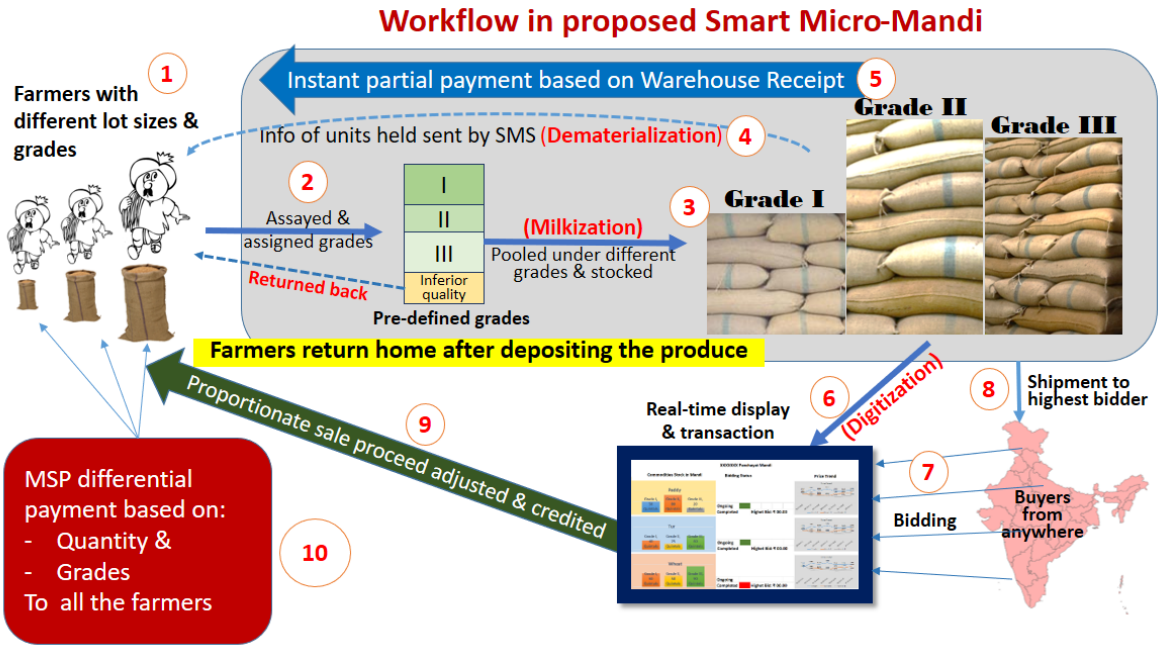
C. Operational level

1. Entry Gate receipt/ Lot ID may be automatically generated on arrival by QR code scanning, as the details about the commodities and lots along with the grade quality might have been entered into the system through the mobile app.
2. There may be separate gate entry for those farmer-sellers who have not entered the lots' details in the mobile app.
3. If the farmers bring some more commodities other than e-NAM tradable commodities, they may be allowed to sell conventionally i.e. offline.
4. Minimum quality specifications for each commodity to be traded through the e-NAM platform should be communicated to the farmers. The farmers shall be asked to declare their lots according to the grade standard on the mobile app.
5. On arrival in the mandi, random sampling should be carried out for the lots, and quality assaying should be done. Each farmer shall be rewarded with the **Five-Star Quality Rating System** based on deviation from the self-declared quality of the commodities brought to the mandi. Continuous Excellent performers may be rewarded in annual function.

6. The details of the commodities/lots should be automatically and seamlessly uploaded on the e-NAM bidding platform. However, it shall be reflected on the trading platform only after physically approved by the mandi officials.
7. All possible commodities may be listed in the system and high priority commodities should appear on top in the given mandi. It will eliminate the possible error in the manual entering the name.

8. After awarding the highest bidder and ensuring the full payment to the sellers' account, the commodities may be transported through third party logistic partners or if buyers wish, it may be kept in the warehouse safely on a storage charge basis.

***Smart Micro-Mandi (SMM):** According to the estimate, India needs about 28,000 Smart Micro-Mandis to provide accessibility to all the farmer-producers. The four basic pillars of the model are: 1) Proximity of the SMM to the farmer (proposed 5-6 km), 2) Assaying -based grading and mixing of the lot (milkization), 3) Dematerialization & Pledge Financing (for instant partial payment to the farmers), and 4) End-to-end digitization. Application of modern technologies like AI, IoT, Data Science, Sensor-based imaging would make these micro-mandi smart. Inter-mandi or national trading of agricultural commodity is only possible, if the quality of each lot are assayed correctly and displayed on the portal. The brief of Smart Micro-Mandi can be accessed on https://naarm.org.in/wp-content/uploads/2018/09/E_Policy_Brief_SMM04082018.pdf.



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Abbreviations

ADMP	Average Daily Modal Price
AGMARKNET	Agricultural Marketing Information Network
APMC	Agricultural Produce Market Committee
APMRA	Agricultural Produce Markets Regulation Acts
CA	Commission Agent
COVID-19	Corona Virus Disease-19
DFI	Doubling Farmers Income
DMI	Directorate of Marketing & Inspection
eNAM	Electronic National Agriculture Market
e-NWR	Electronic Negotiable Warehouse Receipts
FGD	Focus Group Discussion
FPO	Farmer Producer Organizations
GoI	Government of India
ICT	Information and Communication Technology
MH	Maharashtra
MIS	Management Information System
MP	Madhya Pradesh
MP	Madhya Pradesh
NCDEX	National Commodity and Derivatives Exchange Limited
NCF	National Commission on Farmers
NCML	National Collateral Management Services Limited
NFCL	Nagarjuna Fertilizers and Chemicals Ltd.
PGDMA	Post Graduate Diploma in Management (Agriculture)
PIB	Press Information Bureau
ReMS	Rashtriya e Market Services Private Limited
RJ	Rajasthan
RTGS	Real Time Gross Settlement
SFAC	Small Farmers' Agribusiness Consortium
SMS	Short Message Service
TS	Telangana
TS	Telangana
UTs	Union Territories
WRDA	Warehousing Development and Regulatory Authority

Chapter 1

Introduction

Agricultural marketing usually refers to all the activities involved in the supply of farm inputs and output- including all those operations which are related to the procurement, collecting, grading, storing, food and agro-processing, transportation, financing, and selling of the agricultural produce. All these activities may be divided into pre-cultivation, cultivation, and post-production activities, or into input marketing and output marketing. Input marketing is mainly catered by the private sectors, while output marketing rests with the producers, viz. farmers. In India, out of 14.6 crore farmers, more than 85% are smallholders, which means they have operational land holding less than 2 hectares. In some states, like Bihar, West Bengal, and Kerala, the proportion of marginal farmers (<1.0 ha holding) is more than 80 percent. Despite this, total crop production in India has been increasing consistently. In the last 10 years (2009/10 to 2018/19), the production of foodgrains has increased from 218 mt to 285 mt, that of fruits increased from 72 mt to 99 mt, vegetables from 134 mt to 186 mt (Fertilizer Statistics, 2019). Agricultural commodity markets in India are often cited as the archetypal example of competitive markets, having many price-taking producers, and a small number of buyer-traders. The farmers, who often live in remote areas with poor infrastructure, face high transaction costs that significantly reduce their incentives for market participation especially for agricultural output markets (Barrett, 2008; Key, et al., 2000). The markets and marketing of these products has not changed efficiently so far.

The most important factor for sustained growth in agricultural productivity is the 'nature of incentives offered to agricultural producers' in agricultural markets (Bates, 2014; Schultz, 1976). If the basic problem is failure to provide proper incentives to farmers for raising agricultural productivity, then it follows that a principal source of the problem in agricultural markets lies in its institutional framework administered by the state, which determines returns to cultivators for their produce in the markets (Bates, 2014). While ability of the agricultural marketing system to bring steadiness and boost agriculture growth depends on the regulatory framework for regulations of the agricultural markets which are administered by the state government (Purohit, 2013).

Farmers in India sell their produce through brokers and commission agents mainly in distress, due to lack of market connectivity. The small & marginal farmers, with uneconomical sized marketable lots, find it difficult to sell their produce in APMC regulated market. Transportation cost is the major cost in marketing due to the distant location of the APMC mandi. Therefore, instead they sell their produce to local village traders at locally determined prices, who in turn function as aggregators transact at the APMCs. This intermediation has naturally been depriving the farmer-producers of aiming for optimal or market-linked price realization (DFI, 2017). Due to this, despite a very high marketed surplus ratio (70 to 95%) for most of the agricultural commodities, only 30% of the production of cereals, pulses, oilseeds, or vegetables are sold in APMC mandis (Annexure). Due to their high dependency on farming for their livelihood and almost negligible saving from the previous crops, they tend to sell their entire

surplus immediately after the harvest. Most of them are also inter-locked with the village traders or traders in the mandi for their financial need. These factors make them vulnerable when they arrive in the market to sell their produce. Their smaller lot size, mixed quality of produce, an urgency to sell the produce, lack of storage capacity, etc. further aggravate their bargaining position in the output market. Several studies in the past have extensively documented the insufficient infrastructure and lack of reliable information systems, and reduced market efficiency[1] and lowered farmers' incentives to specialise for market production (Lele, 1977; Rilay & Staatz, 1981; Acharya 2006; 2009). According to Chand (2016), agricultural markets are characterized by poor competitiveness, fragmentation, inefficiency, presence of excessive middlemen, and frequent price manipulations.

Agricultural commodities markets in India are regulated by the Agricultural Produce Markets Regulation Acts (APMRA) which was enacted by most of the states during the Sixties and Seventies. All primary wholesale assembling markets were brought under the ambit of these Acts. The APMRA brought radical changes and made it compulsory to sell the agricultural produce only at designated regulated markets (mandis) through registered intermediaries governed by the Agricultural Produce Market Committee (APMC). Moreover, many gains brought by APMRA to improve competitiveness among the buyers got diffused over time and market infrastructure didn't keep pace with the volume of market arrivals (Bisen and Kumar, 2018). These regulated markets became self-serving and failed in resolving the issues like; monopolization of trade by way of trading licenses to different types of middlemen, cartelization of traders, late payment to the farmers, scrupulous deductions and non-transparent system, etc. Price determination is one of the important functions of the market. The method prescribed for the sale of agricultural produce in regulated markets is mainly by open outcry auction, which is not only cumbersome but also has high scope of manipulation (Acharya and Agarwal, 2011; Chengappa, 2012). Presently, there are 7,190 regulated markets in India. Most of these markets are wholesale markets. Besides, the country has 22,505 rural periodical markets, about 20% of which function under the ambit of the regulation (GOI, 2013). The National Commission on Farmers (2007) has recommended that the facility of regulated markets should be available to the farmer within a radius of 5 km.

The Committee of State Ministers constituted for bringing reforms in marketing highlighted several basic challenges in present agricultural marketing systems (GoI, 2013). Those were: *i) Limited access to agricultural produce markets:* Ideally, a regulated market should be available to farmers within a radius of 5 km. *ii) Licensing barriers:* Compulsory requirement of owning a shop/godown for licensing of commission agents/traders in the APMC mandi led to the monopoly of these licensed traders. *iii) Lack of market infrastructure in agricultural markets:* Covered and open auction platforms exist only in two-thirds of the regulated markets, while cold storage units exist in less than one-tenth of the markets, etc. *iv) High incidence of market charges:* APMCs collect market fees ranging between 0.50 % to 2.0 % of the sale value of the produce. Besides, there are several other charges farmers are required to pay. *v) Low*

[1] Marketing efficiency can be defined as marketing of agricultural produce with minimum cost ensuring maximum share of the producer in the consumer's rupee (Acharya & Agarwal, 2009).

price realization by the farmers, vi) Long supply chain with a large number of intermediaries, vii) High marketing and transaction cost for smallholder farmers.

On the recommendation of the Expert Committee and Inter-Ministerial Task Force set up by the Ministry of Agriculture, Govt. of India, a Model Act called Agricultural Produce Marketing (Regulation & Development) Act, 2003 was enacted, though was not adopted uniformly by all the states/UTs. Other marketing systems like contract farming, direct marketing, online trading, cooperative retailing, etc. have to some extent provided alternative options for farmers. The National Commission on Farmers (NCF), constituted in 2004, had recommended a single market for farmers. The Commission also recommended that agricultural marketing be placed on the Concurrent List. Over the years, several reforms in these regulations and acts were introduced to address the anomalies and problems faced by the farmers. Like, 14 major states took out wholesale trade in fruit, vegetables, and spices from the purview of the Agriculture Produce Market Committee (APMC) framework in 2016 (Rao, 2017). The Cabinet Committee on Economic Affairs later approved the central sector scheme for promotion on the national agriculture market on July 1st, 2015. This was a big structural change in the marketing system for agricultural commodities in India. The scheme aimed at integrating all existing APMCs markets for all agriculture commodities at the national level (one nation and one market) and bring all under the Uniform Platform. The initiative was taken based on the success of the online marketing platform created in Karnataka known as ReMS[2]. The average increase in nominal price realization for the commodities due to ReMS implementation in Karnataka has been estimated to the tune of 38 per cent (Chand (2017), while the range of profit improvement for the smallholder farmers is significantly high (36 to 159%) (Levi et al., 2020).

Thus, structural changes in agricultural marketing system in India in the form of Electronic National Agriculture Market (e-NAM) initiative may prove a game-changer in the annals of agricultural marketing. The e-NAM network was officially launched on 14 April 2016. As of 1st May 2020, a total of 785 APMC mandis across 17 states and 2 union territories (UTs) are integrated into the platform. The official website of the system is http://www.enam.gov.in which updates the status of implementation of the scheme. It intends to benefit directly to the farmers by better price realization and reducing transaction cost, elimination of cartels and price manipulation by local trading groups (Chand, 2016). However, so far no systematic investigation has been conducted to examine the effectiveness of e-NAM on the smallholders' participation and price realization by the farmers due to e-NAM.

[2]The Government of Karnataka brought amendment in the Karnataka Agricultural Produce Marketing (Regulation and Development) Act, 1966 in line with the provisions of the Model Agricultural Produce Marketing Committee (APMC) Act, 2003. These amendments not only allowed for a single unified licence to traders. To implement these reforms, a Special Purpose Vehicle, Rashtriya e Market Services Private Limited (ReMS) was created. On 27 August 2010, a comprehensive auction system was developed by National Commodity and Derivatives Exchange Limited (NCDEX) to bring unified electronic platform. ReMS started transacting agricultural commodities through new platform in the year 2011.

Therefore, it was imperative to examine the evolution of the new marketing system in addressing the long-pending problems of the smallholders in the marketing of their agricultural produce. The specific objectives put forth for the study are given below:

1.1. Objectives of the Study

- To examine the preparedness of APMC mandi in adopting the e-NAM,
- To determine the extent and pattern of participation by the smallholders in the new market system,
- To estimate the benefits/ losses arising out from the participation/ not participation in the ongoing transformation in the APMC market, and
- To suggest plausible interventions to make the initiative inclusive

1.2. Limitations of the Study

The present study is based on field survey in two rounds: March 2017 and March-April 2019. It may be possible that the current situation in these e-NAM mandis may be completedly changed as compared to when the survey was conducted. Simialrly, the observations and findings may also be having the usual limitations of survey-based study. We could also not access the lot-wise transaction data in any of the e-NAM mandis visited. Further, when the project started, all the information available in public domain suggested that actual transactions were happening in e-NAM enabled mandis. However, when we conducted the survey in several mandis in different states, the sample farmers were not aware about the nuances of e-NAM. Therefore, we could not get sufficient number of farmers who had sold their commodities through e-NAM to compare with those of non-e-NAM to compare the benefits realised by the farmers due to e-NAM. This also led to another issues of assessing how these mandis were helpful for smallholder farmers in reducing the market and price risks.

Chapter 2
Data and Methodology

This study is mainly based on both primary and secondary data. The study dwells into the changes brought about by the e-NAM scheme in the selected markets. It mainly focuses on the perception, challenges, and benefits of smallholders associated with the participation in the new market regime. The study was initiated in April 2017 and was aimed to conclude in March 2019. However, with several ongoing initiatives and inclusion of new APMC mandis into the fold of the e-NAM network, the study was extended for one more year to examine different dimensions of e-NAM. Thus, the project pertains to a period of 3 years, 2017-2020. Both primary data, as well as secondary data, were used for the purpose, which are being discussed in detail.

2.1 Primary data collection

There are several stakeholders in the new regime of agricultural marking. Accordingly, a survey was conducted of various stakeholders namely, farmers, traders and commission agents. Additionally, mandi officials were also interviewed for gaining insight on the implementation status of APMCs.

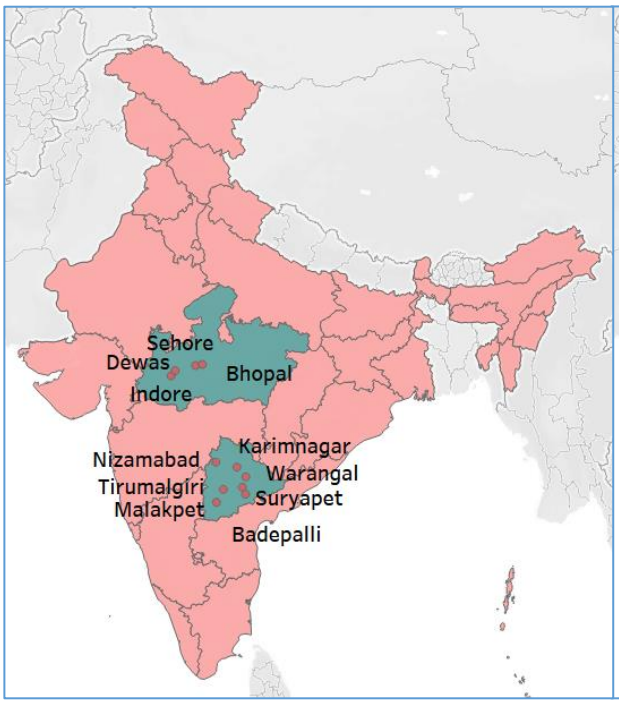


Fig. 2.1: APMCs visited during first round of survey

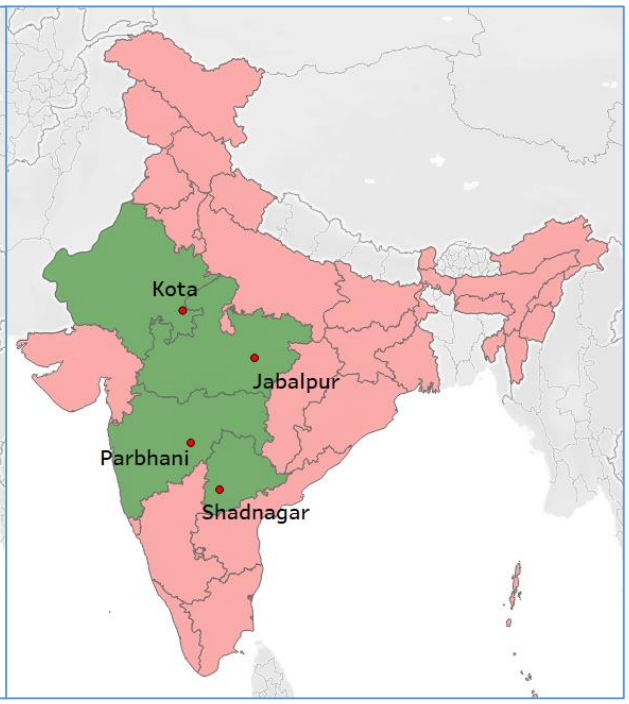


Fig. 2.2: APMCs visited during second round of survey

The survey was undertaken in two rounds. **First-round** was conducted in the states of **Madhya Pradesh (MP) and Telangana (TS) during April-May 2017**. These were considered as frontrunner states where e-NAM was implemented during the first phase in 2016. As it was only one year of implementation in the APMCs during the first round, not many changes were observed during the survey. Therefore, the **second round** of the survey was planned during **January-April 2019 in selected APMC mandis in four states viz. Madhya Pradesh (MP), Maharashtra (MH), Rajasthan (RJ) and Telangana (TS)**. During the second round, Maharashtra state was added, as the state was ranked number one in terms of agricultural marketing and farmers' friendly reform (Annexure I). Besides, Rajasthan was also added in the second round, as news reports were indicating better implementation of e-NAM in Rajasthan state.

2.2 Sampling procedure and sample size

During the first-round survey, from the news reports, it was assumed that all the needed procedures of the e-NAM have been implemented in the onboarded APMC mandis, therefore, a random selection of e-NAM mandis and sampling of farmers in the respective mandis were done. However, during the second round, a cluster sampling procedure was adopted for the primary survey. The lead from the market yard obtained from market functionaries was used to select the clusters.

Table 2.1. Multistage sampling criteria followed during the primary survey

Stage	Sampling category	Method	Remarks
First	States	Purposive	Selection based on implementation of eNAM
Second	e-NAM mandi	Random (First round)	Among all APMC mandis included in the e-NAM network in the year 2016.
		Purposive (Second round)	From each selected state, only one major e-NAM mandi with a good volume of trade on both the platform- e-NAM and offline was selected due to constraints in time and resources.
Third	Farmers	Random (Survey round-I)	- Farmers who visited the selected e- NAM mandi (Survey round I)
		Random (Survey round-II)	- Cluster of 2-3 villages spread over a radius of 50 Km around each selected e- NAM mandis
	Traders/ Commission agent	Random	Focussed Group Discussion with 3-4 traders/ commission agents
	APMC officials	NA	Few (1-2) Mandi officials depending on availability from each sampled APMCs

Primary data collection: The survey of the farmers was accomplished using a pre-tested semi-structured survey schedule developed for the purpose, while FGD (Focus Group Discussion) was conducted with traders/commission agents. The information from mandi officials were gathered by informal conversation.

Table 2.2. Sample size of different stakeholders during both round of surveys

State	**APMC Mandis**	**First Round**		**Second Round**	
		Farmers	**Trader/CA#**	**Farmers**	**Trader/CA**
Madhya Pradesh	Bhopal Indore Sehore Dewas	96	22		
	Jabalpur*			121	4
Maharashtra	Parbhani*			110	3
Rajasthan	Kota*			118	5
Telangana	Malakpet Karimnagar Thirumulagiri Nizamabad Warangal Suryapet Badepally	94	60		
	Rangareddy*			97	4
Total		**190**	**82**	**446**	**16**

#Commission Agents

*During the second round of the survey, the district was selected in the respective state and major APMC mandi in that district was selected for the study.

As Table 2.2 indicates, during the first round of the survey, a large number of e-NAM mandis were selected for the study. We deployed PGDMA students of the Academy for the conduct of the survey in these mandis, and the study became part of their final project. The survey was conducted during March-April months of 2017. However, the experiences and observation from the first round of the survey gave the impression that the implementation of e-NAM in all these selected mandis is still at a nascent stage. Therefore, it was decided to revisit in limited mandis in these states. We also changed our approach to selecting farmers in the second round. Instead of surveying the farmers in mandis, we selected one district with major e-NAM mandi in 4 states-Madhya Pradesh, Maharashtra, Rajasthan, and Telangana. In each district, a cluster of villages was selected around the e-NAM mandi. The farmers in these villages were selected randomly to know about their awareness level, perception, and participation in the e-NAM.

Secondary data collection: Apart from primary survey, extensive secondary data was collected mainly from the following two websites:

https://agmarknet.gov.in/

https://www.enam.gov.in/

These websites were used to harvest details like daily arrivals, peak prices, and other trading details of commodities traded in the APMCs selected for the primary survey. Initially, unit-level transaction data was collected from some of the e-NAM mandis in 2017 through mandi officials. However, that data was quite inconsistent, which may be due to the initial implementation of e-NAM. Thereafter, transaction data from the e-NAM portal and Agmarknet were collected during April 2020 after harvest of rabi season. Although, March-April 2020 is a special situation due to country-level lockdown announcement by the Government of India to contain the spread of Coronavirus (Covid-19). However, the central as well as the state government has given relaxation to agriculture-related activities including crop harvesting and marketing (GoI, 2020).

The Agmarknet provides electronic connectivity to more than 3200 wholesale markets (APMC mandis) of the country. More than 2700 markets report market data related to about 350 commodities and 2000 varieties at the Agmarknet portal regularly. The scheme is being implemented by the Directorate of Marketing & Inspection (DMI), Government of India in association with the State Agricultural Marketing Boards/Directorates and APMCs. For the study, market arrival and traded price of different agricultural commodities in mandis of selected states have been collected for the April month of the year 2020 to compare with that of the e-NAM portal.

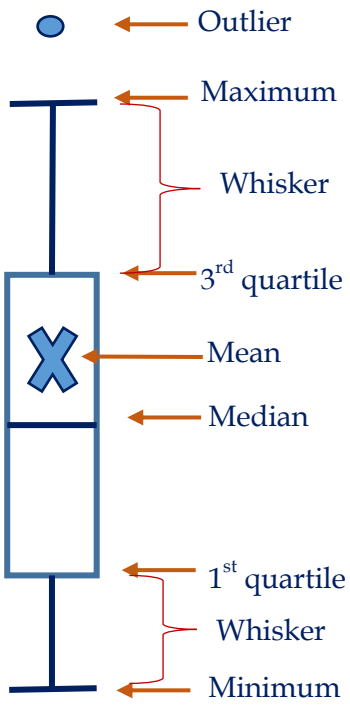
The live trade data of different agricultural commodities in the selected e-NAM mandis in the states of Maharashtra, Punjab, Rajasthan, and Uttar Pradesh was also collected from e-NAM portal for April month 2020. During this period, no e-NAM mandis were trading live in Telangana state, while very few commodities in few mandis of Madhya Pradesh were showing live trading. Therefore, live trading data couldn't be collected from these two states, which were our original states of interest in the study. For the same period, arrival and price data for different commodities in these markets were also collected from agmarknet.gov.in which reports total commodities traded in the respective mandis.

2.3 Data Analysis

The data collected from both the primary survey and secondary sources were analyzed using descriptive statistics viz. percentage, mean, range and standard deviation.

Box and whisker charts have been used to present the comparison between eNAM and Non-eNAM model prices. The chart shows the variability of a data set using minimum value, maximum value, and quartiles of the data set. The following are presented in the chart:

a) Interquartile range- The middlebox represents the middle 50% data
b) 3rd quartile- 75% data falls below the 3rd quartile
c) 1st quartile- 25% data falls below the 1st quartile.
d) Outlier- Outliers are plotted as individual points. These differ significantly from other data
e) Whisker- These represent variability outside the 1st and 3rd quartile



An independent sample t-test has been used to test the difference in mean value of average daily modal price (ADMP) under eNAM and non-eNAM for major commodities. The test compares the means between two unrelated groups on the same continuous, dependent variable. It follows the following six assumptions:

a) The dependent variable should be measured on a continuous scale.
b) The independent variable should consist of two categorical, independent groups.
c) There is no relationship between the observations in each group or between the groups themselves.
d) There should be no significant outliers.
e) The dependent variable should be approximately normally distributed.
f) There needs to be a homogeneity of variances.

Levene's Test for Equality of Variances is also measured as a part of the t-test. The test assesses the equality of variances for a variable calculated for two or more groups.

Chapter 3

e-NAM Implementation in India

Agriculture and agriculture marketing are state subjects, thus is administered by the respective states as per their agri-marketing regulations through Agricultural Produce Marketing Committee (APMC). However, this regulation hinders the free flow of agri-commodities from one market area to another even within the state. Subsequently, multiple handling of agri-produce and multiple levels of mandi charges ends up escalating the prices for the consumers without commensurating benefits to the farmers. Over the years, several market reforms were introduced, though mostly led to cosmetic change only. In 2003, the Government of India formulated the Model Agricultural Produce Marketing Committee (Model APMC) Act and advised the states to implement it to remove the obstacles faced by the farmers in the agricultural market to sell their farm produce. Several innovative initiatives were suggested under this, like allowing private markets, promotion of contract farming, etc. However, the acceptance and adoption of the Model Act remained patchy and uneven across the states. Therefore, in the budget of 2014, the Government of India announced the need to create a National Agriculture Market and approved a Central Sector Scheme for "Promotion of National Agriculture Market" on 1st July 2015 with a budget allocation of ₹200 crores (PIB, 2015) The scheme envisaged the deployment of a common e-market platform in 585 selected regulated wholesale agriculture markets by March 2018. The common e-market portal was called e-NAM.

Among various factors, traditional agricultural markets in developing countries has been one of the major factors affecting farmers' income. Integrating geographically distant markets within a common platform is expected to increase market competition, enable transparency of the price discovery process, and ultimately, improve farmers' profitability (Levi et al, 2020). The e-NAM intended to promote uniformity, streamlining of procedures across the integrated markets, removes information asymmetry between buyers and sellers and promotes real-time price discovery, promotes transparency in the auction process, and access to a nationwide market for the farmer. The Ministry of Agriculture & Farmers' Welfare, Govt. of India has appointed Small Farmers' Agribusiness Consortium (SFAC) as the lead implementing agency which maintains the eNAM platform with the help of M/s. Nagarjuna Fertilizers and Chemicals Ltd. (NFCL), as Strategic Partner.

3.1 Onboarding of APMC mandis on e-NAM platform

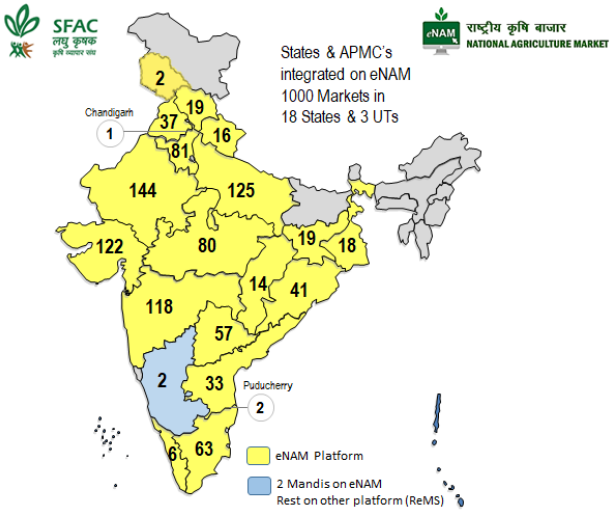
There are about 7200 APMC mandis in India. Bringing all to the e-NAM platform in a single stroke is a humungous task. Therefore, the Government of India (GoI) incentivized the states to onboard select mandis according to their preferences. Three conditions were given to the state for inclusion of mandis into e-NAM, on acceptance

of which the GoI made provision of grant of ₹30 lakhs for each mandi for modernization facilitating e-NAM implementation. Those were:

(i) State government should ensure a single trading license to be valid across the state,

(ii) Single point levy of market fee in the state, and

(iii) Provision for electronic auction as a mode for price discovery.



Stakeholders on board (as on 30.04.2020)	
States/UTs	21 (18+3)
Traders	1,28,478
Commission Agents (CAs)	70,969
FPOs	1,005
Farmers	1,66,18,683
Total	**1,68,19,135**

Fig. 3.1: State-wise number of APMC mandis integrated to e-NAM platform and different stakeholders registered

Accordingly, e-NAM was launched on 14th April 2016 initially connecting 21 mandis in 8 states (Gujarat, Telangana, Rajasthan, Madhya Pradesh, Uttar Pradesh, Haryana, Jharkhand and Himachal Pradesh) for 25 commodities including wheat, maize, pulses, oilseeds, potatoes, onions, and spices. Later, 2 mandis of Haryana- Shahabad and Ambala were integrated from June 1st, 2016. As of May 1st, 2020, a total of 785 APMC mandis across 17 states and 2 union territories (UTs) are integrated into the platform (Fig 3.1). It may be noted that in Karnataka state, there is a separate Unified Market Platform called ReMS that has been in operation since the year 2014. Recently, two mandis from ReMS have also been integrated with the e-NAM platform, thus opening a new vista of inter-operability between two different platforms. Currently, about 1.7 crore farmers and 942 farmer producer organizations (FPOs) are registered on the platform, which means that many farmers might have transacted through e-NAM at least once in the last 4 years. Entire transaction proceeds are facilitated by about 1.3 lakhs traders and about 71 thousand commission agents registered on e-NAM across these mandis. As of 30 April 2020, total trade volume of 3.41 crore metric tonnes & 37 lakh numbers (Bamboo & Coconut) collectively worth approximately ₹ 1.0 lakh crore have been recorded on eNAM platform (PIB, 2020).

Table 3.1: State-wise number of registered traders and unified licenses issued (as on 3rd May 2020)

S. No.	Name of State/ UT	*Mandis registered on eNAM	Registered stakeholders on e-NAM			
			Traders	CAs	FPOs	Farmers
1.	Andhra Pradesh	33	3,066	2,253	101	14,33,597
2.	Chandigarh	1	63	59	0	7,106
3.	Chhattisgarh	14	3,039	227	8	1,34,964
4.	Gujarat	122	9,040	6,719	24	8,65,154
5.	Haryana	81	10,091	21,398	84	27,17,486
6.	Himachal Pradesh	19	1,945	1,101	41	1,20,623
7.	Jharkhand	19	1,906	0	24	1,93,620
8.	Karnataka	2**	n.a.	n.a.	n.a.	n.a.
9.	Madhya Pradesh	80	20,260	7	23	30,11,446
10.	Maharashtra	118	16,869	13,456	230	11,61,382
11.	Odisha	41	801	0	26	55,516
12.	Puducherry	2	133	0	0	12,386
13.	Punjab	37	1,393	5,267	2	2,10,498
14.	Rajasthan	144	11,762	5,187	108	13,06,241
15.	Tamil Nadu	63	2,276	4	89	2,05,528
16.	Telangana	57	5,379	4,177	54	18,15,588
17.	Uttar Pradesh	125	33,451	8,444	91	32,97,728
18.	Uttarakhand	16	4,631	2,578	14	53,490
19.	West Bengal	18	2,373	92	86	16,330
Total		1000	1,28,478	70,969	1005	1,66,18,683

CAs= Commission Agents; n.a.= Not available

*As on 15th May 2020;

**ReMS in Karanataka. 2 ReMS mandis got integrated with e-NAM in May 2020.

From Table 3.1, it may be observed that so far 21 percent of registered traders on e-NAM have unified license, who can trade across the mandis within their respective states. Among all the 18 states/UTs, 4 states- Odisha, Rajasthan, Telangana, and Uttarakhand have given unified licenses to all the registered traders. Besides, Andhra Pradesh has also issued unified licenses to about 80 percent of the registered traders. On the other hands, states like Gujarat, Haryana, Madhya Pradesh, Maharashtra, and Uttar Pradesh have 50 to 100 e-NAM mandis with a very high number of registered traders, but there is a dismal performance in terms of issuing unified licenses, which would defeat the purpose better price discovery for the farmers' commodities.

3.2 Innovations and initiatives in e-NAM

Since the launch of e-NAM in the year 2016, several initiatives were taken to improve the conduct and functions of these e-NAM mandis. Efforts are being put to make the

e-NAM platform more inclusive, transparent, easy, and progressive. The ongoing COVID-19 pandemic (since January 2020) has also pushed for some of the changes, which may have far-reaching implications to take the business forward. For example, the Government of India announced complete lockdown in the entire country since 25th March 2020 in two phases, which is expected to end on 3rd May 2020 selectively, depending upon the severity of the positive cases in the given district of any state. During this lockdown, complete transportation and supply chain came to standstill. Labours working in different industries and urban areas started moving back to their native place. These created a huge labour shortage in the agricultural mandis as well. Although, the government has relaxed the movement of vehicles and operations for essential services including handling of agricultural commodities. But, it is at a much lower level than the normal period. Under such circumstances, the e-NAM has taken some proactive measures like declaring WRDA registered warehouses as the market place, so that the farmers need not to transport the commodities stored in these warehouses to market. Instead, information of these commodities can be uploaded on the e-NAM portal and the traders/buyers can lift the commodities from the warehouse directly. The e-NAM has also initiated to bring transporters and logistic service providers on board to facilitate the transaction. Another important step taken was- the collection centres of FPOs were also declared as market place to reduce the transportation cost for the farmers. These initiatives though are taken under special circumstances (COVID pandemic), however, being proactive measures may be continued after the pandemic as well. The chronological development of e-NAM in brief is given in Table 3.2.

Table 3.2: Chronological development on e-NAM

Date	Event
April 14, 2016	• Launch of e-NAM • Commencement of e-NAM connecting 21 mandis in 8 states
June 2016	• 2 more mandis from Haryana integrated to e-NAM
November 2016	• 250 mandis across 10 State and 64 commodities has been integrated.
March 2017	• 417 APMC mandis in 13 states were integrated
March 2018	• 585 mandis across 18 states were integrated.
January 2019	• Govt of Rajasthan notifies the conversion of all existing traders licenses of e-NAM Mandis to unified license with effect from Jan 20, 2019. • e-NAM reported first inter-state trade through e-NAM. A farmer from Haldwani in Uttarakhand sold his tomato crop to a trader in Bareilly in Uttar Pradesh. • Similar, inter-State transactions between e-NAM mandis in Uttarakhand and Uttar Pradesh in potatoes, brinjal and cauliflower have also commenced.

February 2019	• Government plans to link 22,000 mandis (rural markets) including all 7,500 APMCs mandis with the e-NAM platform by 2022.
March 2019	• The shopping cart is introduced in e-NAM. Traders can create a temporary list of lots from within/different mandis by adding them to cart, so that they can bid in bulk. • Discount in mandi fee to traders was introduced for making e-payment to the farmers. • Bunching of selected invoices for a single payment was introduced. It is applicable for inter-mandi and inter-state invoices also. • Unified trading license system for inter-state introduced.
June 2019	• A new version of e-NAM portal e-NAM 2.0 was launched, which included a mobile app, WDRA integration, multi-lingual facility, inclusion of shopping cart, merging invoices, traders' incentives on trading through e_NAM, interstate trade, logistics portal, FPO module
July 2019	• 150 commodities were included on e-NAM
August 2019	• The government of Andhra Pradesh state and Telangana state declare WDRA registered CWC warehouses in the state as a market. Farmers can sell their products through e-NAM directly from the warehouse.
April 2020	• Covid-19 makes way for the new normal. Direct marketing from farmers/group of farmers/ FPOs, etc. allowed by bulk buyers/ processors/big retailers, etc. • Official launch of Warehouse (e-NWR) based trading on eNAM from WDRA approved warehouses. • FPOs can upload their produce for their collection centres for bidding through e-NAM without bringing to the mandis.
May 2020	• Integration of 200 more mandis across 7 states with e-NAM on 1st May 2010, taking the total tally to 785 e-NAM enabled mandis. • 117more mandis integrated with the e-NAM platform on 15th May 2020➔ 962 e-NAM mandis. • Integration of e-NAM with the Unified Market Platform (UMP) of Karnataka's Rashtriya e-Market Services (ReMS). • 38 new mandis integrated on the e-NAM platform on 15th May 2020, totaling **1000 e-NAM mandis** in India.

Source: https://enam.gov.in/web/events

3.3 Process flow on e-NAM platform

As shown in figure 3.2, all the e-NAM mandis have been mandated to have computerized registration of farmers and lot entry ID generation at the gate entry level itself. For each lot of the produce, the farmer brings to the mandi, a unique ID is generated. The unique ID contains a farmer name, produce, quantity, etc. With unique

ID, farmers go to the auction hall, where samples are collected for assaying. After quality checks, information is entered into the e-NAM portal. Buyers or traders who want to buy the farmers' produce are required to get a license by mandi officials. Mandi officials will give username and password and the license that is issued to them is applicable at the national level. Before bidding traders are required to keep some security money in the bank. Traders can bid the required commodity by using mobile apps or computer kiosks that are available in the market. After bidding, the farmer/seller requires to give acceptance for the bid. The farmer has the option to reject or accept the bid, if rejected then the second round of bidding takes place. After acceptance, the weighment of the commodity will be done. All weighments should be integrated with the main computer, so that records can be kept in the portal with a separate unique ID. After completion of weighments sale receipt is generated and given to the farmers by mandi officials. The money is transferred to the farmer through RTGS on the same day/next day.

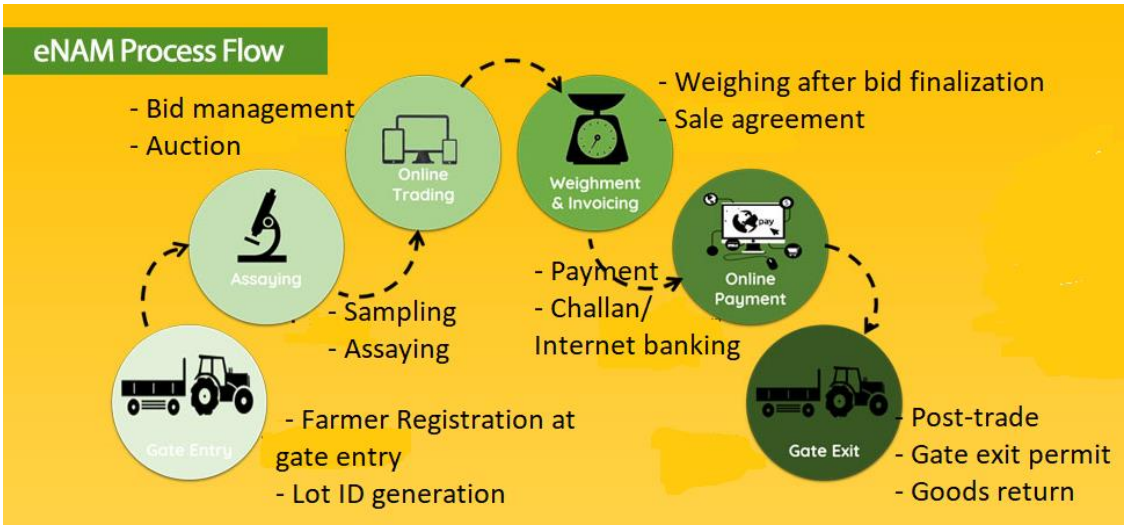


Fig. 3.2: Process flow of e-NAM mandi

3.4 Coverage of commodities under e-NAM

The e-NAM intends to facilitate the trading of agricultural commodities based on quality. As the process flow in the preceding section exhibits, the commodity lots once enter into the mandi, first and foremost activities are taking samples and conducting quality assessment, based on which the lots can be categorized and placed on the e-NAM portal for bidding purposes. Moreover, e-NAM has identified a total of 150 agricultural commodities to be traded through e-NAM. The complete list is given in Annexure IV. The list includes 25 types of cereals and pulses, 13 types of oilseeds, 29 types of fruits, 40 types of vegetables, 14 types of spices, and the remaining 29 types of commodities under the miscellaneous category. The exhaustive list includes almost all types of agricultural commodities- from green leafy vegetables to tender coconut and flowers like gladiolus and carnation.

A detailed list of quality parameters for all 150 commodities has been given on the e- NAM portal, which can be accessed at https://enam.gov.in/web/docs/Quality_Parameters_150_commodities.pdf

For all the commodities, essential and optional quality parameters have been given. For instance, in case of cereals, essential parameters to be measured are moisture, foreign matter, admixture/ other edible grains, immature & shriveled grains, damaged/ discoloured grains, weevilled grains; while optional parameters are uric acid content, aflatoxin, protein content, minimum test weight, etc. These parameters vary from commodity to commodity. As per the e-NAM norms, samples shall be drawn from each lot of the commodities. Sampling methods are also given in the instruction. A snapshot of quality parameters for a specific range of major commodities (cereals, pulses, fruits, vegetables, etc.) is given in Annexure V. The quality assaying shall be done in the lab set up at the mandi, and as per the quality

Box 1. Sampling methods recommended for assaying

For all the commodities, different sampling methods have been recommended by e-NAM. Sampling starts as- 5 % or minimum one container shall be randomly selected for sampling. Therafter, further sampling should be done from the selected container.

Foodgrains:
(i) 250 gm shall be drawn from each selected container and shall be mixed homogenously, called as primary sample, and (ii) 250 gm shall be drawn from primary sample called as Laboratory sample.

Fruits:
(i) 5 (10 for mango) Nos shall be drawn from each selected container and shall be mixed homogenously, called as primary sample; (ii) 5 (10 for mango) nos. shall be drawn from primary sample called as Laboratory sample.

TOP Vegetables: (Tomato, Onion & Potato)
(i) 1 Kg shall be drawn from each selected container and shall be mixed homogenously called as primary sample, (ii) 500 g shall be drawn from primary sample called as Laboratory sample

Vegetables like bottle gourd, cucumber, bitter gourd, brinjal, cabbage, cauliflower, etc.
(i) 5 Nos (for bottle gourd, ridge gourd, radish, cucumber, cabbage, cauliflower, etc.) or 10 Nos (for bitter gourd) or 15 No. (for brinjal, carrot) shall be drawn from each selected container and shall be mixed homogenously, called as primary sample (ii) All the primary samples shall be checked for the assaying.

Leafy vegetables (Spinach, Coriander leaves), green chillies, etc.
(i) 500 g shall be drawn from each selected container and shall be mixed homogenously called as primary sample. (ii) 100 g (500g for spinach) shall be drawn from primary sample called as Laboratory sample

Source: https://enam.gov.in/web/docs/Quality_Parameters_150_commodities.pdf

assessment, the lots shall be categorized into 3 range- Range 1 for the best quality and Range 3 for low quality.

It is also made mandatory that all the lots should have a minimum quality standard which shall be assured by the farmer-sellers, like all the foodgrains should be clean, wholesome, reasonably uniform in size, shape, and colour characteristic to the variety; free from obnoxious smell and fungus infestation. Similarly for fruits and vegetables, it should be intact, firm, clean, of reasonably uniform size & shape, color (Red/Yellowish/Pinkish Green/Greenish Red) characteristics to the variety, and free from bruises, soft patches, insect/mechanical injury, visible disorders, fungal infestation. The assayer is also supposed to mention the name of the Variety of each lot and upload the photo of the lot on the portal.

3.5 Inter-state trading license and inter-state trade on e-NAM

The-e-NAM is expanding the base of buyers through inviting traders from other mandis within the state as well as from other states. For this, e-NAM in consultation with the respective state government initiated the process of issuing inter-state trade licenses to the traders. So far, the application of 32 traders from 4 states have been approved for inter-state trade. Maximum number of traders from Telangana state has got the license to trade in 6 other states (Table 3.3). This may be the beginning, as several applications from many other states have been rejected. Though, the reasons for rejection are not reported in the e-NAM portal.

Table 3.3: Inter-state licenses approved to the traders till 31st January 2020

From state	Licensed approved for the states							Grand Total
	Andhra Pradesh	Madhya Pradesh	Maharashtra	Punjab	Rajasthan	Telangana	Uttar Pradesh	
Andhra Pradesh						1		1
Madhya Pradesh					3	1	3	7
Rajasthan		2		2				4
Telangana	6*	1	9		2	2		20
Grand Total	**6**	**3**	**9**	**2**	**5**	**4**	**3**	**32**

Source: https://enam.gov.in/NAMV2/home/interstateTrade/StateLicense.html
Note: * License for 2 traders are still pending for approval

3.6 Live e-NAM mandi and Live trading on e-NAM portal

According to the Report of Committee on Doubling Farmers' Income, Vol. IV (2017), some key features that e-NAM must have to realize the intended potential are:

- Auction of the produce takes place simultaneously in the same electronic platform in all the onboarded regulated markets (APMC markets) in the country.

- Every regulated market is supported by infrastructure for quality assaying of the produce. Harmonized standards & grades are accepted across markets, to allow seamless trade across platforms.
- The collection of sale proceeds from the buyer and remit it to the bank account of the seller is facilitated by the market.
- Restrictions in the transportation of the commodity are removed. A buyer, irrespective of his location, can participate in any market of choice. The required agri-logistics infrastructure for storage and transportation is put in place.
- The institution of an agency to support inter-mandi trade, as also the dispute resolution mechanism is in place.

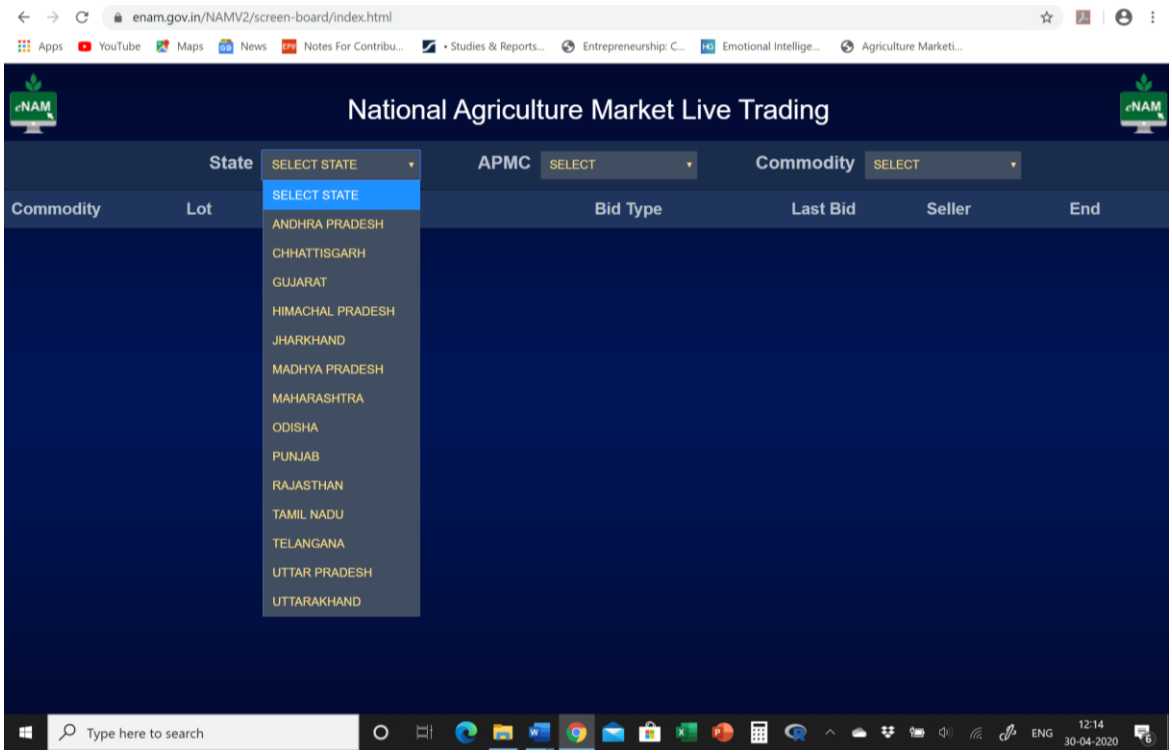
Keeping the above points in view and as per industry standard procedures in other e-trading platforms like NCDEX eMarkets Limited and ReMS (Rashtriya eMarket Services Pvt. Ltd) in Karnataka, all the integrated markets must be live during trading hours, irrespective of available farmers selling the produce. Without having real-time information simultaneously in different markets, the price discovery can not be possible in an efficient manner. This is one of the major challenges e-NAM is currently facing. Fig 3.3 shows the actual number of e-NAM mandi available for live trading on 30th April 2020 at 12:14hrs. Two different locations on the e-NAM portal are showing two different information about the number of live mandis.

Fig 3.3A exhibits 151 mandis out of 841 e- NAM mandis across 15 different states/UTs doing live trading at the given time. However, when we visited the live trading platform (Fig 3.3A), not only some of the states were different (as Uttar Pradesh and Uttarakhand are not shown in Fig 3.3A), but also the number of live mandis in those states were very different. As can be seen from the right sidebar in Fig 3.3A, only 56 mandis were seen live including those in Uttar Pradesh and Uttarakhand states. The name of the live mandis observed in some of the major states is given in Annexure-VII. **Such mismatch in information and non-availability of all the mandis simultaneously on the Live Trading platform may defeat the purpose of e- NAM of providing uniform national trading platform**. In such cases, inter-mandi bidding may also be a difficult proposition for the traders who might be looking for specific commodities and could have offered better prices to the seller-farmers. The existing system again would encourage trading done by the local traders, which may continue to form a cartel to manipulate the price.

No. of Mandis doing online trading — LIVE

State	No. of APMC	Mandis doing Online Trade	No. of mandis showing live trade at that time
ANDHRA PRADESH	33	11	2
CHANDIGARH	1	1	NS
CHHATTISGARH	14	9	4
GUJARAT	121	7	2
HARYANA	81	2	NS
HIMACHAL PRADESH	19	10	3
JAMMU AND KASHMIR	2	0	NS
JHARKHAND	19	6	2
KARNATAKA	2	0	NS
KERALA	6	0	NS
MADHYA PRADESH	83	13	0
MAHARASHTRA	116	14	3
ODISHA	41	7	1
PUDUCHERRY	2	1	NS
PUNJAB	37	5	4
RAJASTHAN	144	48	18
TAMIL NADU	63	16	2
TELANGANA	57	1	1
Total	841	151	**56**
			11 (UP)
			3 (UK)

A. Number of mandis doing online trading



B. States showing their e-NAM mandi trading live

Fig. 3.3: Screenshots showing number of e-NAM mandis live trading

Source: https://enam.gov.in/web/mandis-online (accessed on 30.04.2020 at 12:14hrs)

Table 3.4: Opening and closing time of trade in different mandi for different commodities (as on 17-18 Apr 2020)

State	Mandi	Commodities	Opening time	Closing time*
Maharashtra	Akola	Bengal gram, Red gram (Tur)	10:30 hrs	13:30 hrs
	Nasik	Pomegranate Onion Red	13:10 hrs 15:30 hrs	17:00 hrs 17:24 hrs
Punjab	Mansa	Cotton	13:00 hrs	19:36 hrs
	Patiala	Potato Kinnow	12:10 hrs 15:00 hrs	16:26 hrs 16:22 hrs
	Amritsar	Paddy-Basmati 1121	13:00 hrs	16:55 hrs
Rajasthan	Atru	Bengal Gram, Mustard, Wheat	11:45 hrs	17:42 hrs
	Bundi	Bengal Gram, Lentil Mustard Wheat	14:00 hrs 15:00 hrs 16:00 hrs	14:46 hrs 16:00 hrs 17:00 hrs
	Sri Madhopur	Bajra-Hybrid, Barley, Bengal gram, Guar seeds, Mustard, Taramira	12:30 hrs	15:00 hrs
	Kota	Wheat, Mustard	15:30 hrs	16:00-17:00 hrs
	Sriganganagar	Barley	16:50 hrs	18:50 hrs
Uttar Pradesh	Akbarpur	Green vegetables (several types)	11:45 hrs	12:31 hrs
	Sitapur	Wheat	11:45 hrs	13:15 hrs

*As indicated on the Live trade site. If trade doesn't close or more lots are entered, the bidding time is extended till mandi is open.

3.7 Daily transaction through e-NAM in major mandis, 2017

The daily transaction of different commodities in e-NAM mandis are recorded and displayed on the e-NAM portal. During the initial period, mandi-wise complete transaction details were made available, however, now the transaction details for the past one week is only kept for the general public. Accordingly, we harvested the transaction data for the period **January-December 2017** for all the e-NAM mandis and all commodities and examined the reported transaction details for major commodities in major mandis for 4 states- Madhya Pradesh, Maharashtra, Rajasthan and Telangana. The portal displays data as date, state, APMC, commodity type, minimum price, modal price, maximum price, arrival quantity (quintal), and traded quantity (quintal).

3.7.1. e-NAM transaction in Madhya Pradesh state

There were 58 APMC mandis registered on e-NAM in Madhya Pradesh in the year 2017. As per the reported transaction on e-NAM, these mandis altogether handled 48 types of different commodities (including different varieties of the same commodity).

There were a total of 15,000+ daily records[1]. Out of the total volume of transactions (3.23 lakh quintals), about **61 percent was handled by 15 e-NAM mandis** only, while another 31 percent volume was transacted at 21 e-NAM mandis together and rest 22 mandis handled only 8 percent of commodities (Fig 3.4).

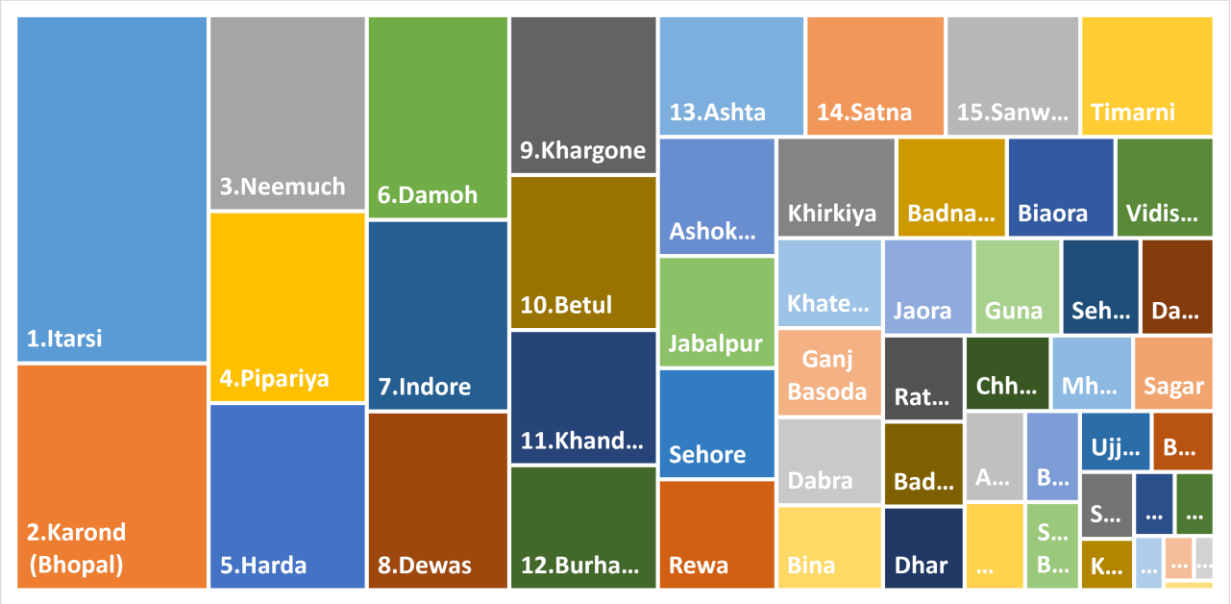


Fig. 3.4: e-NAM mandis in Madhya Pradesh according to commodity transaction in 2017

In these 15 mandis, 6 commodities (Chana/Bengal Gram, Tur/Red Gram, Masoor/Lentil, Soybeans, Wheat, and Urad/Black Gram) together constituted more than 3/4th or 75 percent of total transaction on e-NAM platform in the state (Fig 3.5).

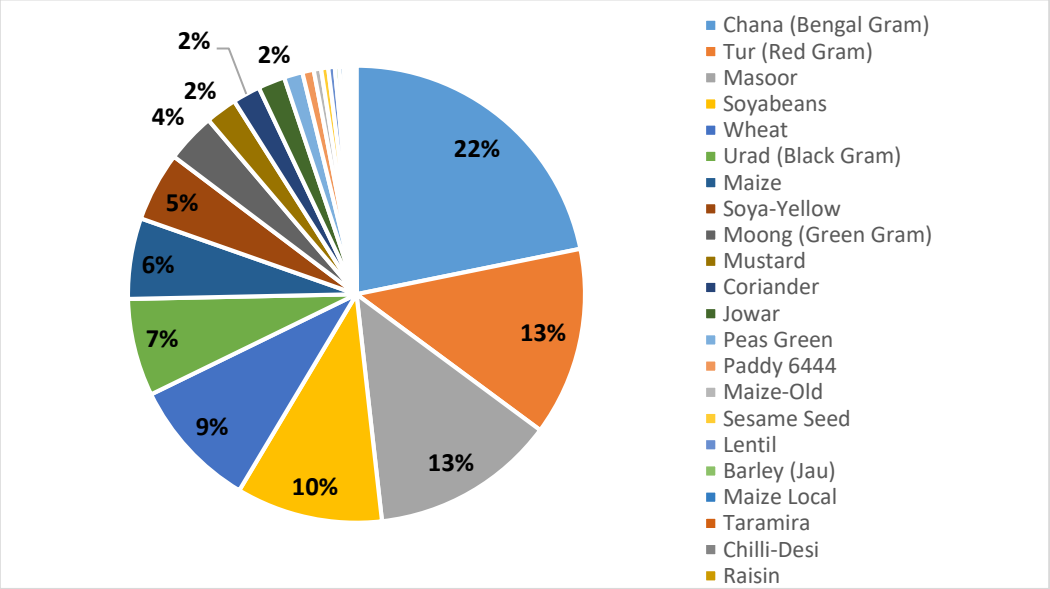


Fig. 3.5: Share of different commodities transacted in the top 15 e-NAM mandis in Madhya Pradesh, 2017

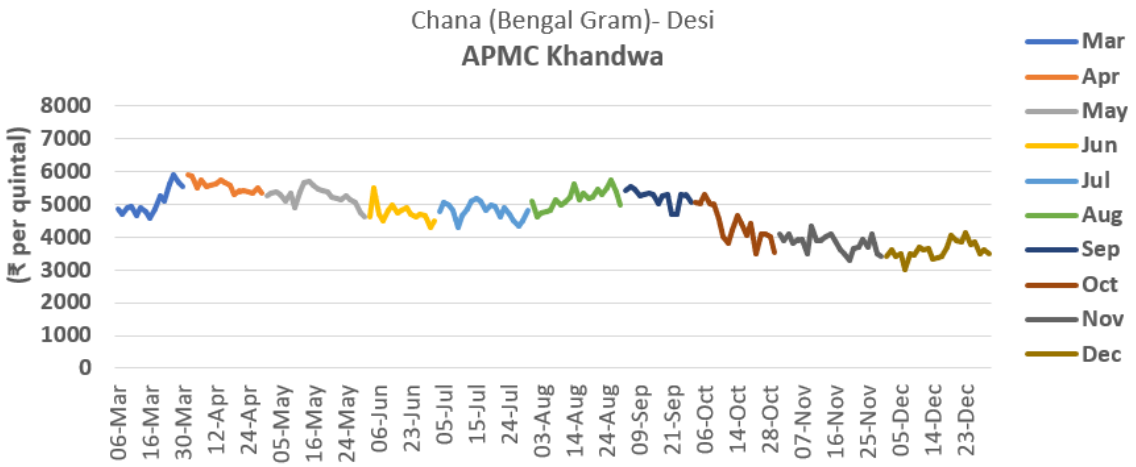
[1] There were 13 records showing huge difference between traded and arrival quantity (>500 or <-500 quintals). Those records were removed from the analysis.

When the transaction pattern of these major traded commodities was analyzed, it was observed that 5 e-NAM mandis handled about 34% of the total transaction of Chana/Bengal Gram on the e-NAM platform in the state (Table 3.5). Each of these mandis had a different quantity of monthly transactions. While 3 states transacted the highest quantity in March month, APMC Ashoknagar received the highest arrival in October month.

Table 3.5: Monthly transaction of Chana (Bengal Gram) in top 5 mandis, 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Grand	Trend
Khandwa			746	657	1028	595	564	643	184	356	517	730	6020	
Itarsi			1443	955	953	185	281	388	205	332	545	429	5716	
Dewas	132	674	743	560	691	192	536	402	335	475	407	445	5592	
Burhanpur			1697	1030	848	700	502	240	178	83	52	52	5382	
Ashoknaga	36	69	379	41	175		30	537	946	1189	1137	622	5161	

In these 5 markets, the daily price movement was quite different. There was huge variability in modal price every month in Dewas and Itarsi markets, while all the markets observed decline in modal price after October month onward. Although traded quantity during the last quarter was comparatively lower than the first quarter of the year (Fig 3.6). This is an interesting trend in the price as during harvest time (March-April), the modal price is higher than the sowing season (October-November). The minimum support price (MSP) for Chana/Bengal Gram was ₹4000/q and ₹4400/q in 2016-17 and 2017-18, respectively.


Chana (Bengal Gram)- Desi
APMC Khandwa
(₹ per quintal)
8000
7000
6000
5000
4000
3000
2000
1000
0
06-Mar
16-Mar
30-Mar
12-Apr
24-Apr
05-May
16-May
24-May
06-Jun
23-Jun
05-Jul
15-Jul
24-Jul
03-Aug
14-Aug
24-Aug
09-Sep
21-Sep
06-Oct
14-Oct
28-Oct
07-Nov
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Mar
Apr
May
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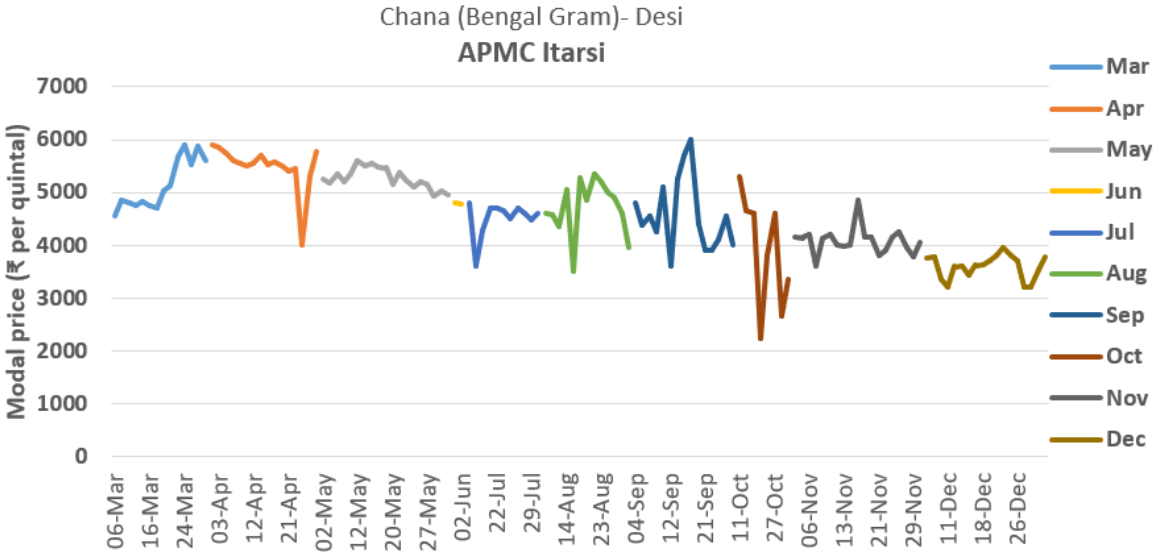
Oct
Nov
Dec


Chana (Bengal Gram)- Desi
APMC Itarsi
Modal price (₹ per quintal)
7000
6000
5000
4000
3000
2000
1000
0
06-Mar
16-Mar
24-Mar
03-Apr
12-Apr
21-Apr
02-May
12-May
20-May
27-May
02-Jun
22-Jul
29-Jul
14-Aug
23-Aug
04-Sep
12-Sep
21-Sep
11-Oct
27-Oct
06-Nov
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11-Dec
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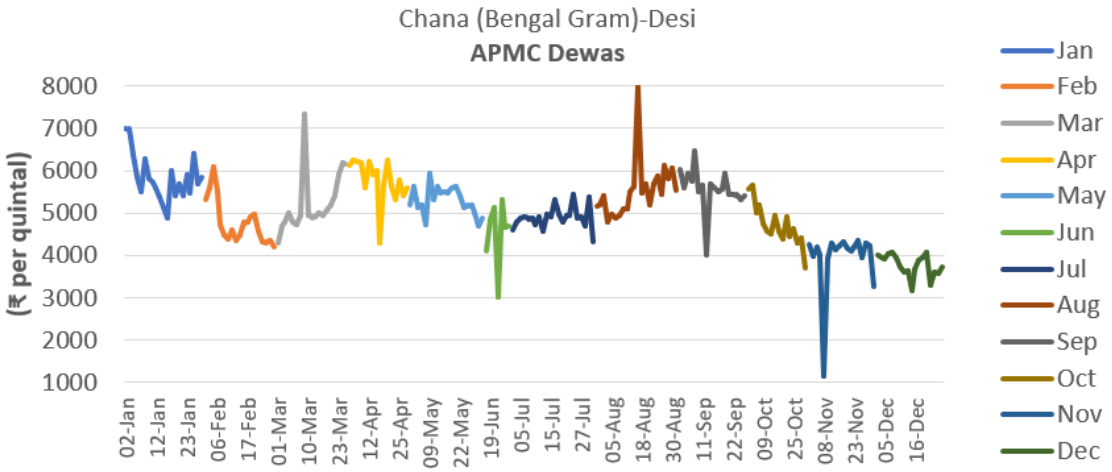
26-Dec
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


Chana (Bengal Gram)-Desi
APMC Dewas
(₹ per quintal)
8000
7000
6000
5000
4000
3000
2000
1000
02-Jan
12-Jan
23-Jan
06-Feb
17-Feb
01-Mar
10-Mar
23-Mar
12-Apr
25-Apr
09-May
22-May
19-Jun
05-Jul
15-Jul
27-Jul
05-Aug
18-Aug
30-Aug
11-Sep
22-Sep
09-Oct
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Dec

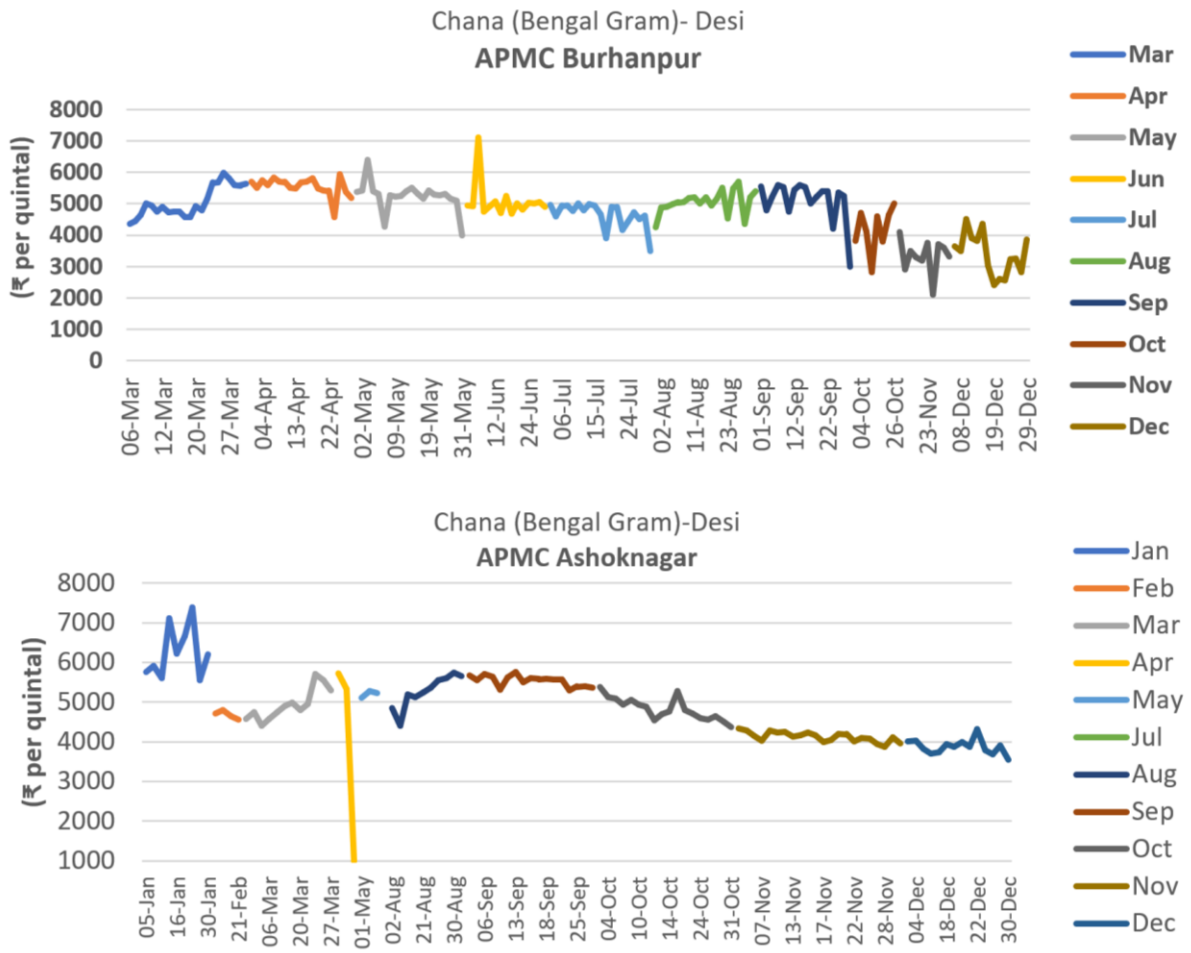


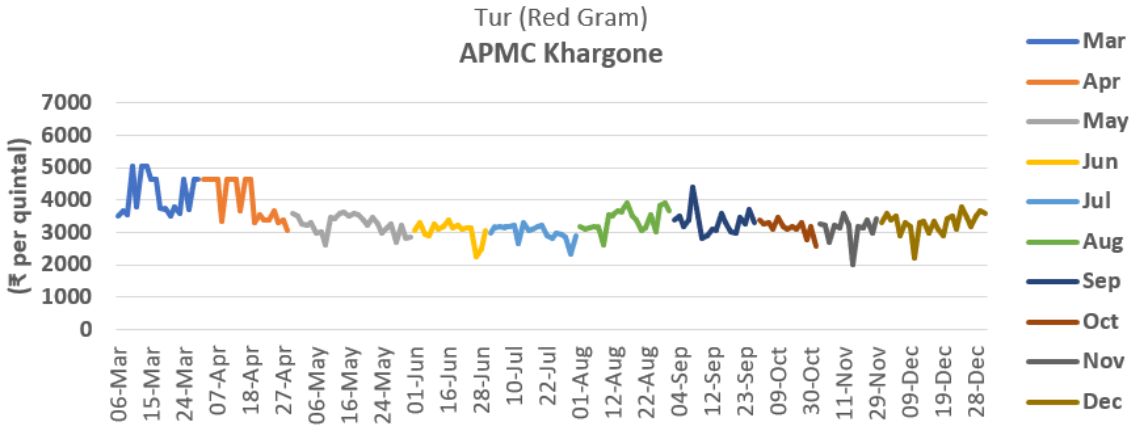
Fig. 3.6: Average daily modal price of Chana (Bengal Gram) in 5 major e-NAM mandis in Madhya Pradesh, 2017

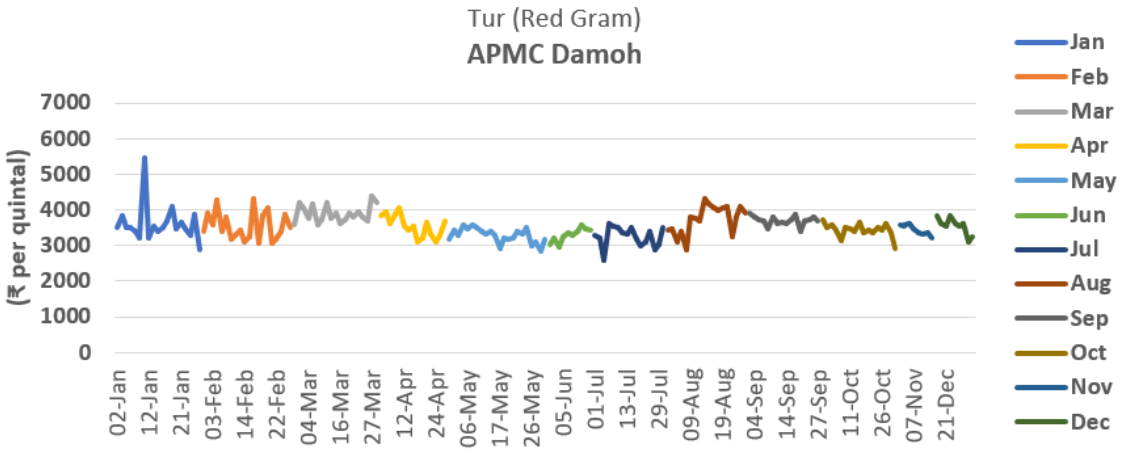
In the case of Tur/Arhar/Red Gram, the top 5 e-NAM mandis handled about 68% of the total transaction of Tur on the e-NAM platform in the state (Table 3.6). The arrival and trade of the commodity was maximum during March to May month (harvest month) in these markets.

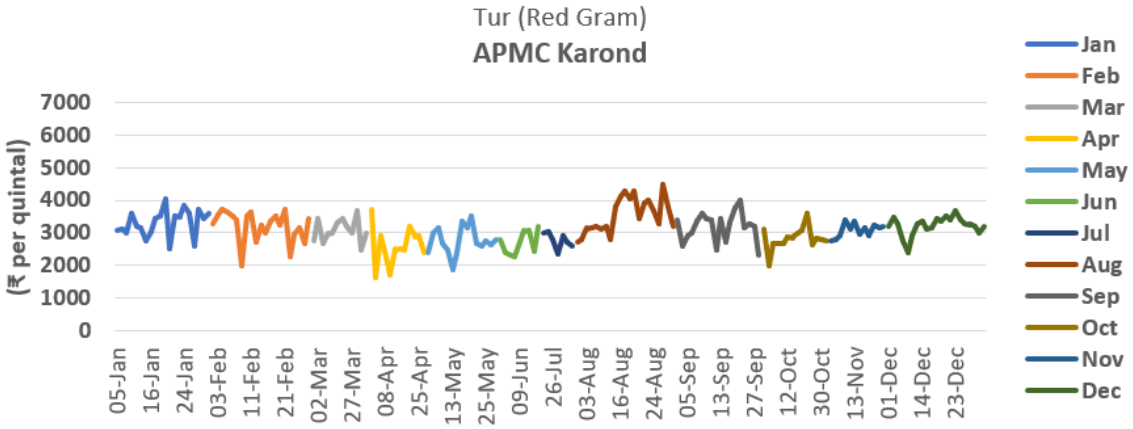
Table 3.6: Monthly transaction of Tur (Red Gram) in top 5 mandis in 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Khargone			5490	2226	484	168	271	210	115	115	46	90	9215	
Damoh	357	554	521	371	659	184	352	445	220	262	127	175	4227	
Karond	306	442	142	165	253	93	83	253	255	162	102	157	2413	
Indore		291	335	255	322		182	305	245	154	72	162	2323	
Harda	121	131	530	624	154		130	84	39	27	18		1858	

The daily modal price for trade of Tur/Red Gram in major 5 e-NAM mandis are given in Fig 3.7. It may be observed that except for a few days in March and April, the modal price remained in between ₹3000/q to ₹4000/q in all these markets. On a few trading days, the modal price went as low as ₹2000/q in some of the mandis. While the MSP for Tur/Arhar were ₹5050/q and ₹5450/q in 2016-17 and 2017-18, respectively.







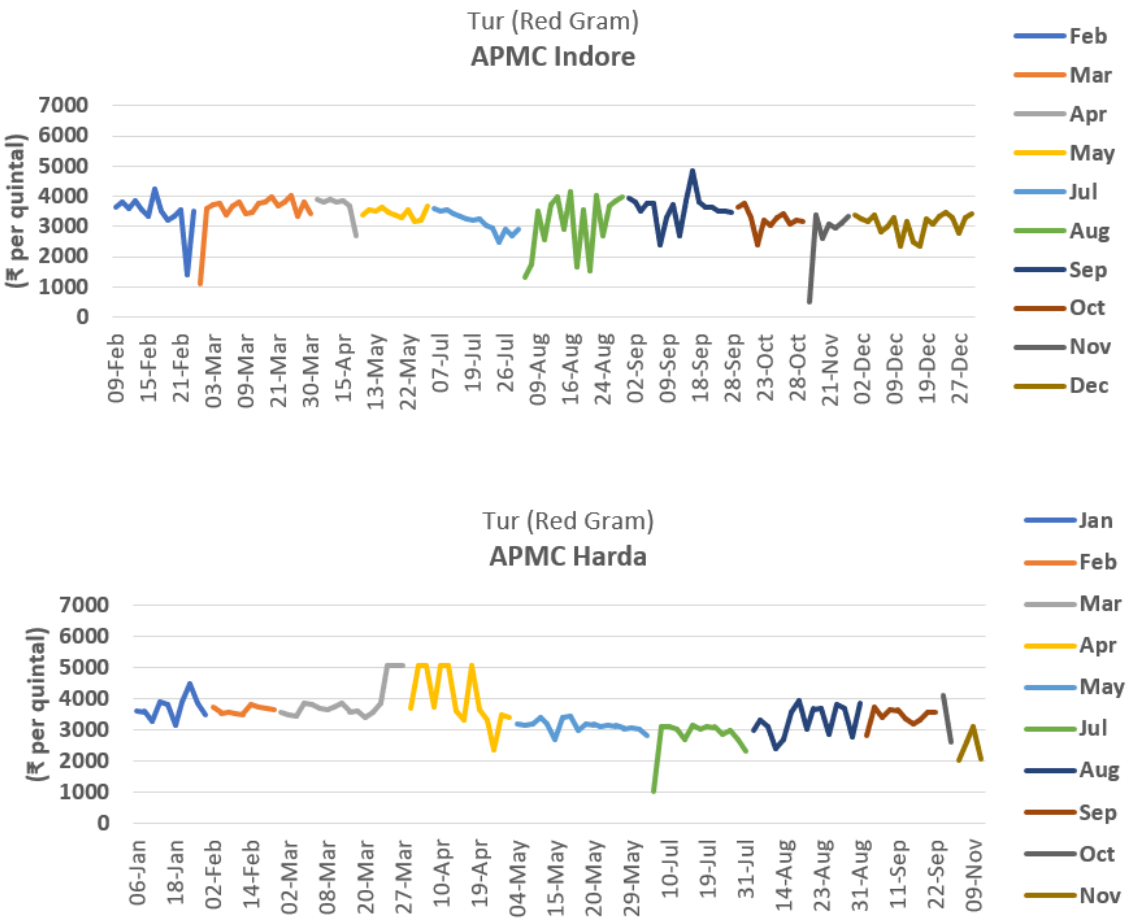


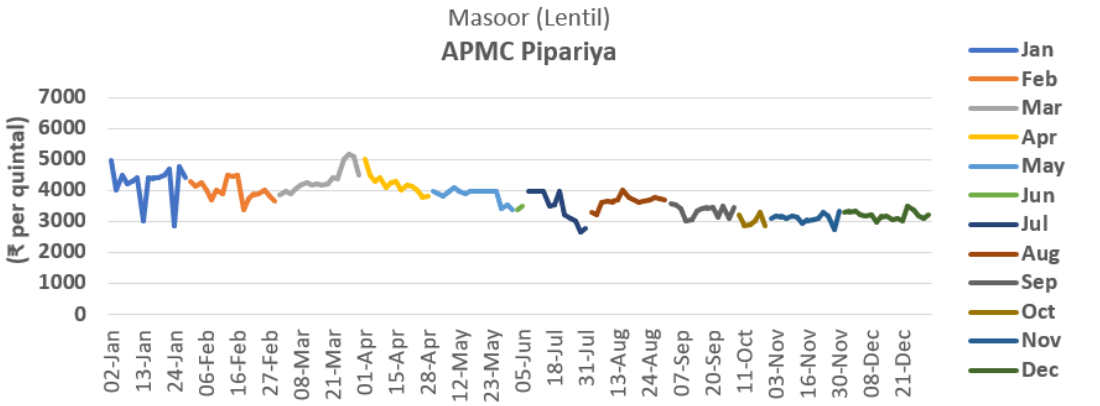
Fig. 3.7: Average daily modal price of Tur (Red Gram) in 5 major e-NAM mandis in Madhya Pradesh, 2017

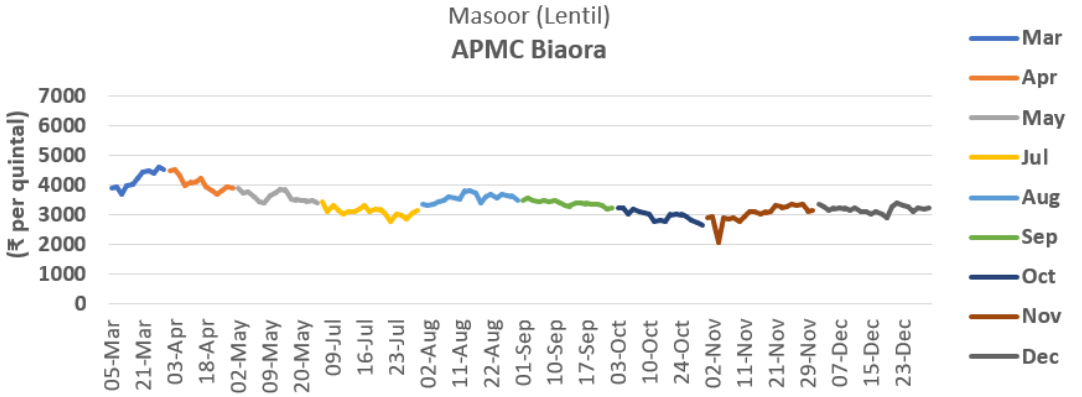
Masoor/Lentil is the third most important traded commodity on e-NAM in Madhya Pradesh state. In the case of Lentil, the top 5 e-NAM mandis handled about 54% of the total transaction of Lentil on the e-NAM platform in the state (Table 3.7). These markets had different period, when the arrival of the commodity was maximum in 2017. The largest transaction had been reported in APMC Pipariya, where a huge quantity was traded during May and July months. In other markets as well, a large quantity was traded between May to August months.

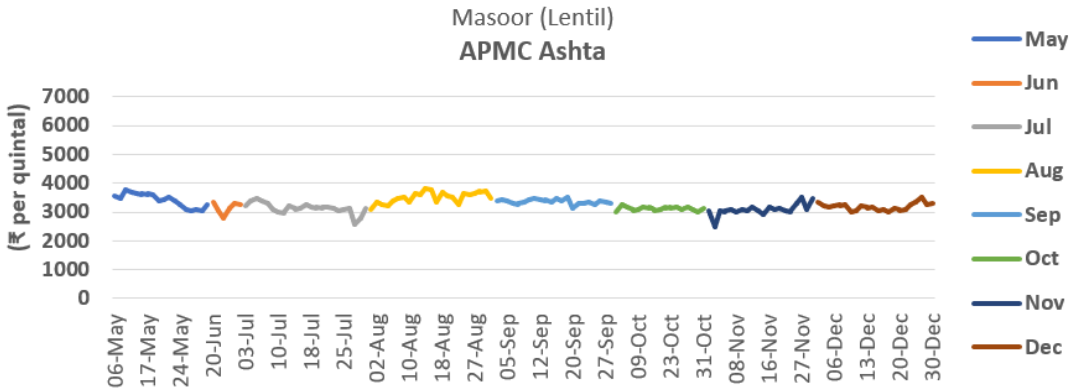
Table 3.7: Monthly transaction of Masoor (Lentil) in top 5 mandis in 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Pipariya	310	306	842	506	2375	29	2530	655	378	258	592	603	9384	
Biaora			308	471	570		486	680	663	661	696	603	5138	
Ashta					336	135	809	790	682	485	720	608	4565	
Neemuch			890	191	1921	142	389	254	210	175	242	110	4524	
Sehora				149	203	79	434	646	512	561	429	589	3602	

The daily modal price for trade of Masoor/Lentil in major 5 e-NAM mandis are given in Fig 3.8. It may be observed that the price realization in these mandis were very different. The largest trading mandi, Pipariya offered more than ₹4000/q during the first quarter of the year, while in other mandis, the trading price remained around ₹3000 3500/q. While the MSP for Masoor/Lentil were ₹3950/q and ₹4250/q in 2016-17 and 2017-18, respectively.







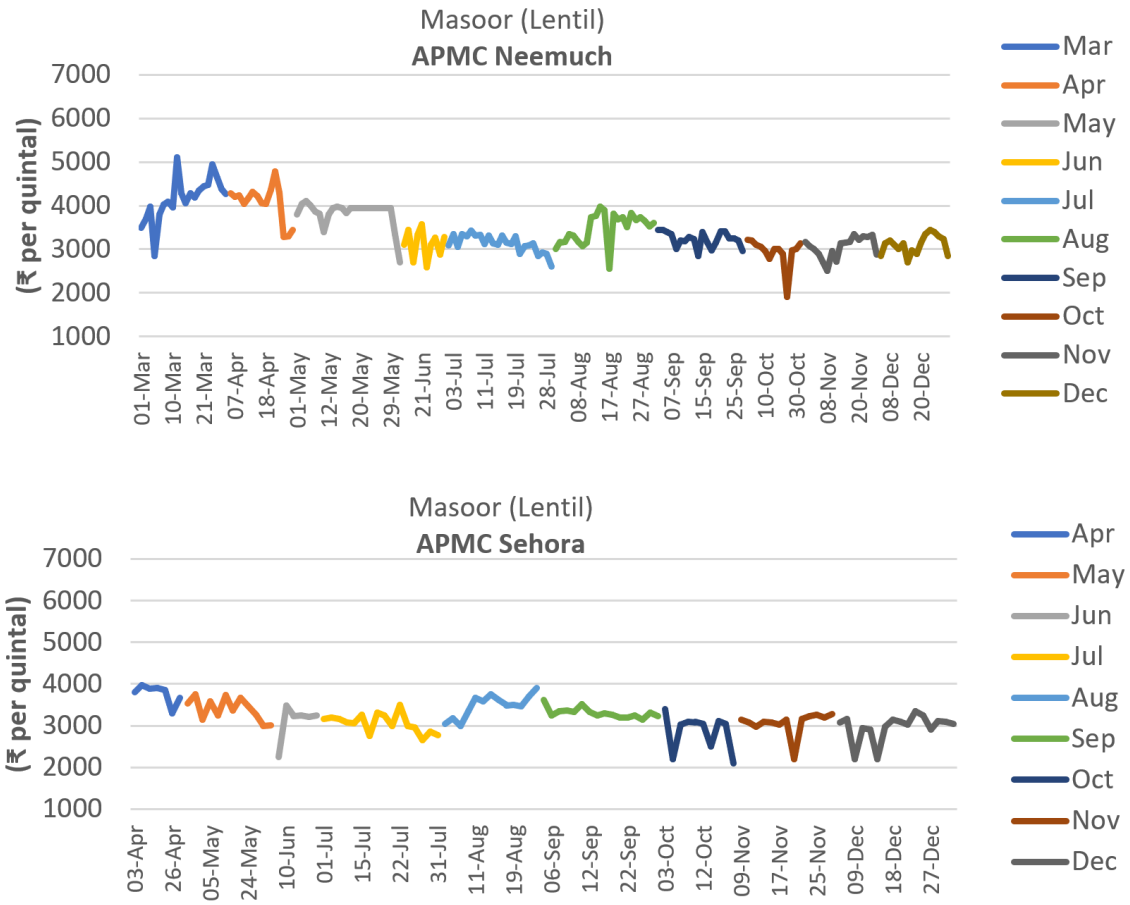


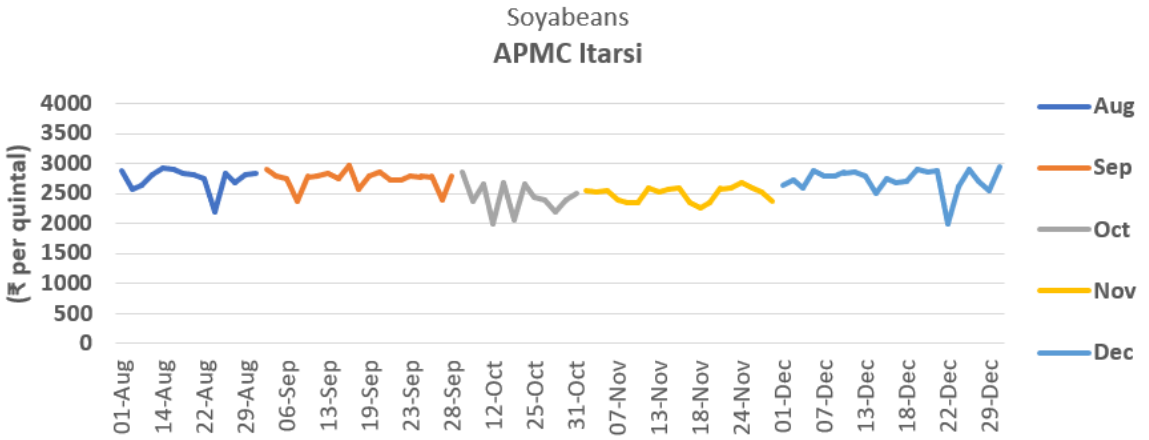
Fig. 3.8: Average daily modal price of Masoor(Lentil) in 5 major e-NAM mandis in Madhya Pradesh, 2017

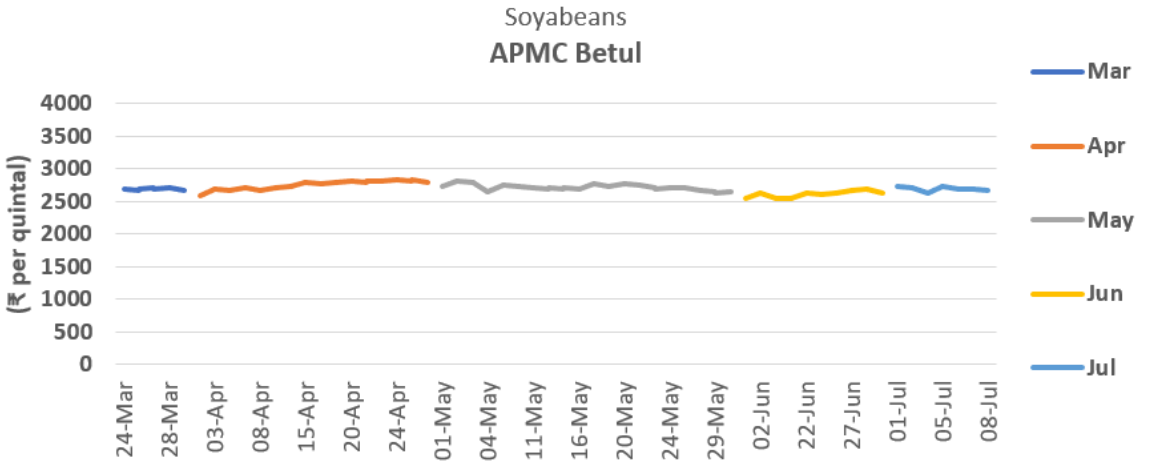
Madhya Pradesh is the largest producer of soybeans in India. However, its trade is highly concentrated in 5 mandis- Itarsi, Betul, Damoh, Chhindwara, and Rewa (Table 3.8). The 5 e-NAM mandis handled almost 90% of the total transaction of Soybeans on the e-NAM platform in the state (Table 3.8). The largest transaction had been reported in APMC Itarsi, where a huge quantity was traded during August to December months. Being Kharif season crop, it is harvested in September/October months.

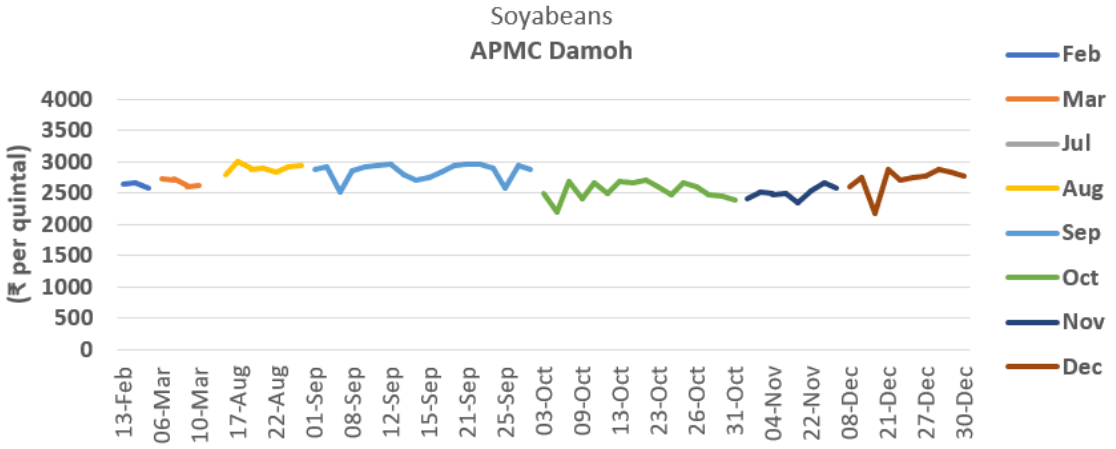
Table 3.8: Monthly transaction of Soybeans in top 5 mandis in 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Itarsi								2595	3175	2556	2236	2282	12844	
Betul			270	984	1103	520	515						3392	
Damoh		72	123				43	297	864	869	430	405	3103	
Chhindwa	103	101	242	79				21	294	470	80	187	1577	
Rewa			133	326	28			138	269	70	148	287	1399	

From Fig 3.9, it is evident that except in APMC Rewa, the modal trading price of soybeans remained in the range of ₹2500-3000 per quintal. In the Rewa market, the selling price went below ₹2500 per quintal. While the MSP for Soybeans (yellow) were ₹2775/q and ₹3050/q in 2016-17 and 2017-18, respectively.







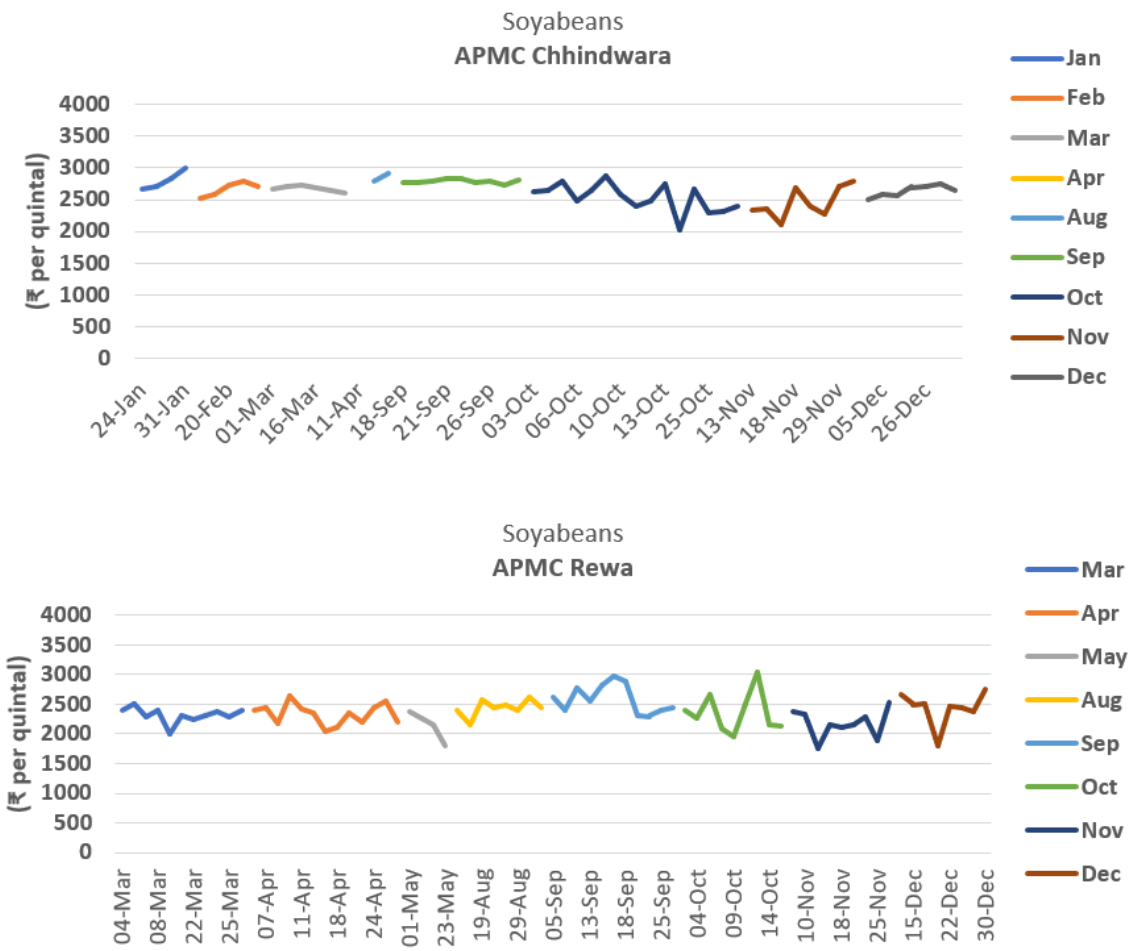


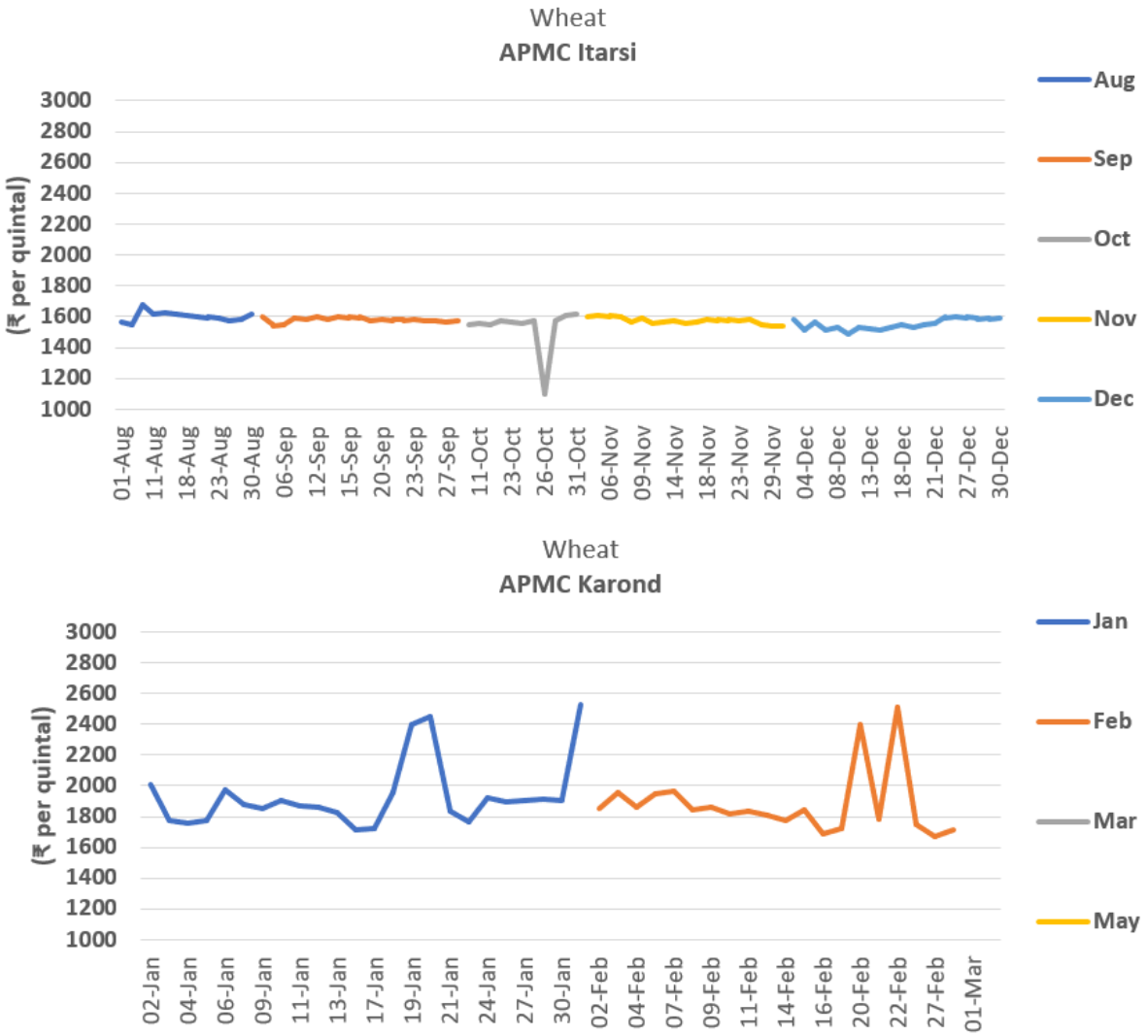
Fig. 3.9: Average daily modal price of Soybeans in 5 major e-NAM mandis in Madhya Pradesh, 2017

Madhya Pradesh is also one of the largest producers of wheat in India. However, its trade is highly concentrated in 5 mandis- Itarsi, Karond, Sanwer, Betul, and Timarni (Table 3.9). The 5 e-NAM mandis handled almost 97% of the total transaction of Wheat on the e-NAM platform in the state. The largest transaction had been reported in APMC Itarsi, where a huge quantity was traded during August to December months. While in other mandis, the largest quantity was traded either in January or May/ June months.

Table 3.9: Monthly transaction of Wheat in top 5 mandis in 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Itarsi								1340	1626	1088	1695	2330	8079	
Karond	2281	1819	79		4								4183	
Sanwer					738	664	467	253	340	197		213	2872	
Betul			228	893	440	667	579						2807	
Timarni					1070	449	167						1686	

From Fig 3.10, it is evident that the average modal price in Itarsi mandi remained around ₹1600/q throughout the trading months. While in second-largest mandi viz. Karond (Bhopal), though trading has been reported only for January-March months, the modal price was significantly high as compared to that in Itarsi mandi. In other mandis, the modal price remained below the minimum support price. The MSP for wheat were ₹1625/q and ₹1735/q in 2016-17 and 2017-18, respectively.



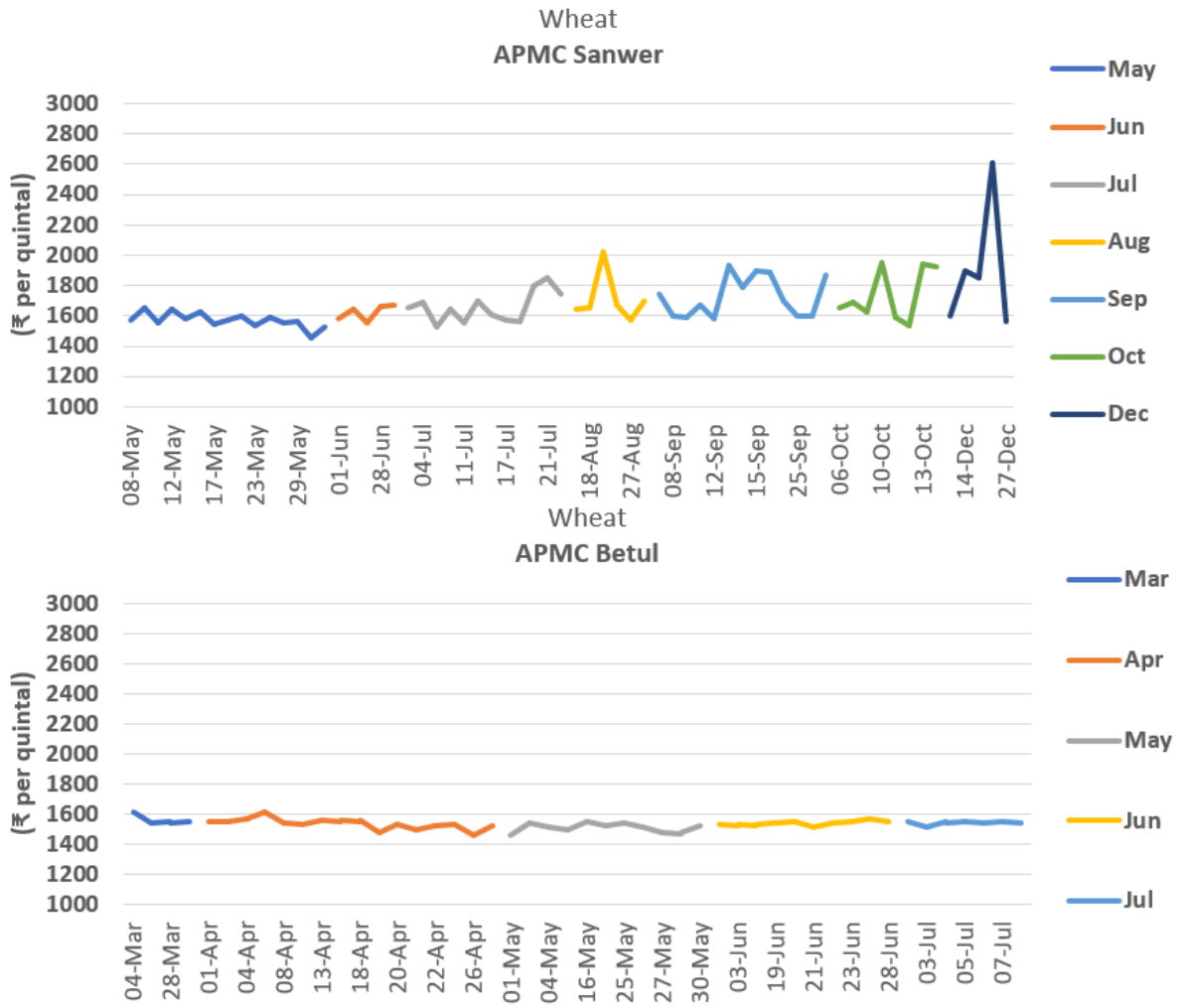


Fig. 3.10: Average daily modal price of Wheat in 5 major e-NAM mandis in Madhya Pradesh, 2017

3.7.2. e-NAM transaction in Maharashtra state

There were 44 APMC mandis registered on e-NAM in Maharashtra in the year 2017. The transaction data was available only for 10 months (March to December). As per the reported transaction on e-NAM, these mandis altogether handled 38 types of different commodities (including different varieties of the same commodity). There were about 2,700 daily records. Out of the total volume of transactions reported (0.88 lakh quintals), about **84 percent was handled by 10 e-NAM mandis** only, while another 14 percent volume was transacted at 10 e-NAM mandis together and rest 24 mandis handled only 2 percent of commodities (Fig 3.11).

Among all the commodities recorded on the e-NAM portal as traded, Soyabean was the most traded, followed by wheat and Tur/Red Gram. Only 6 commodities together constituted almost 85% of the total transaction on e-NAM in Maharashtra state (Fig 3.12).

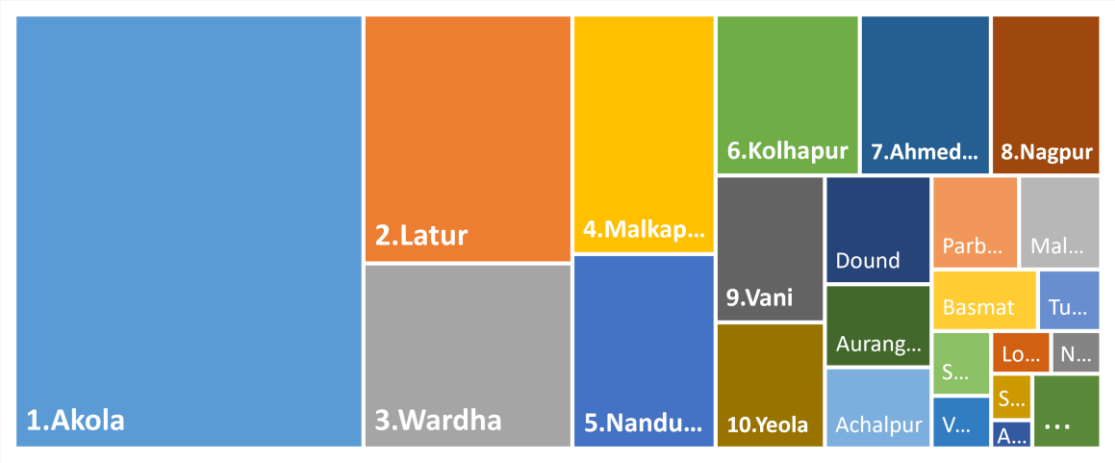


Fig. 3.11: e-NAM mandis in Maharashtra according to commodity transaction in 2017

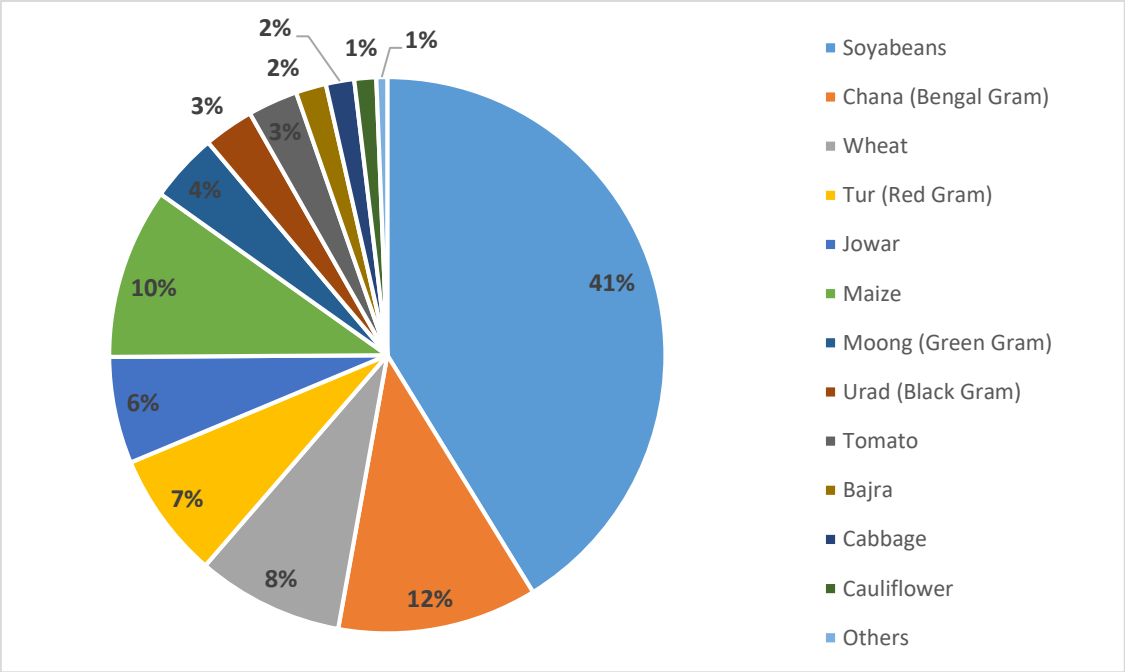


Fig. 3.12: Share of different commodities transacted in the top 10 e-NAM mandis in Maharashtra, 2017

Among top traded commodities, Soyabeans stand first in the state. Soybeans are mainly traded in Akola and Latur markets (Table 3.10). The top 5 e-NAM mandis traded more than 91% of total soybean trade on e-NAM in the state. While in Akola, soybean was traded from September to December month, in Latur, almost 99% of trade happened in December month. While in other 3 major markets, the trade continued slowly over August-December months.

Table 3.10: Monthly transaction of Soybeans in top 5 mandis, 2017 (quintals)

APMC	Mar	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Akola				947	1659	4841	5553	13000	
Latur	47						8488	8535	
Wardha	16		561	542	772	800	1048	3739	
Vani			113	179	589	758	621	2260	
Malkapur		24	128	29	654	584	535	1954	

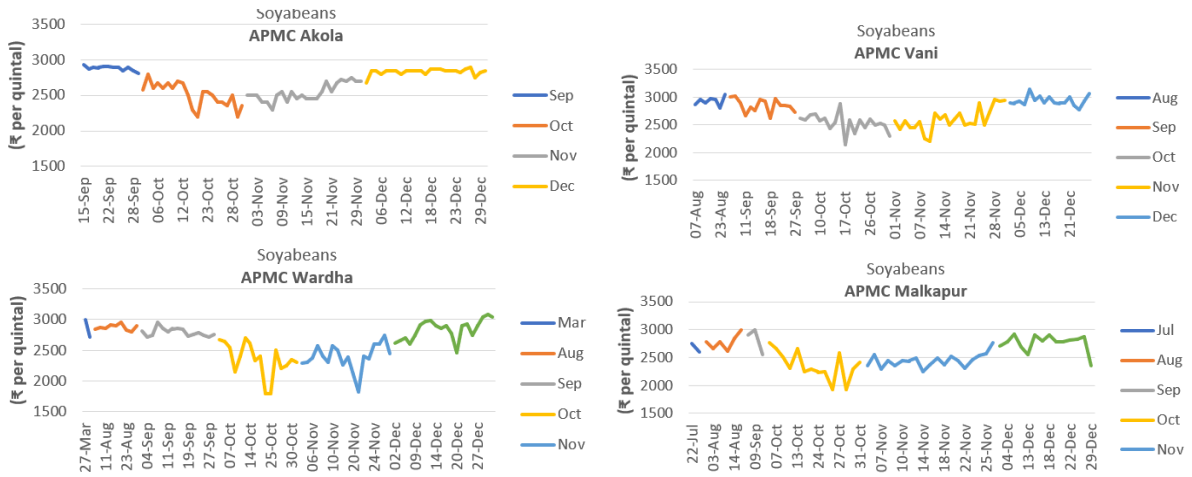


Fig. 3.13: Average daily modal price of Soybeans in major e-NAM mandis in Maharashtra, 2017

The price in these mandis had similar movements in all the 5 markets. During September and October, the traded modal price was higher, then came down, during October and mid-November. However, thereafter the market price of soybeans started firming up. While the MSP for Soybeans (yellow) were ₹2775/q and ₹3050/q in 2016-17 and 2017-18, respectively.

The Bengal Gram or Chana was the second-largest traded commodity on e-NAM in the Maharashtra state. The commodity was mainly traded in 3 e-NAM mandis- Akola, Wardha, and Latur. These 3 mandis handled almost 87% of the total traded Bengal Gram in the state.

Table 3.11: Monthly transaction of Chana (Bengal Gram) in top 3 mandis, 2017 (quintals)

APMC	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Akola			15	787	2719	1933	5454	
Wardha	95	378	328	95	115	137	1165	
Latur				10	898	143	1051	

The price of Bengal Gram in these mandis was highly volatile. While in the major market of Akola, the traded price for Bengal Gram remained subdued, below ₹4000/q. While in the other 2 major mandis, prices were volatile. The MSP for Chana/Bengal Gram were ₹4000/q and ₹4400/q in 2016-17 and 2017-18, respectively.

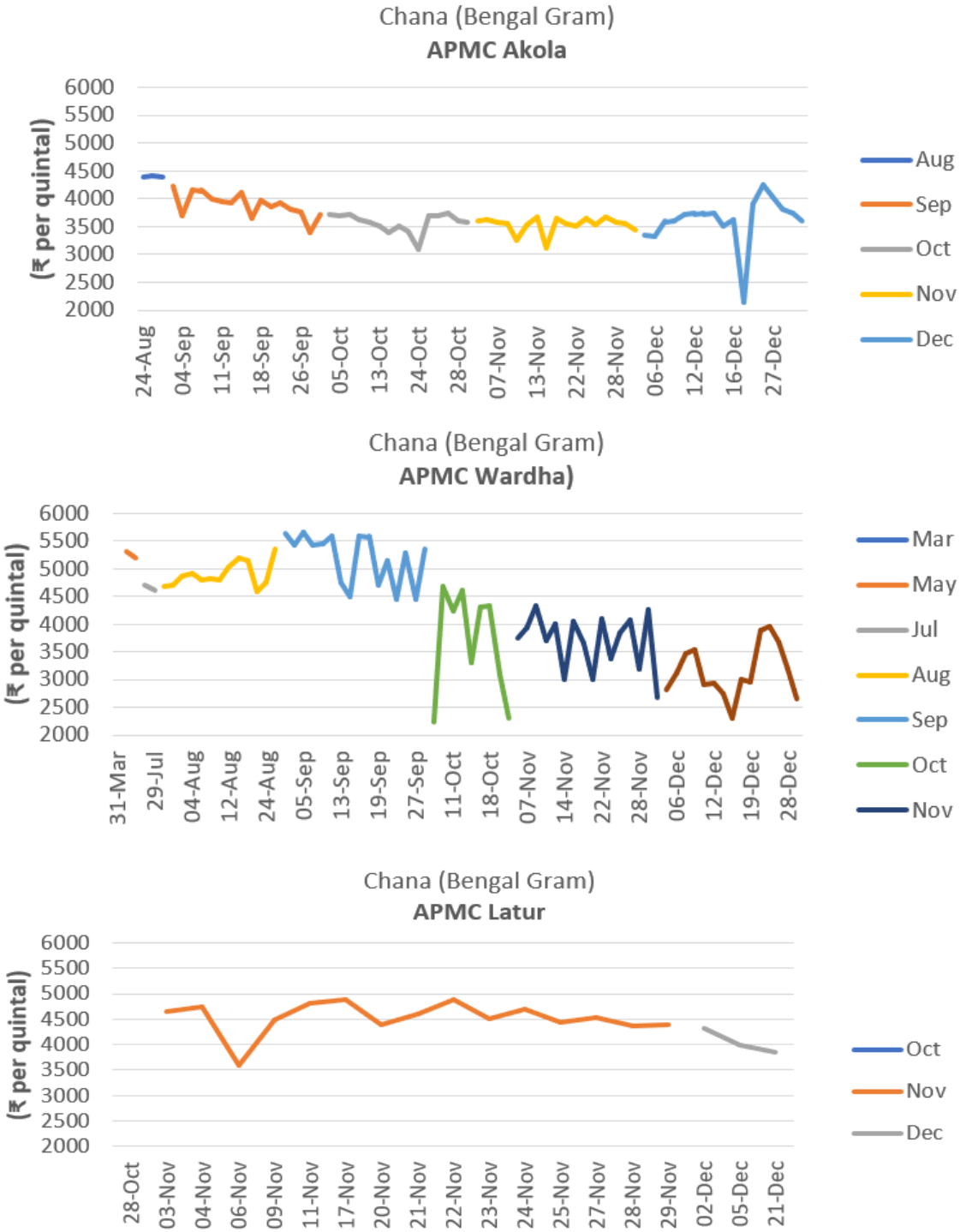


Fig. 3.14: Average daily modal price of Chana (Bengal Gram) in major e-NAM mandis in Maharashtra, 2017

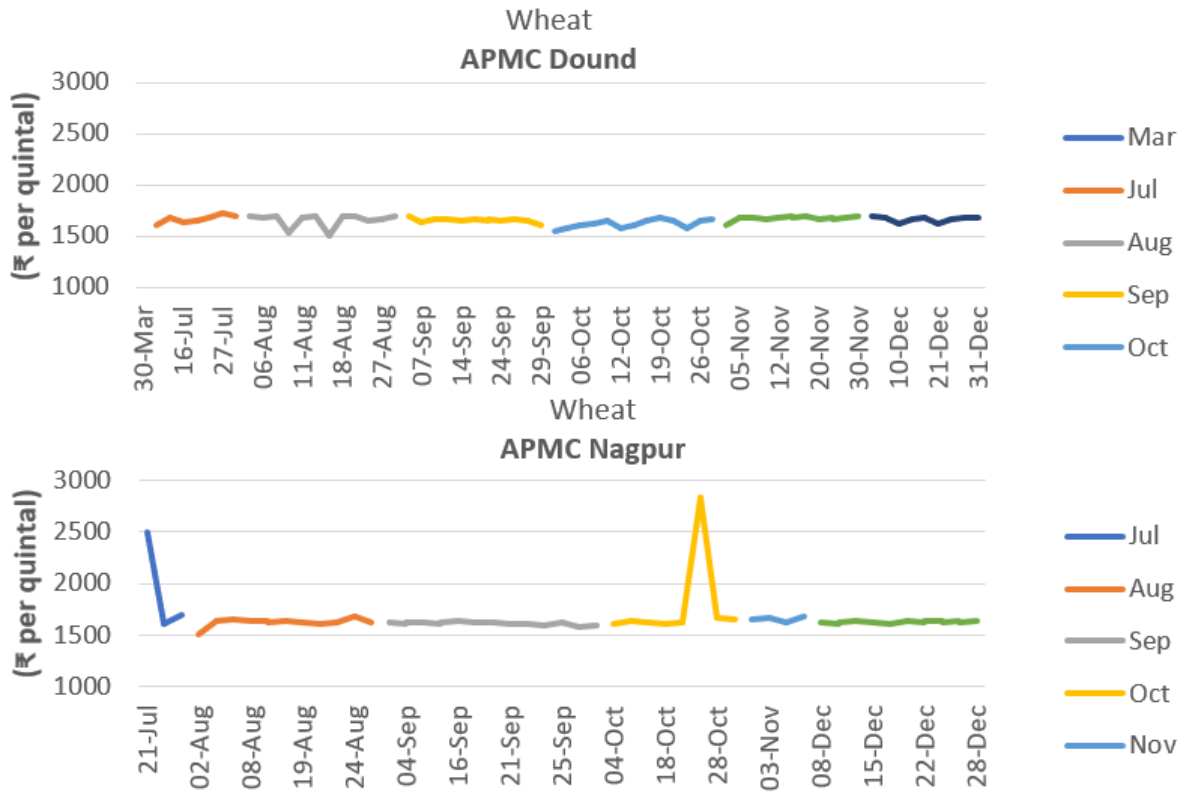
Wheat is also an important commodity reported to be traded on the e-NAM platform in several e-NAM mandis in Maharashtra state in the year 2017. The 5 e-NAM mandis given in Table 3.12 transacted more than 74% of total wheat transactions on e-NAM in Maharashtra. Except in Achalpur mandi, maximum arrival happened during August-September month.

Table 3.12: Monthly transaction of Wheat in top 5 mandis, 2017 (quintals)

APMC	Mar	Apr	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Dound	8			159	442	467	408	361	307	2152	
Nagpur				195	499	321	451	198	363	2027	
Achalpur									1600	1600	
Ahmednagar			58	125	79	311	275	338	277	1463	
Wardha	8			196	318	247	123	181	191	1264	

From Fig 3.15, it is evident that the average modal price in all the 4 mandis remained around ₹1500-1600/q throughout the trading months. The MSP for wheat were ₹1625/q and ₹1735/q in 2016-17 and 2017-18, respectively.

Although Maharashtra is one of the largest producers of Tur/Arhar/Red Gram in India, only 2 e-NAM mandis- Akola and Wardha transacted about 82% of total Red Gram transacted through e-NAM in the state (Table 3.13). Most of the transactions have been reported during November-December months. The average daily modal price of Tur/Arhar in both the mandis is presented in Fig 3.16.



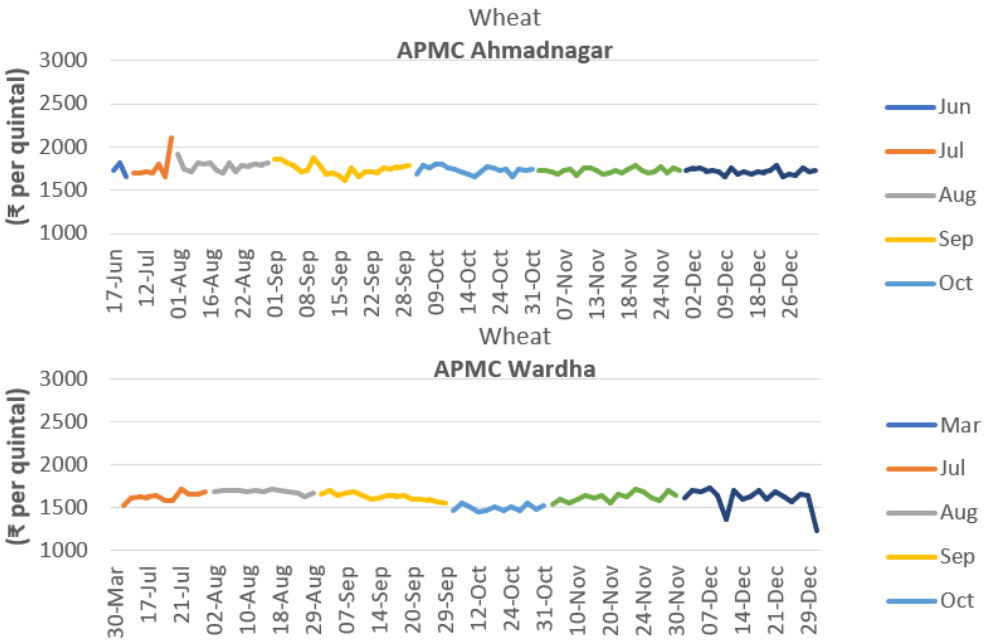


Fig. 3.15: Average daily modal price of Wheat in major e-NAM mandis in Maharashtra, 2017

Table 3.13: Monthly transaction of Tur (Red Gram) in top 2 mandis, 2017 (quintals)

APMC	Aug	Sep	Oct	Nov	Dec	Total	Trend
Akola		4	165	1827	1677	3673	
Wardha	148	410	141	144	199	1042	

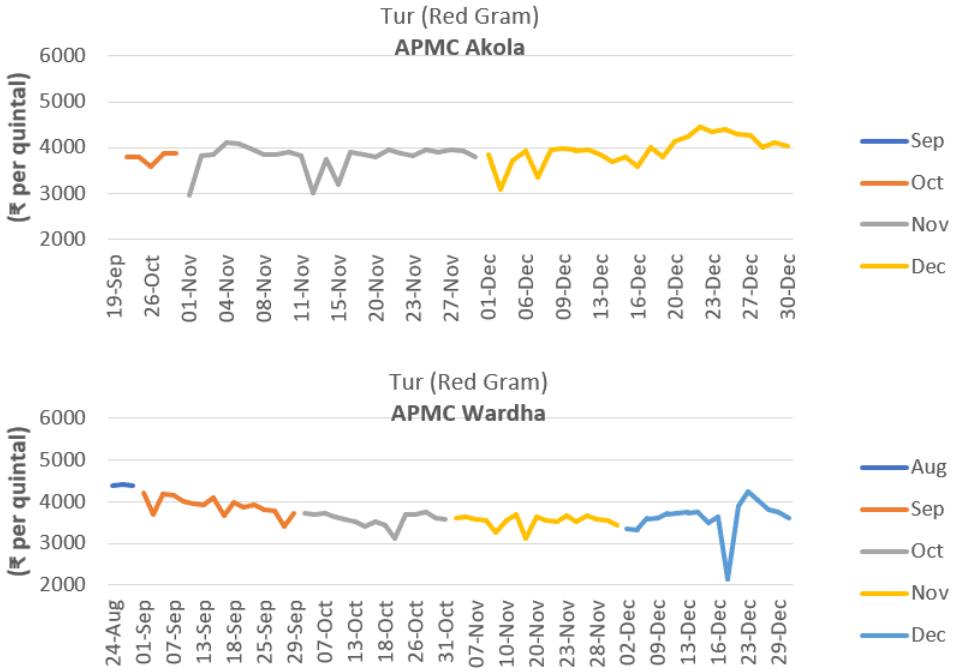


Fig. 3.16: Average daily modal price of Tur (Red Gram) in major e-NAM mandis in Maharashtra, 2017

3.7.3. e-NAM transaction in Telangana state

The 44 APMC mandis registered on e-NAM in Telangana state handled 202 types of different commodities (including different varieties of the same commodity) in the year 2017. Out of the total volume of transactions (27.83 lakh quintals), the **top 12 e-NAM mandis handled about 61 percent** of total commodity by volume and about 80 percent was handled by 21 e-NAM mandis. While 17 percent volume was transacted at 15 e-NAM mandis together and rest 8 mandis handled only 2.7 percent of commodities. These mandis are ranked and listed in that order in Fig 3.17. There were a total of 28800+ daily records[2].

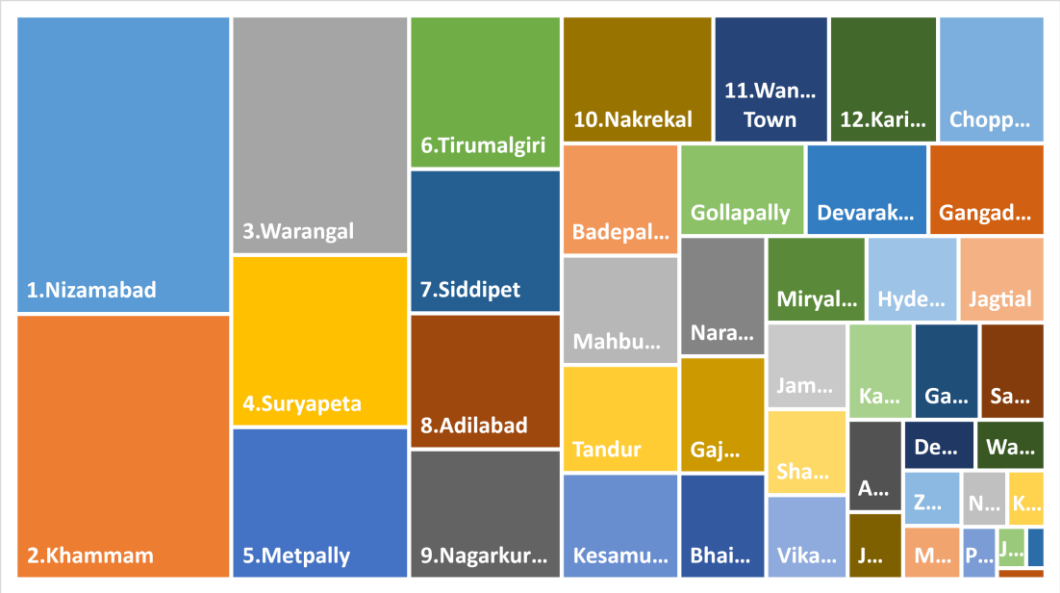


Fig. 3.17: Different e-NAM mandis in Telangana according to commodity transaction in 2017

Among all the commodities recorded on the e-NAM portal as traded, two commodities- Paddy and Turmeric constituted more than 50% of total transactions on e-NAM in the state. It was followed by Chillies, Red Tur/Gram, Cotton, and Maize. These 6 commodities together constituted more than 95% of the total transaction on e-NAM in Telangana state (Fig 3.18). Moreover, there were a large number of varieties within each commodity, for example, 36 types of paddy, 6 types of turmeric, 18 types of chillies, 7 types of cotton, etc. Within Paddy, apart from common paddy, other popular varieties traded were MTU 1010, IR 64, Grade-1, RNR, etc. Such a huge variation within commodity complicates further the quality assaying process before online trading.

[2] 496 entries had '0' traded quantity, still modal price was given and 179 entries were having '0' Arrival as well as Traded quantity, but Modal price were given. 106 entries had very high mismatch between arrival and traded quantity (>500 or <-500q). All these have been removed for analysis.

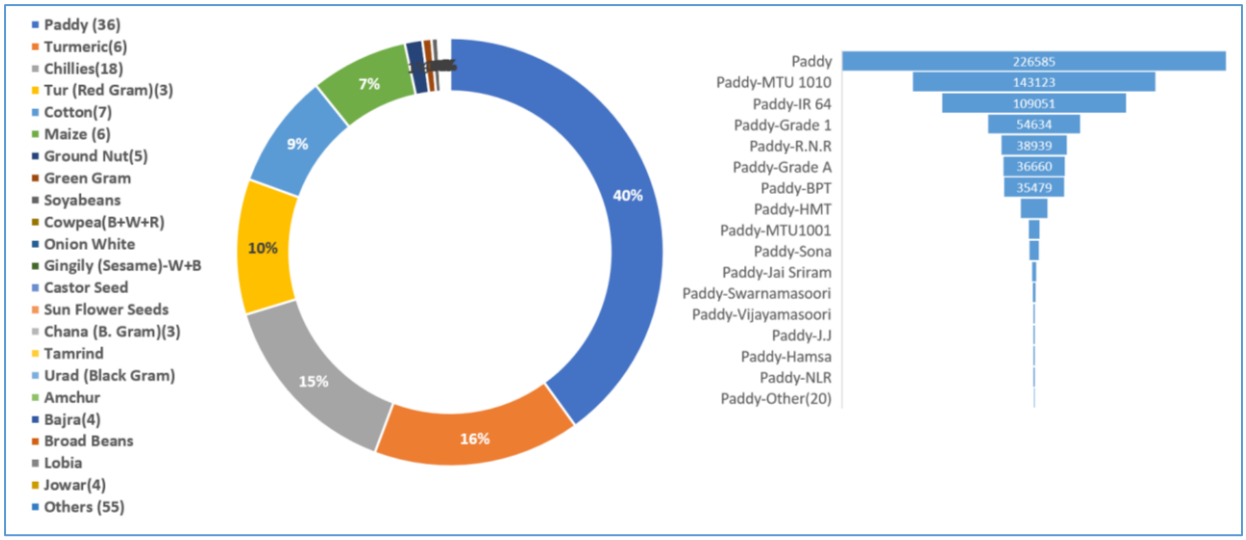


Fig. 3.18: Share of different commodities transacted in the top 12 e-NAM mandis in Telangana, 2017

Among top traded commodities, the top 5 e-NAM mandis traded about 45% of total paddy trade on e-NAM in the state (Table 3.14). While in Suryapeta and Tirumalgiri mandis, Paddy was traded throughout the year, in other 3 major markets, major trade happened during the first quarter (January-March) of the year.

Table 3.14: Monthly transaction of Paddy in top 5 mandis, 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Suryapeta	9010	12736	11826	8737	20436	5339	2984	3985	4657	8504	23970	18366	130550	
Tirumalgiri	5059	1695	2866	29767	18490	1927	1271	725	3090	13022	18947	9120	105979	
Nakrekal	7301			41095		138		4		10887	29048	4353	92826	
Metpally	24323				16975	19551					2178	20961	83988	
Siddipet					67994				293	918	1601	1499	72305	

In two major e-NAM mandis, viz. Suryapeta and Tirumalgiri, there was huge variability in the modal price of traded paddy. During August-September months, the modal price was higher (around ₹1800/q), while during the rest of the months, it was relatively less. The variation in price was also due to the varieties. For the other 3 markets, prices reported on the e-NAM portal were not in order, as can be seen in Nakrekal mandi, the same modal price was entered for the whole month (Fig 3.19).

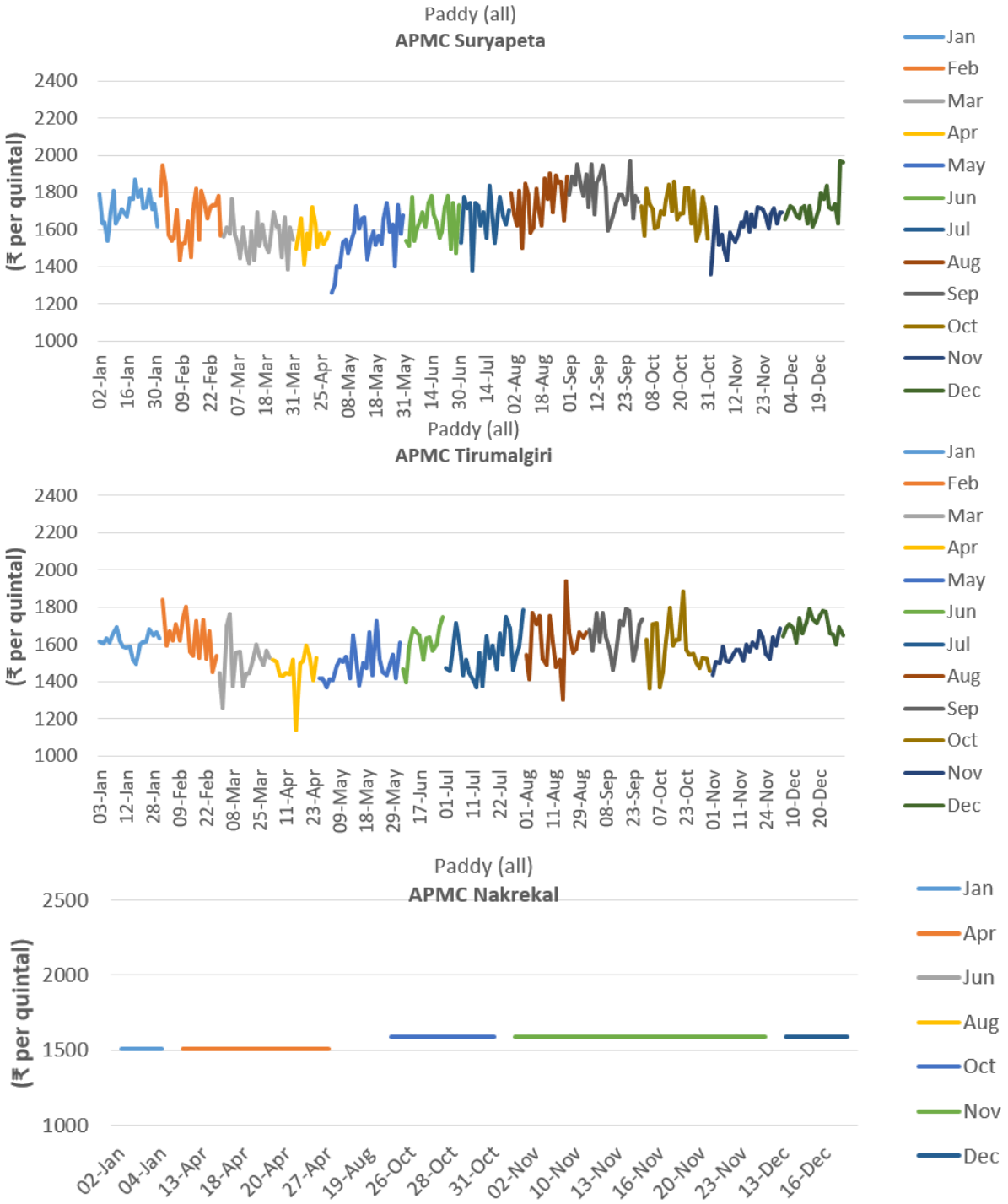


Fig. 3.19: Average daily modal price of Paddy in major e-NAM mandis in Telangana, 2017

Turmeric, the second important transacted commodity was mainly transacted at Nizamabad, Warangal, Metpally, and Vikarabad (Table 3.15). These 4 mandis together constituted more than 96% of total turmeric transacted on e-NAM in the state. Turmeric is traded in the form of bulb, chura, and finger (major). Maximum trade happens in February-Marc months.

Table 3.15: Monthly transaction of Turmeric in top 4 mandis, 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Nizamabad	116	150508	60912	1989	798	3650	5067	5438	5029	3118	4833	6357	247815	
Warangal	485	106	450	2130	2714	2809	2269	1215	489				12667	
Metpally		1077	1766	1552	1784	1164		1					7344	
Vikarabad	34	25	17	166	220	412	1251	583	576	401	937	301	4923	

The price of turmeric was also very much volatile in Nizamabad and Warangal mandis throughout the year. The average daily modal price for all types of turmeric in these markets is given in Fig 3.20. The modal price was ranged between ₹3750 to ₹8000/q. During May-June month, the price slipped to almost half of that offered during February month in these mandis. It may be noted that there is no MSP for turmeric, which is being demanded by the farmers in the state.

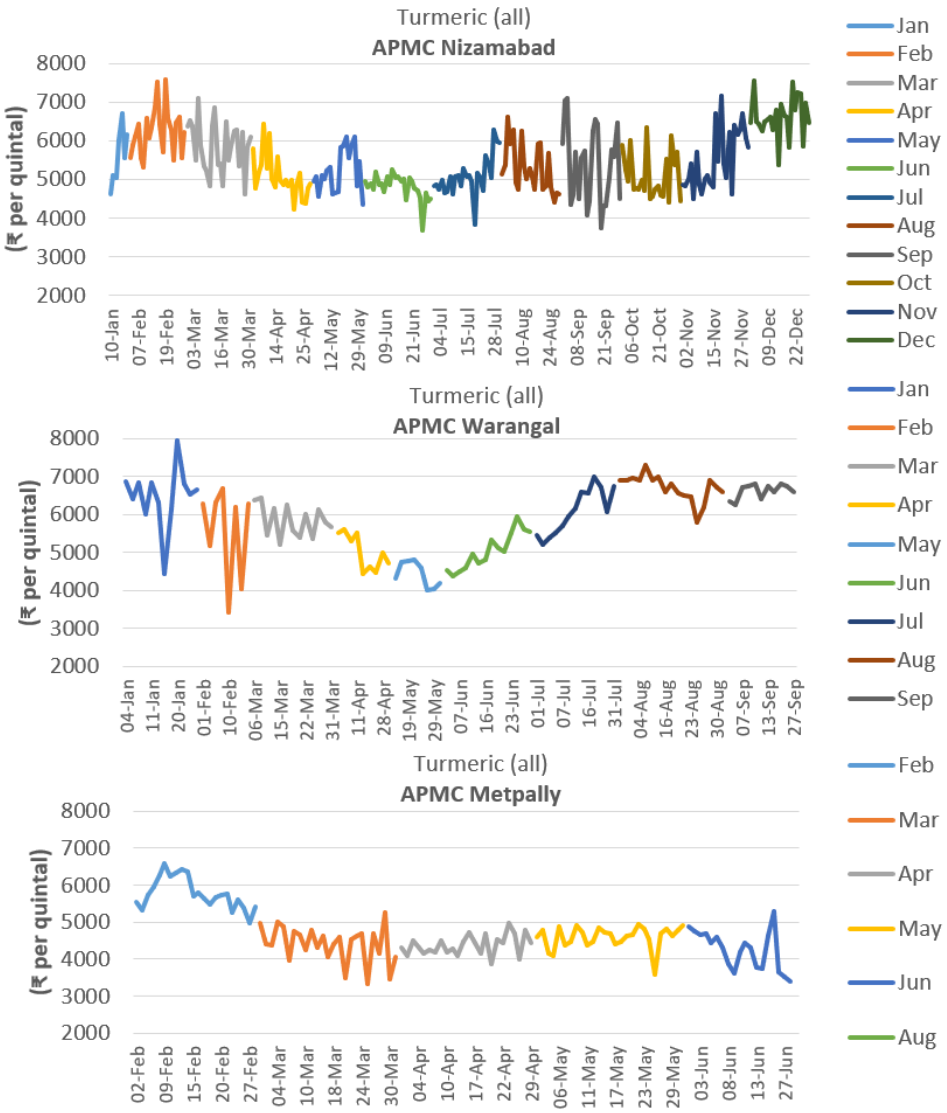


Fig. 3.20: Average daily modal price of Turmeric in major e-NAM mandis in Telangana, 2017

Chillies also have a similar story as of turmeric. Only 3 e-NAM mandis transacted almost 100% of total dry chillies in the state. The transaction reported on the e-NAM portal also shows that in Khammam mandi, which is the largest chilli trading mandi, had almost 80% of total transactions in a single month (July), while in other two markets, maximum trading happened during February-March months (Table 3.16).

Table 3.16: Monthly transaction of Dry Chillies in top 3 mandis, 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Khammam							172200		9404	1573	694	307	184178	
Warangal	2504	9427	21373	5041	8364	4517	2029	2391	3216	1964	2402	1089	64317	
Hyderabad	3524	10538	7660	886	58	131	2727	3422	4047	1895	1707	1552	38147	

Chilli-farmers also observed huge price volatility. As shown in Fig 3.21, the average modal price of chillies dropped from ₹9500/q in January month to almost ₹2000/q in May month and almost hovered around the same level until September-October months in all 3 markets. During the last quarter of the year, volatility in price also increased.

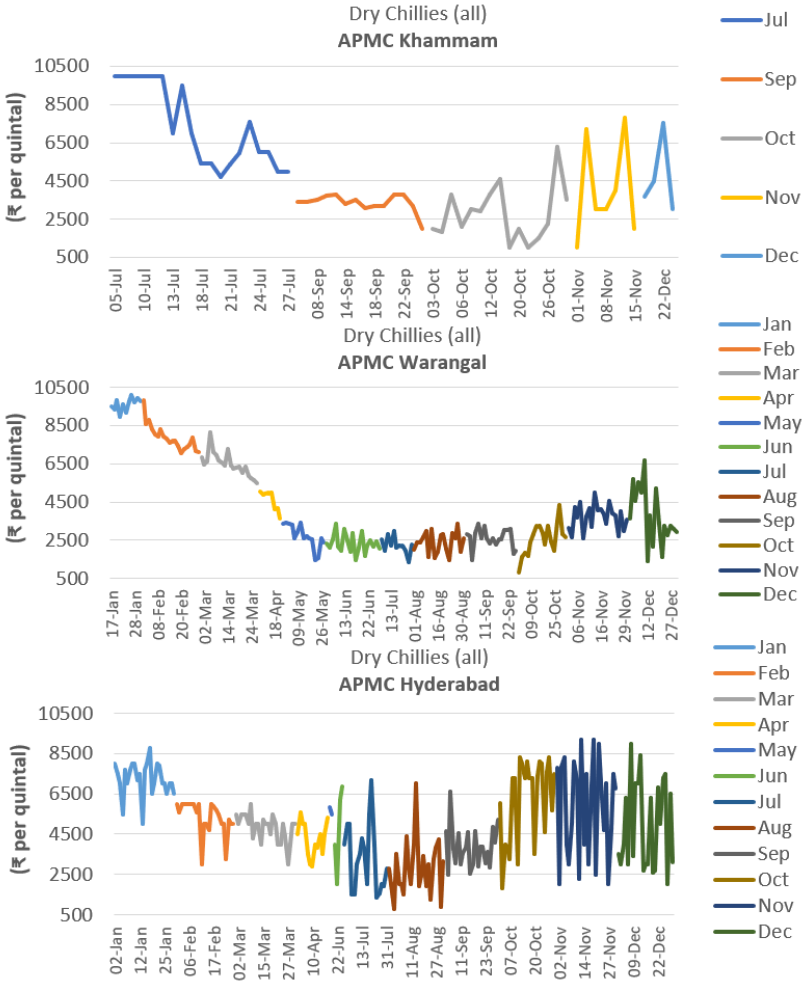


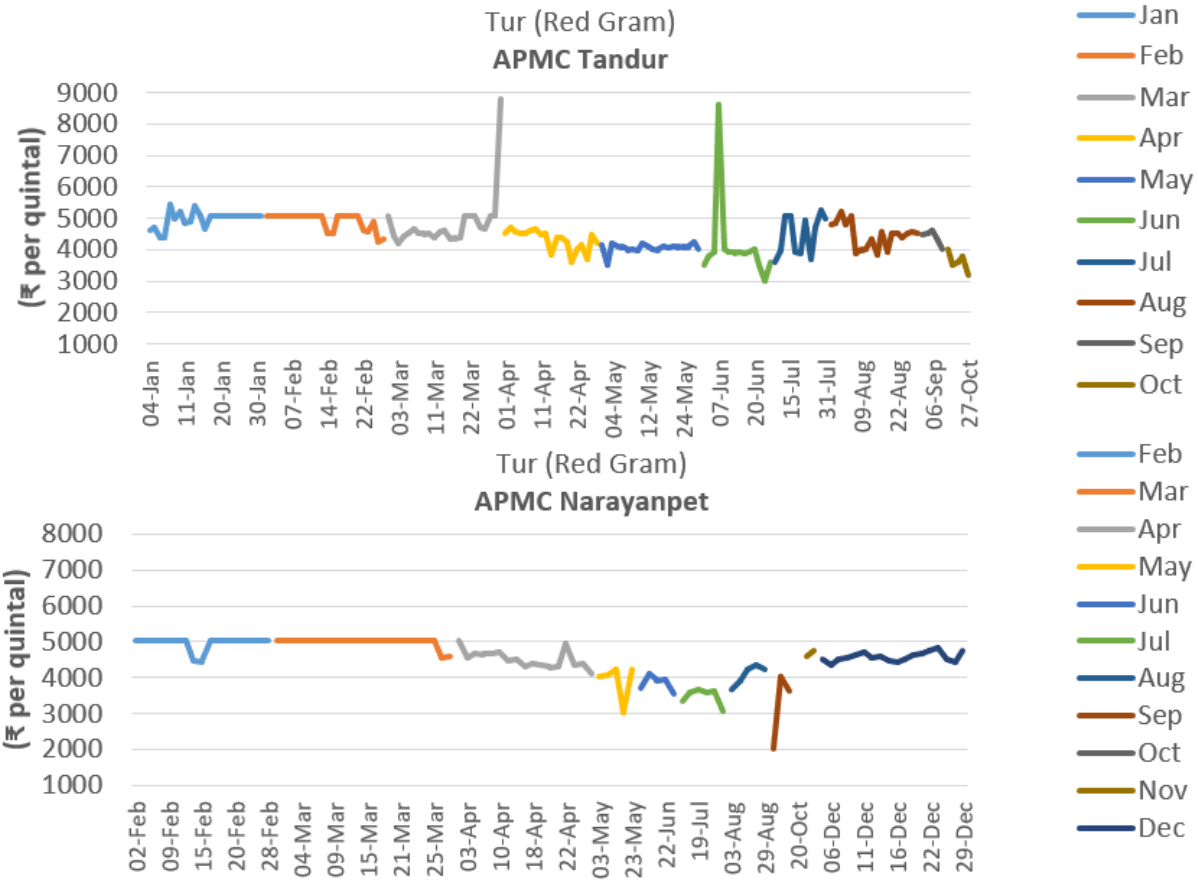
Fig. 3.21: Average daily modal price of Dry Chillies in major e-NAM mandis in Telangana, 2017

The 5 top e-NAM mandis as given in Table 3.17 traded about 60% of total Tur/Arhar transacted on the e-NAM platform in the state. In Adilabad and Nagarkurnool mandis, maximum trade happened in June month, while in Tandur and Naryanpet mandis, it was in February month. This is a surprising contrast within the state.

Table 3.17. Monthly transaction of Tur (Red Gram) in top 5 mandis, 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Adilabad		26121	4857			32396	17695						81069	
Tandur	10654	17615	2431	706	900	327	1057	2367	93	54			36204	
Narayanpet		16830	7146	260	15	30	39	22	5	1	7	518	24873	
Nagarkurnc	217	64			33	21612	33					3	21962	
Shadnagar	1788	9542	7554										18884	

In terms of traded price in 3 major mandis, except a few days, the daily modal traded price of the commodity remained rangebound. It was a surprising fact that the modal price reported for Adilabad mandi was the same for the entire month (Fig 3.22). Not only modal price was the same, but minimum and maximum traded price was also reported to be the same on the e-NAM portal, which appears to be not correct for such huge transaction quantity.



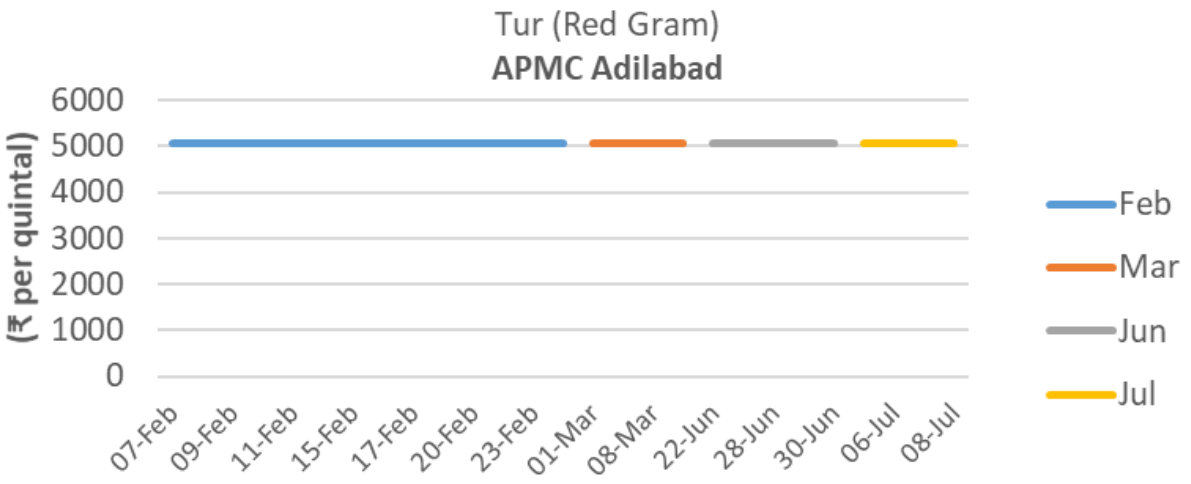
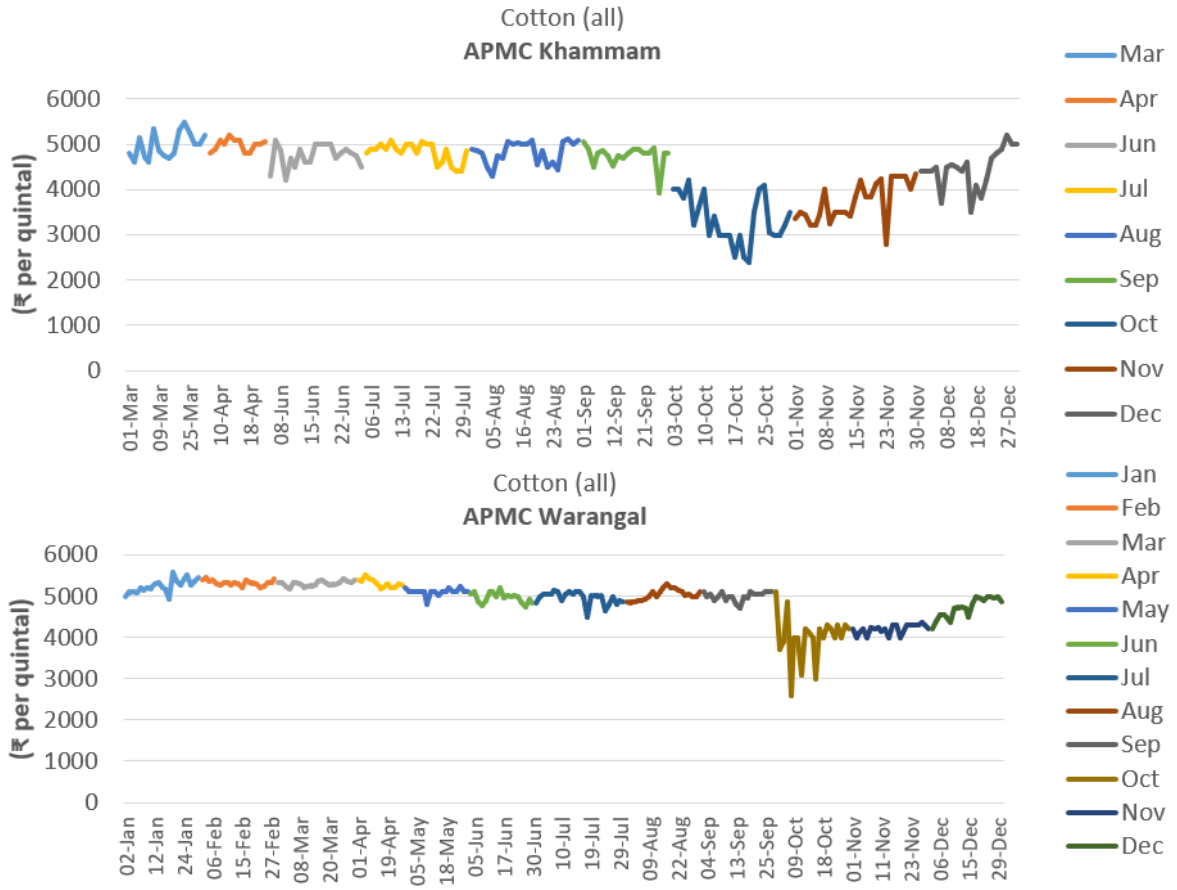


Fig. 3.22: Average daily modal price of Tur (Red Gram) in major e-NAM mandis in Telangana, 2017

Cotton is another cash crop for the Telangna farmers, which are mainly reported to be traded at 5 e-NAM mandis, as given in Table 3.18. These mandis together transacted almost 90% of total cotton traded in e-NAM in the state. Further, Khammam and Warangal are the main two e-NAM mandis for cotton trade, but both the mandis has reported different month as maximum trade month. In terms of traded price, it remained in the range of ₹4000-5000/q during the first eight months, thereafter there was a sudden drop in the modal price (Fig 3.23)



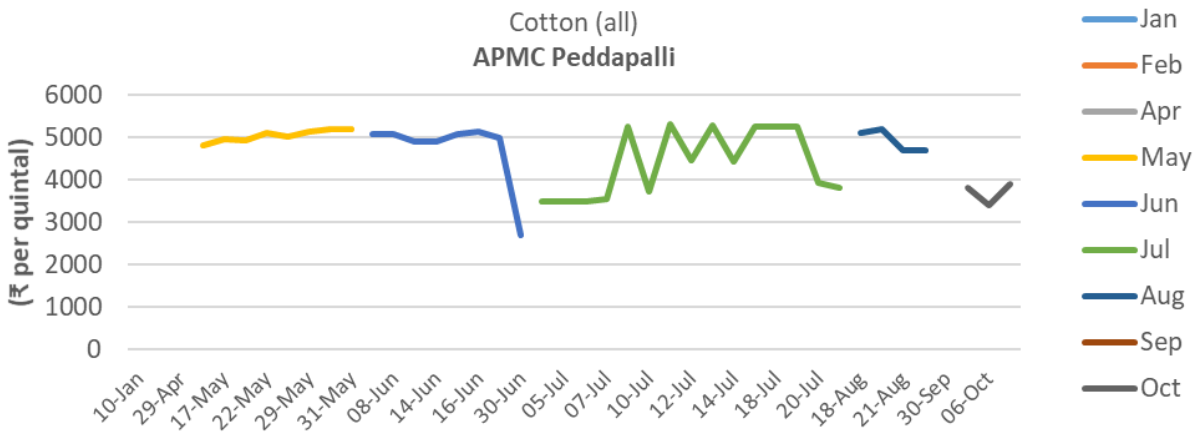


Fig. 3.23: Average daily modal price of Cotton in major e-NAM mandis in Telangana, 2017

Table 3.18: Monthly transaction of Cotton in top 5 mandis, 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Khammam			2388	3080		2605	3299	2010	1419	12051	31710	11945	70507	
Warangal	5320	8208	12995	3483	3766	5395	11384	6505	5276	3140	3131	1702	70305	
Peddapalli	4	5		5	221	992	7607	39	6	13			8892	
Kesamudram	637	803	652			531	1155	514	582	422	408	569	6273	
Gajwel	910	591	950	190	5					613	1088	767	5114	

Different types of maize grain are traded in the mandis of Telangana state. Those are maize bilt, maize hybrid, maize local, maize-new, maize-old, etc. The top 5 e-NAM mandis constituted roughly 50% of the total transaction on e-NAM in the state (Table 3.19). Surprisingly, the largest mandi viz. Metpally reported only two months- November and December for maize trade, while in other mandis, maize was traded around the year. The trade mainly peaked during October-December months. The traded price in 3 major e-NAM mandis are given in Fig 3.24.

Table 3.19: Monthly transaction of Maize in top 5 mandis, 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Metpally						7		1			31388	6886	38282	
Warangal	1554	843	2111	1415	1418	669	455	188	637	4122	11457	2383	27252	
Badepally	916	587	313	208	490	3634	8815	40	754	1513	236	3079	20585	
Kesamudram	572	531	799	668	794	4605	1543	75	476	4606	4819	929	20417	
Vikarabad	1183	2160	583	598	855	1379	2901	47		188	4194	5975	20063	

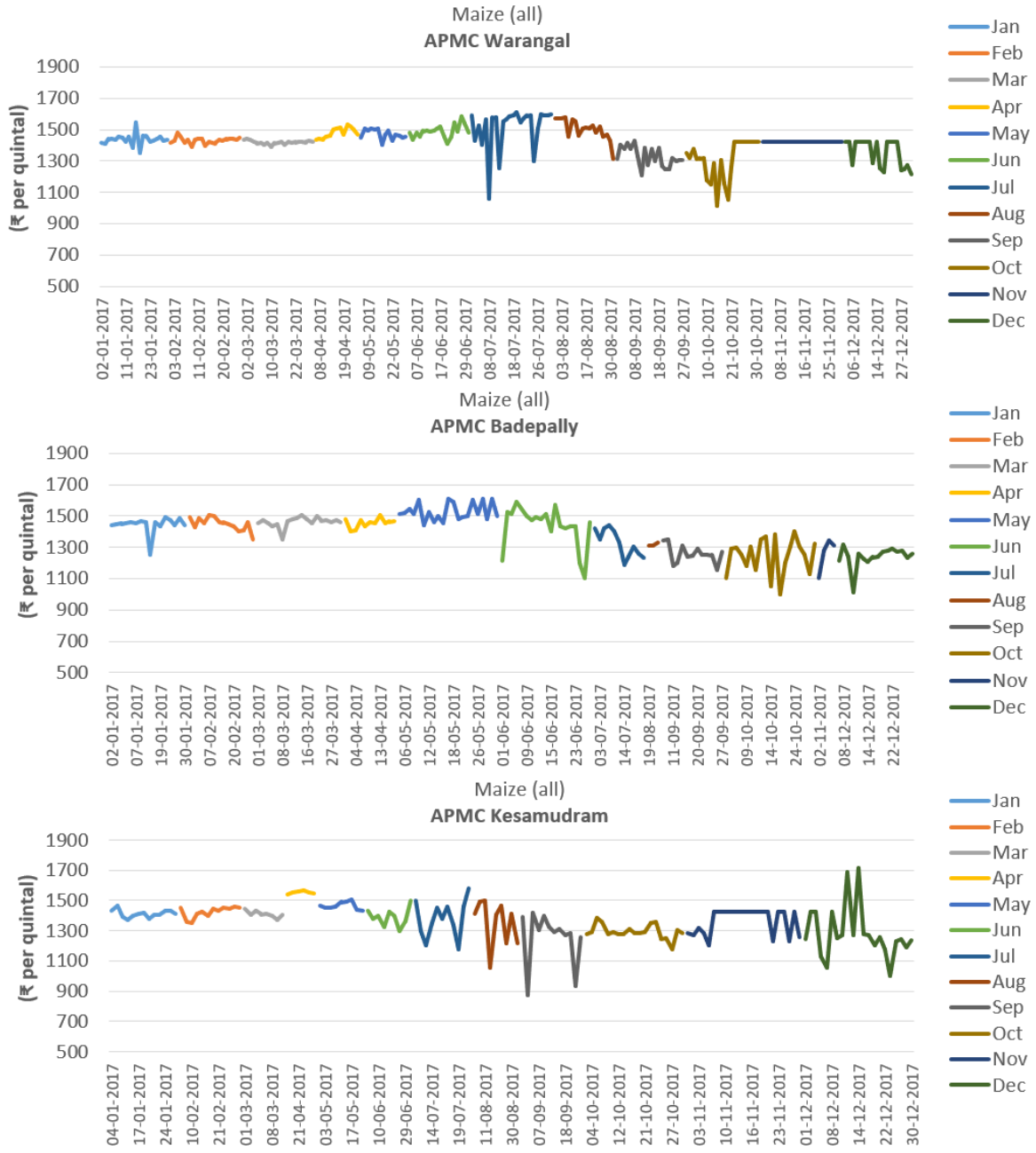


Fig. 3.24: Average daily modal price of Maize in major e-NAM mandis in Telangana, 2017

3.7.4. e-NAM transaction in Rajasthan state

The 25 e-NAM mandis in Rajasthan handled 56 types of different commodities (including different varieties of the same commodity) in the year 2017. Out of the total volume of transactions (5.57 lakh quintals), the **top 10 e-NAM mandis handled about 61 percent** of total commodity by volume. These mandis are Kota, Sri Ganganagar (Grain), Padampur, Sri Madhopur, Bikaner (Grain), Bandikul, Nokha, Bundi, Nagour and Jodhpur (Grain) in that order (Fig 3.25). While 15 mandis handled 40 per cent of commodities. There were a total of 14800+ daily records[3]. Major commodities traded in the top 10 e-NAM mandis are given in Fig 3.26 and Fig 3.27. Mustard, Guar Seeds, Wheat, Soybeans, Moong/Green gram, and Bengal Gram together constituted about 60% of total transactions in e-NAM in the state.

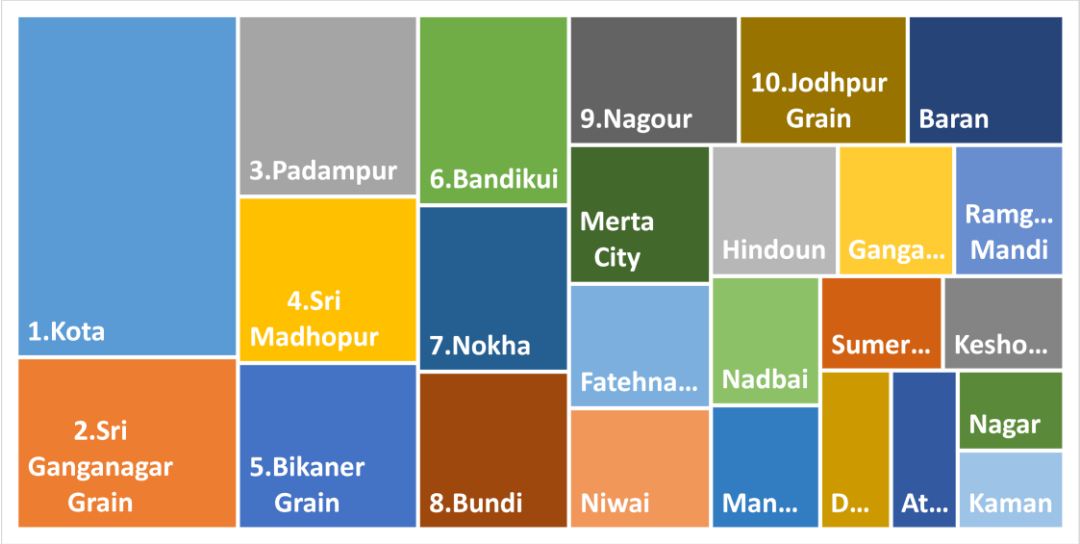


Fig. 3.25: Different e-NAM mandis in Rajasthan according to commodity transaction in 2017

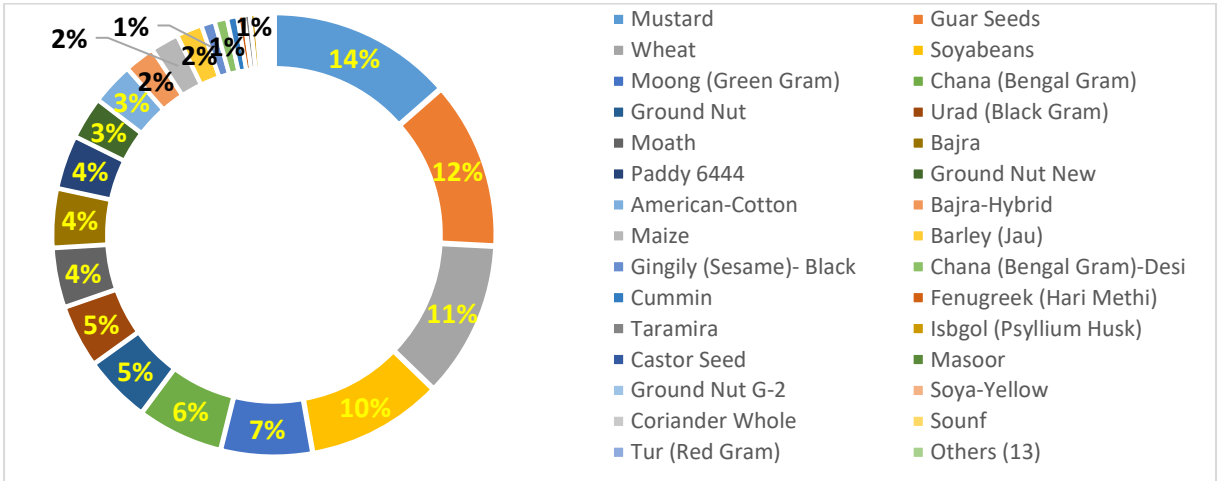


Fig. 3.26: Commodities transacted in the top 10 e-NAM mandis in Rajasthan, 2017

[3] Modal price was given for 15 entries with '0' traded quantity. Similalry, 6 entries were having '0' Arrival quantity, while 10 entries had very high mismatch between arrival and traded quantity (>500 or <-500q). All these have been discarded for analysis.

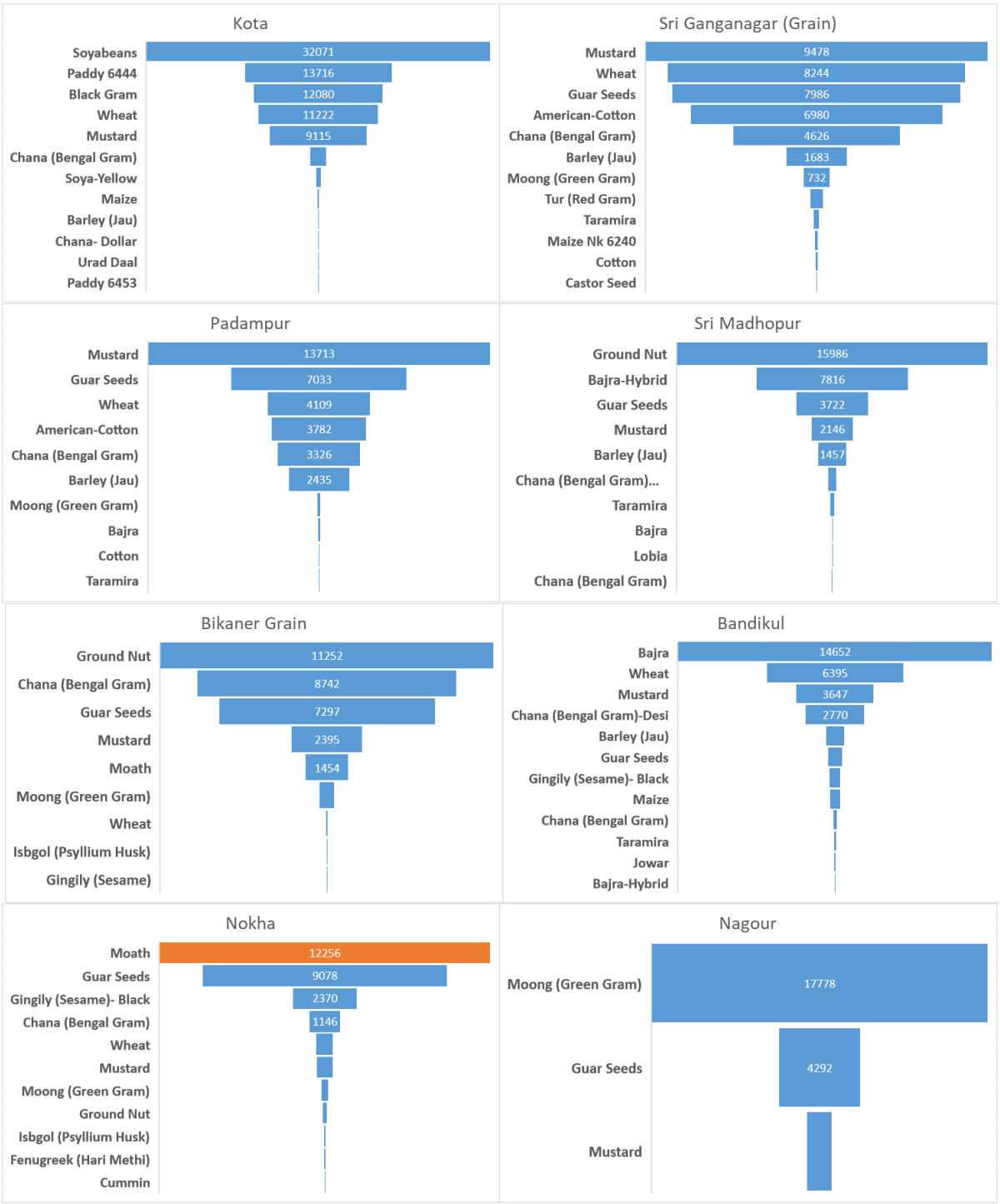


Fig. 3.27: Major commodities transacted through e_NAM in major e-NAM mandis

Top 5 e-NAM mandis in Rajasthan traded 42% of total mustard transactions in the state on the e-NAM platform. The maximum trade in each of these mandis happened during different months of the year (Table 3.20). The average daily modal price in 3 main e-NAM mandis are presented in Fig 3.28.

Table 3.20: Monthly transaction of Mustard in top 5 mandis, 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Padampur	799	791	1079	1673	1779	1615	1466	405	1863	828	576	839	13713	
Merta City	549	361	588	1055	1287	999	846	1034	1257	803	903	621	10303	
Sri Ganganagar Grain			134	87		1469	1301	1132	1852	950	1250	1303	9478	
Kota						728	512	1122	1828	1164	1764	1997	9115	
Gangapura	392	474	1463	182	500	581	556	777	903	678	761	865	8132	

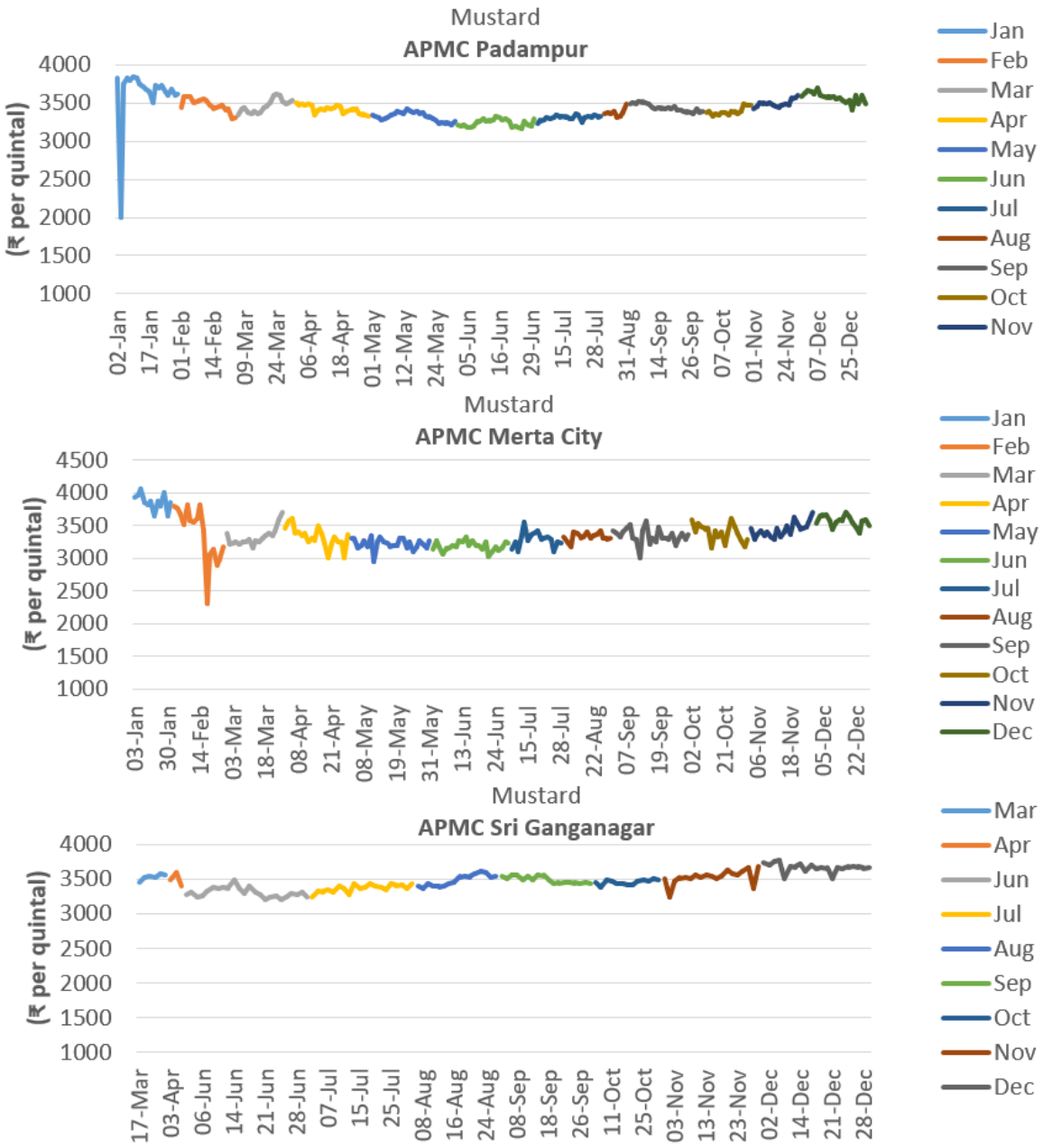


Fig. 3.28: Average daily modal price of Mustard in major e-NAM mandis in Rajasthan, 2017

Top 5 e-NAM mandis in Rajasthan traded 81% of total Guar seeds transactions in the state on the e-NAM platform. Arrival of mustard takes place from June month onward in these mandis. The maximum trade in each of these mandis happened during November-December months (Table 3.21). The average daily modal price in 3 main e-NAM mandis are presented in Fig 3.29.

Table 3.21: Monthly transaction of Guar Seeds in top 5 mandis, 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Nokha			25	6	13	92	783	1512	1391	1017	1138	3101	9078	
Sri Ganganagar Grain						784	738	668	538	1002	2365	1891	7986	
Bikaner Grain						160	172	790	1018	750	828	3579	7297	
Padampur	107	65	80		99	464	279	128	758	1922	1850	1281	7033	
Nagour						159	204	250	348	742	1743	846	4292	

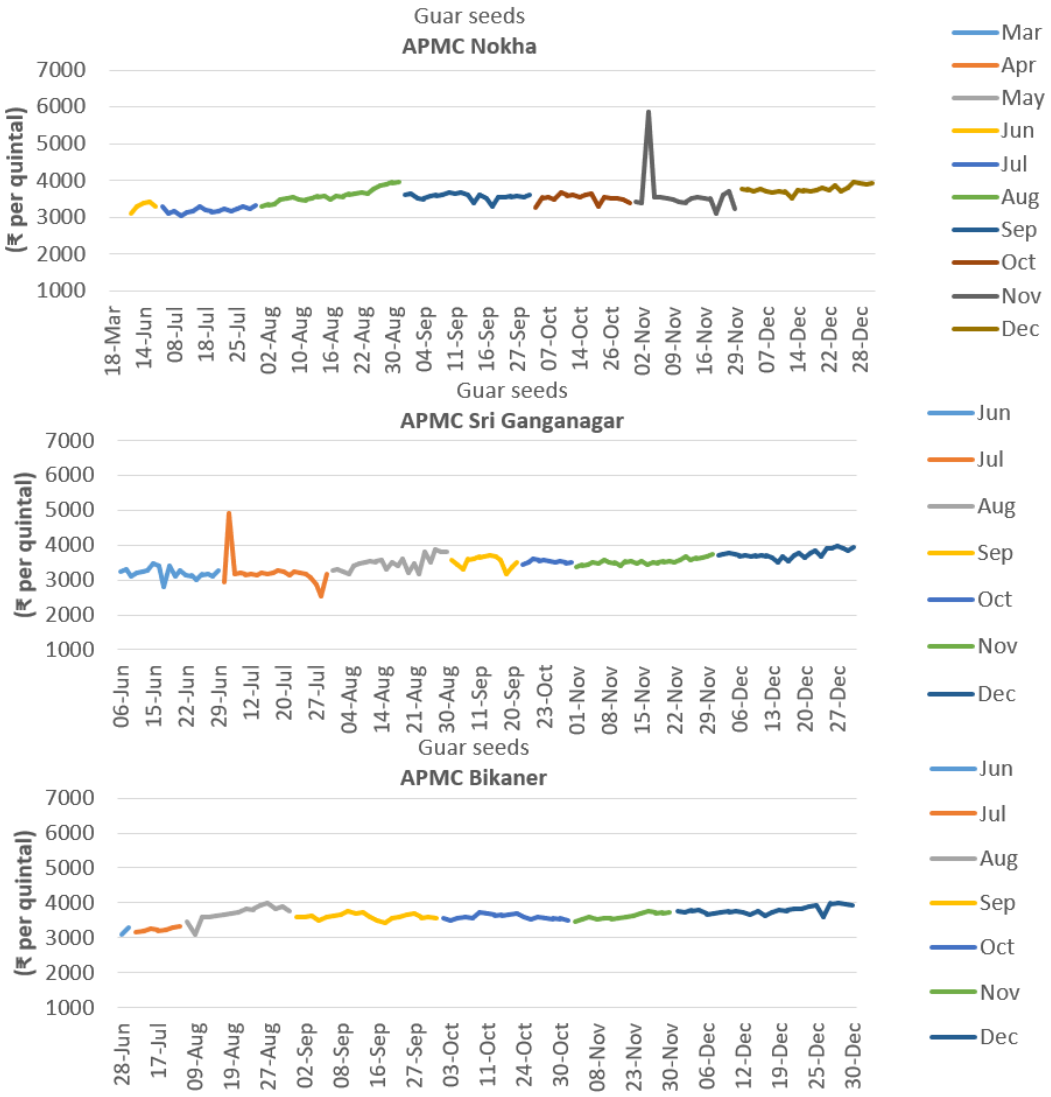


Fig. 3.29: Average daily modal price of Guar Seeds in major e-NAM mandis in Rajasthan, 2017

Top 5 e-NAM mandis in Rajasthan traded 49% of total Guar seeds transactions in the state on the e-NAM platform. Fatehnagar and Kota are two major e-NAM mandis for the Guar Seeds trade. The maximum trade in each of these mandis happened during different months (Table 3.22). The average daily modal price in 3 main e-NAM mandis are presented in Fig 3.30.

Table 3.22: Monthly transaction of Wheat in top 5 mandis, 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Fatehnagar	398	485	597	1206	1625	2078	1869	2557	2575	1375	912	838	16515	
Kota								51	2287	1584	3060	4240	11222	
Bundi							1009	1070	1490	1977	1079	2292	8917	
Sri Ganganagar Grain						1935	1875	1742	1215	400	638	439	8244	
Sumerpur			61	641	615	1891	1186	112	877	1096	974	593	8046	

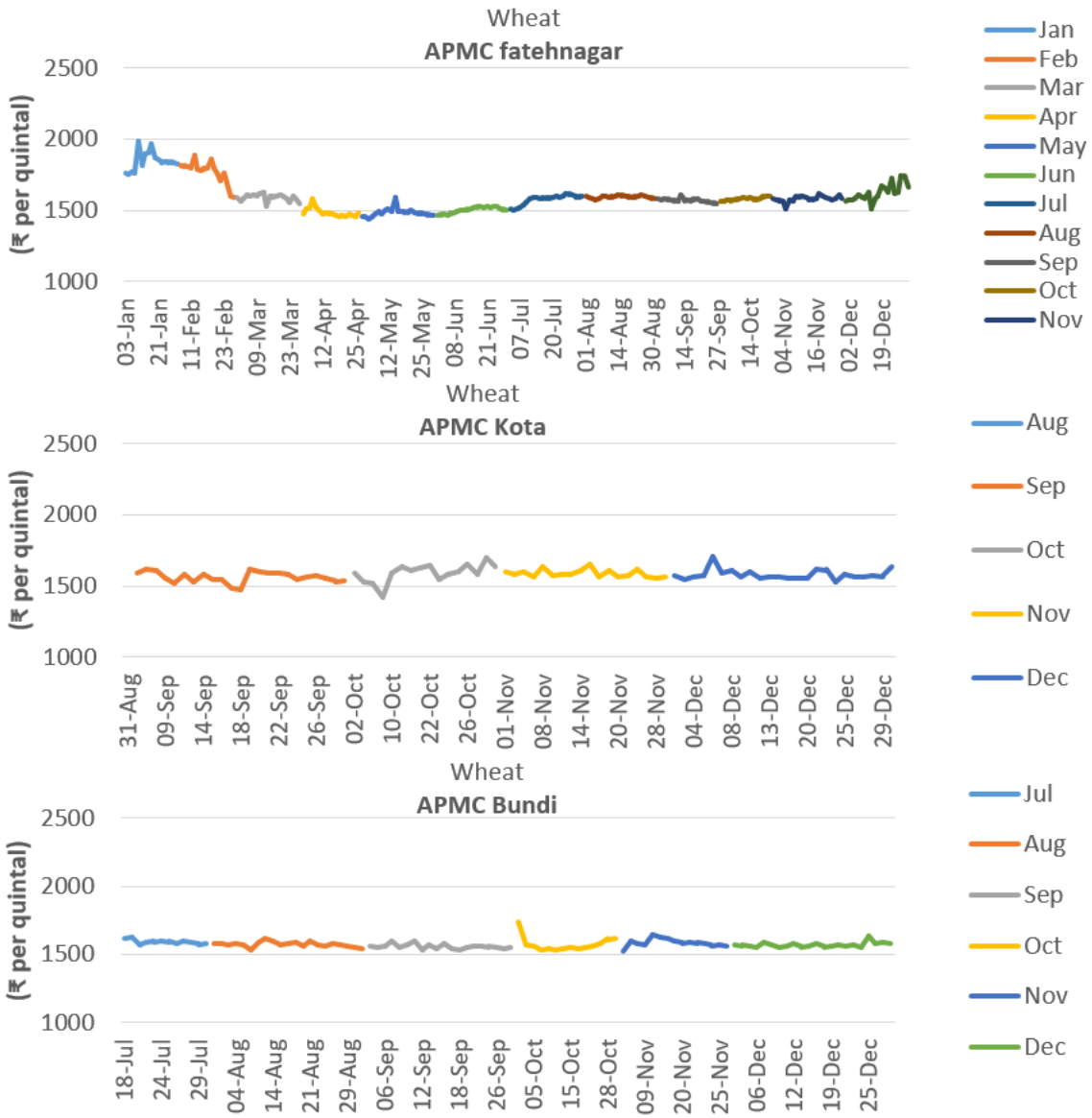


Fig. 3.30: Average daily modal price of Wheat in major e-NAM mandis in Rajasthan, 2017

Top 4 e-NAM mandis in Rajasthan traded 92% of total Soybeans transactions in the state on the e-NAM platform. Kota and Ramganj mandi are two major e-NAM mandis. The maximum trade in each of these mandis happened during November month (Table 3.23). The average daily modal price in 3 main e-NAM mandis are presented in Fig 3.31.

Table 3.23. Monthly transaction of Soybeans in top 4 mandis, 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Kota		286	786	701	954	1411	3442	6247	11265	7489	32581	838	16515	
Ramganj Mandi				261	48	13	431	708	1259	1563	4283	4240	11222	
Atru	71	26	9	109	376	414	480	706	660	703	3554	2292	8917	
Baran								290	1145	1410	2845	439	8244	

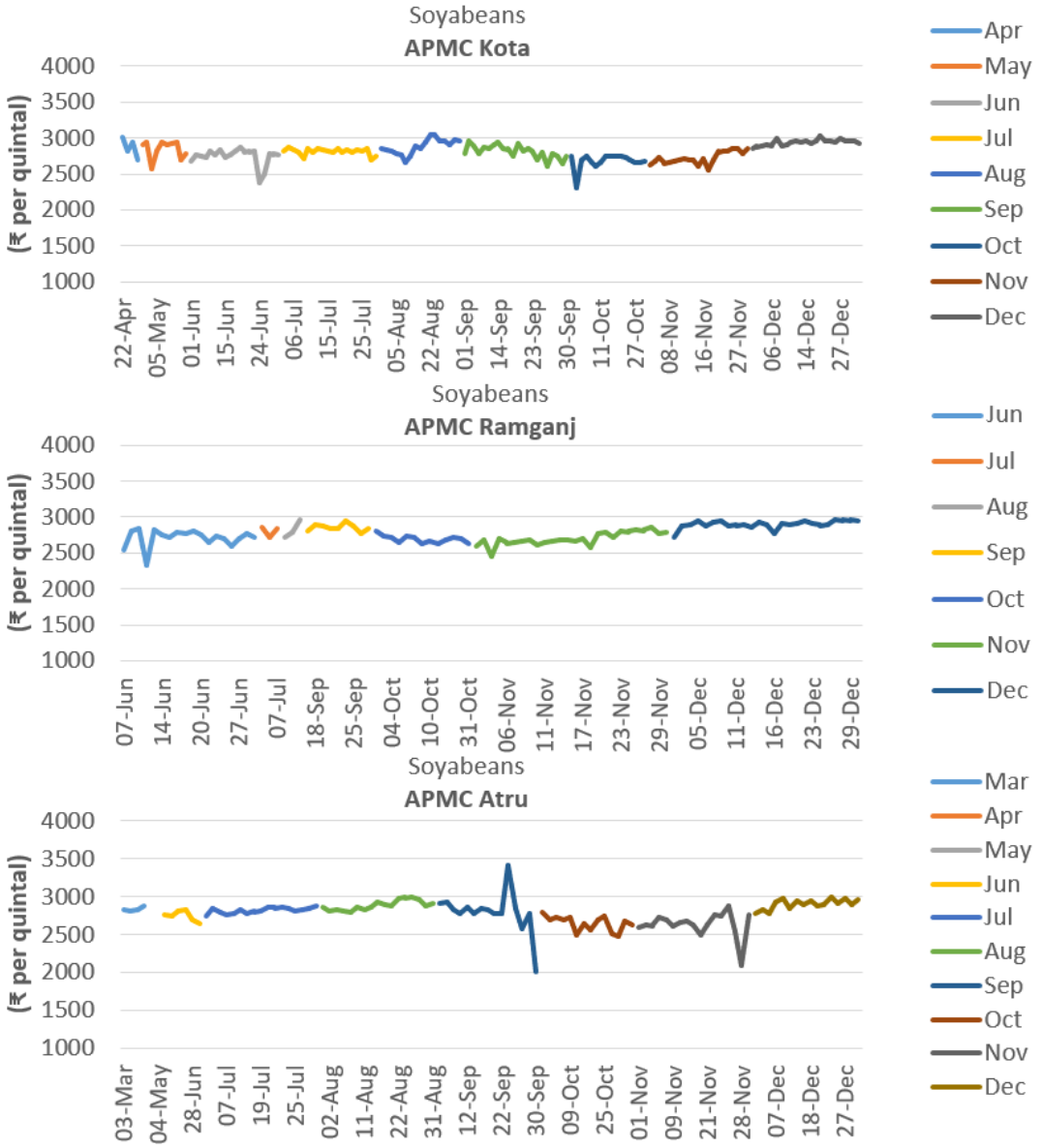


Fig. 3.31: Average daily modal price of Soybeans in major e-NAM mandis in Rajasthan, 2017

Top 4 e-NAM mandis in Rajasthan traded 43% of total Moong (Green Gram) transactions in the state on the e-NAM platform. Nagour and Merta City are two major e-NAM mandis for soybeans trade. The maximum trade in each of these mandis happened during November month (Table 3.24). The average daily modal price in 3 main e-NAM mandis are presented in Fig 3.32.

Table 3.24: Monthly transaction of Moong (Green Gram) in top 4 mandis, 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Nagour	648	1047	1274	912	1377	1291	892	1321	1333	1788	2388	3507	17778	
Merta City	713	870	802	754	711	1033	526	907	1207	768	1138	1199	10628	
Jodhpur Grain			13		13	15	94	379	673	738	962	920	3807	
Sumerpur						109	63			132	802	936	2042	

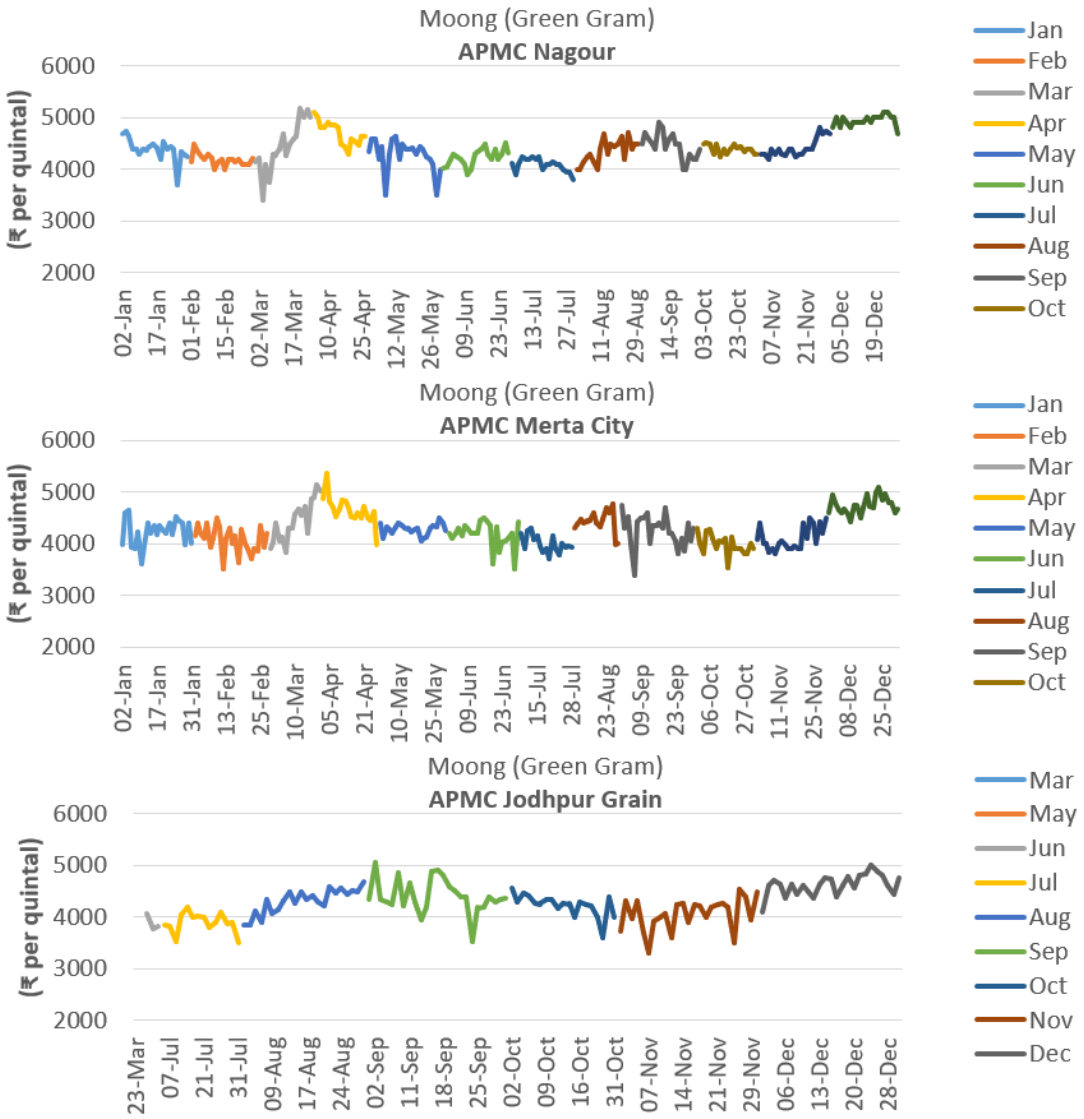


Fig. 3.32: Average daily modal price of Moong (Green Gram) in major e-NAM mandis in Rajasthan, 2017

Top 5 e-NAM mandis in Rajasthan traded 67% of total Chana (Bengal Gram) transactions in the state on the e-NAM platform. The maximum trade in each of these mandis happened in different months of the year (Table 3.25). The average daily modal price in 3 main e-NAM mandis are presented in Fig 3.33. The traded price in these 3 major mandis shows that the price was peak during August-September months when it touched ₹6000/q, it remained in the range of ₹4500-5000/q during rest of the year.

Table 3.25. Monthly transaction of Chana (Bengal Gram) in top 5 mandis, 2017 (quintals)

APMC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Trend
Bikaner Grain				210	2620	1077	1108	1707	678	317	378	647	8742	
Baran	10	93	1363	330	672	675	737	694	343	384	1250	1141	7692	
Sri Ganganagar Grain				45		693	1132	676	639	466	582	393	4626	
Ramganj Mandi	3	182	669	541	538	448	222	318	288	173	412	229	4023	
Padampur	1	3			130	775	805	198	862	211	227	114	3326	

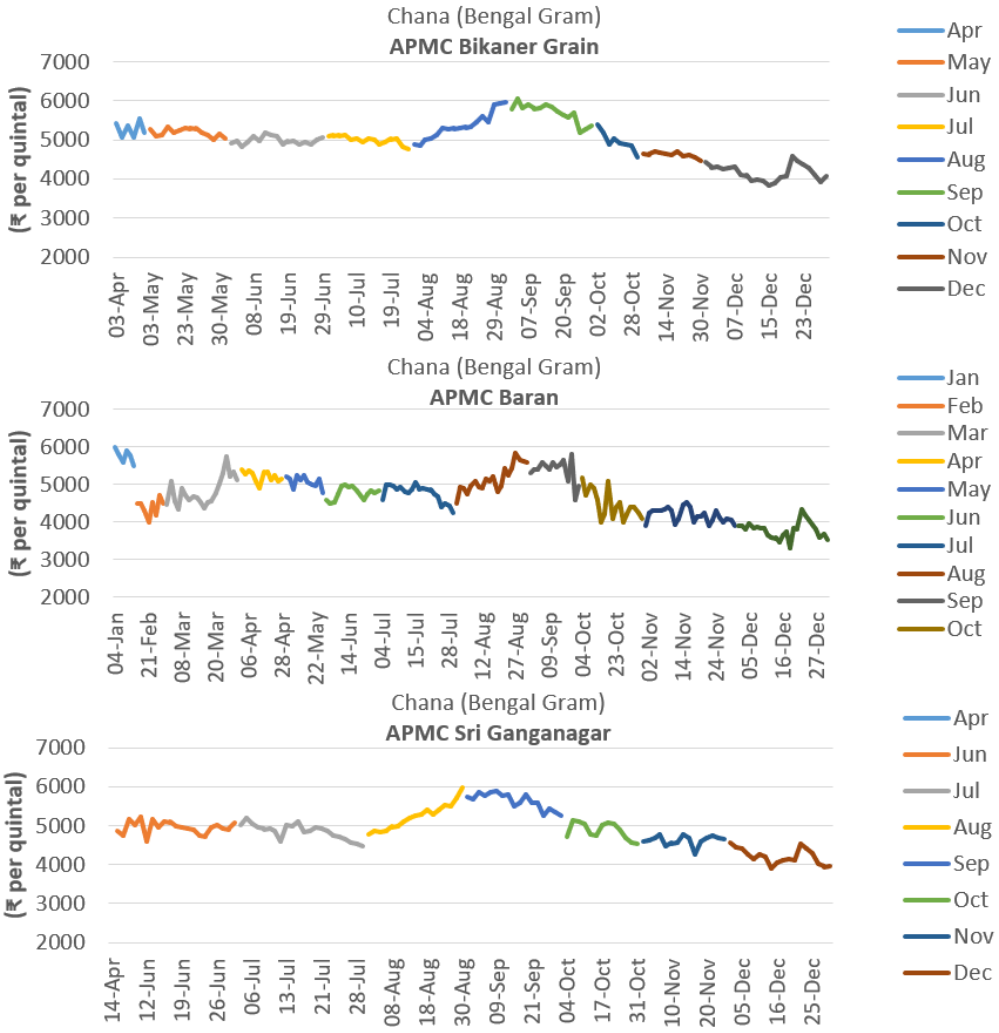


Fig. 3.33: Average daily modal price of Chana (Bengal Gram) in major e-NAM mandis in Rajasthan, 2017

The preceding discussion explained that there are few e-NAM mandis in each state, which has a significantly higher volume of transactions in a year. However, the transaction quantity also varies hugely across different months in a year. Further, in each of these mandis, less than 5 agricultural commodities, mostly 2-3 commodities, constitute more than 70-80% of the total transaction. Therefore, it would be better to standardize the process of implementation mainly for these commodities first and implement 100% of the transaction of these commodities in these mandis to give benefits to the maximum number of the farmers selling the commodities in the respective mandis. Moreover, some of the transaction information (quantity arrivals & traded, minimum, maximum & modal prices) given on the e-NAM portal appears to be not authentic, which warrants automated real-time monitoring of e-NAM implementation in these mandis.

Chapter 4

Characteristics & Preparedness of e-NAM Mandis

The e-NAM is contemplated to promote uniformity, streamlining of procedures across the integrated markets, removing information asymmetry between buyers and sellers and promoting real-time price discovery, based on actual demand and supply, promoting transparency in the auction process, and access to a nationwide market for the farmer, with prices commensurate with the quality of his produce and online payment and availability of better quality produce and at more reasonable prices to the consumer. Thus, e-NAM seeks to leverage the physical infrastructure of APMC mandis through an online trading portal, enabling buyers situated even outside the state to participate in trading at the local level. Price discovery through e-platform would ensure a fair price to the farmers. As discussed in the previous chapter, two rounds of survey was conducted during the study. The primary survey was carried out in the selected e-NAM enabled mandis in the states of Madhya Pradesh and Telangana states during the first round in the year 2017, while the survey of farmers was done in one district each from 4 states viz. Madhya Pradesh, Maharashtra, Rajasthan, and Telangana in the year 2019. In these 4 states, the farmers were selected from the villages around the major e-NAM mandi in the district.

4.1 General features of selected e-NAM mandis

The characteristics of these e-NAM mandis are presented in this section. The general information about the selected mandis in Telangana state has been presented in Table 4.1a. It may be observed that except in the Karimnagar market, in the rest of six markets in Telangana, e- NAM was launched during the first phase itself. Before the launch of e- NAM, the Nizamabad market committee implemented the e-tendering system in collaboration with NCDEX from last two years. In all the selected markets, almost all commodities were reported to be traded through e- NAM, except in Malakpet (Hyderabad) yard, whereas of now only one commodity, chillies have been included into the e-NAM, when the survey was conducted in 2017.

Table 4.1b explains the general features of selected e-NAM mandis in Madhya Pradesh state. Out of 4 selected APMC mandis in Madhya Pradesh state, three were integrated with the e-NAM platform during the second round of expansion of e- NAM, while APMC Bhopal was included in the e-NAM fold during pilot stage itself. However, it can be seen that during the field survey, none of these mandis were transacting directly through the e-NAM platform.

Table 4.1a: General features of the selected mandis in Telangana state

Particulars		APMC mandis registered on e-NAM platform						
		Malakpet	**Karimnagar**	**Thirumulagiri**	**Nizamabad**	**Warangal**	**Suryapet**	**Badepally**
Date of e-NAM implemented		14-04-2016	06-09-2016	14-04-2016	14-04-2016	14-04-2016	31-08-2016	16-04-2016
Commodities traded in selected mandi		Chilli, Onion, Tamarind	Paddy, Maize, Cotton, Pulses	Paddy, Pulses, GN	Turmeric, Maize, Paddy, Onion	Chilli, Maize, Cotton, Turmeric, Pulses	Pulses, Oilseeds, GN	GN, Maize, Castor, RG, Paddy, Cotton
Commodities traded through e-NAM		Chilli	All Commodities	All commodities	All commodities	All Commodities	All commodities	All commodities
Warehousing facilities		**No**	Yes	Yes	Yes	Yes	Yes	**No**
Number of stakeholders registered in e-NAM	Traders	128	110	55	420	647	129	98
	CA	151	13	43	120	447	134	58
	Farmers	9200	NA	18000	61397	NA	NA	NA

Source: First round of field survey (2017) CA: Commission Agents
Commodity: GN- Groundnut, RG: Red Gram/Tur

Table 4.1b: General features of the selected mandis in Madhya Pradesh state

Particulars	APMC mandis registered on e-NAM platform			
	Bhopal	**Indore**	**Sehore**	**Dewas**
Date of e-NAM implemented	14/04/2016	30/09/2016	15/09/2016	29/09/2016
Commodities traded in selected mandi	All Crops	All crops	All crops	All crops
Commodities identified for e-NAM	Wheat, Chana, Soyabean, Lentil, Maize, Mustard, BG, GG, Red-chilli etc.	BG, GG, RG, Jowar, Lentil, Pea, etc.	Chana, RG, Lentil, etc.	Chana, BG, GG, RG, Pea, Jowar, Maize, Mustard, etc.

Commodities traded through e-NAM		**At present, no commodities were traded through e-NAM**			
Warehousing facilities		Yes	No	Yes	Yes
Number of stakeholders registered in e-NAM	Traders	851	1477	309	300
	CA	Madhya Pradesh has no commission agents in APMCs.			
	Farmers	10886	12000	5000	5096

Source: First round of field survey (2017) CA: Commission Agents
Commodity: GN- Groundnut, RG- Red Gram/Tur, BG- Black Gram/ Urad, GG- Green Gram/ Moong, Chana- Bengal Gram

4.2 Preparedness of e-NAM enabled selected mandis (Round-I survey)

The successful implementation of e-NAM depends upon the preparedness of these e-NAM enabled mandis in bringing some changes to facilitate the trading on electronic platforms. These markets require appropriate infrastructure- efficient standardizing and grading system, high-quality internet facility, terminals for information dissemination & bidding, inter-linkage with financial institution, access to other segments of marketing chain like warehouses, cold storage, well-trained staffs, etc. It is important to mention here that ReMS in Karnataka is considered to be the role model for the conceptualization of e-NAM at the national level. The ReMS system of the unified market model was developed by the National Commodity & Derivative Exchange Ltd (NCDEX) way back in 2011. The ReMS integrated all the mandis in Karnataka state and has provided facilities of assaying in mandis, online payment to farmers, facilitation of warehouse-based sale of produce, and commodity funding for all stakeholders.

Table 4.2 describes the components that are followed presently in selected mandis in Telangana state. In Nizamabad market, producers have the option to sell their produce without a commission agent. The gate entry and generation of unique Id has been implemented in all the markets, while assaying facilities are not functional in any of these mandis, except in Nizamabad. In Nizamabad market, the assaying lab is functional and done by NCML, a subsidiary of NCDEX. Every day assaying agencies were checking moisture percentage of about 15% of total lots.

At present in all the markets except in Nizamabad direct-purchase center (DPC), commission agents pay the farmers by cheque/RTGS/cash. In Nizamabad DPC, the payments were integrated into e-NAM and the farmer is receiving money directly by traders. In these markets, the electronic weighments are installed but not integrated into the e-NAM portal.

Table 4.2: Implementation of different components of e-NAM in selected mandis in Telangana, 2017

Particulars	Mala kpet	Karim-nagar	Thiru-mulagiri	Nizama-bad		Wara-ngal	Surya-pet	Bade-pally
				Non DPC	DPC			
Generation of Unique Lot ID at entry gate	✓	✓	✓	✓	✓	✓	✓	✓
Sampling from heap	×	×	×	×	×	×	×	×
*e-Auction	✓	✓	✓	✓	✓	✓	✓	✓
Assaying	×	×	×	×	×	×	×	×
Best price-SMS sent to the farmers	×	×	×	×	×	×	×	×
Electronic weighments	×	×	×	×	×	×	×	×
Generation of sale receipt	×	×	×	×	✓	×	×	×
Online payment	×	×	×	×	✓	×	×	×
Permit/ Gate exist	✓	✓	✓	✓	✓	✓	✓	✓

Source: Field Survey (2017)

Note ✓ means followed and × means not followed

DPC: Direct Purchase Centre

**Online bidding is not happening and trading happens in traditional ways and data has been entered in the system after the trade.*

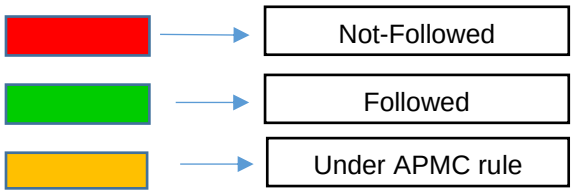
The information dissemination about the bidding winner list was not followed as per the procedure and farmers and traders continue to face information asymmetry. Even SMS services regarding prices were not implemented. In Nizamabad DPC center mandi officials were announcing the winner bid lists whereas in other markets manual receipts were given to the farmers instead of generating sale receipts. In general, the infrastructure support needed to make the e-NAM platform functional at mandi level was not available in most of the APMCs under study. Proper internet connectivity, lack of skilled staff, non-functional assaying facilities, grading, and sorting was not available in these APMCs. Trainings so far arranged for the mandi staff and traders for effective implementation were found to be inadequate.

Table 4.3 describes the preparedness of selected mandis in Madhya Pradesh for implementing online trading on the e-NAM portal. During the survey in these mandis in March 2017, it was observed that Unique Lot ID is generated and given to farmers at auction platform. Assaying facilities and e-auction were not implemented in any of these markets. Best price SMS to farmers facility was also not available except in Dewas mandi. Farmers had the right to refuse to sell their goods at any time. At

present in all the markets, the provision of payment is made through cheque and RTGS. However, farmers were receiving money in cash directly by the traders. In all the markets, the electronic weighing is installed, but the weighing is done by the traders at their shops.

Table 4.3: Implementation of different components of e-NAM in selected mandis in Madhya Pradesh, 2017

Particulars	**Bhopal (Karond)**	**Indore**	**Sehore**	**Dewas**
Generation of Unique Lot ID at entry gate*				
Sampling from lots				
Assaying				
e-Auction				
Best price-SMS sent to the farmers				
Electronic weighing				
Generation of sale receipt**				
Mode of Payment (Cashless)				
Permit/Gate exist				



* Generated later

** Issued by the traders

Assaying equipment, particularly, moisture meters are found to be available in many markets. However, assaying is not found to be happening in any of these markets. Farmers' lots with gate entry kept on the trading platform. Traders check for the quality themselves by physically visiting the lots before quoting the price for the traded commodities. In the best-case scenario, traders use Digital Moisture Meter for moisture content. Based on physical assessment, traders quote the price for a given lot on the e-NAM portal (Fig 4.1). The highest bidders are declared as winner. From the above information, it may be concluded that all these APMC mandis in both the states-Madhya Pradesh and Telangana, were not fully ready for the trading of agricultural commodities on the e-NAM platform. The only difference was the trade information is recorded digitally after the trade for the day completes in the market.

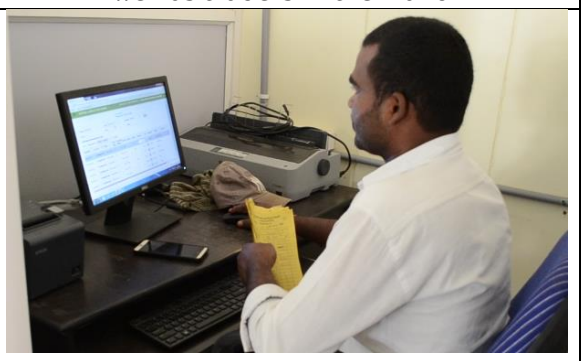
Commission agent key stakeholder at Parbhani mandi

Space constraint at Malakpet mandi

Snapshot of Kota mandi

Cash payment is preferred by farmers as well as traders in the mandi

Trader physically inspecting the lot



Trader putting his bid after physical inspection of the lots

Fig. 4.1: Different marketing activities going on during visit to e-NAM mandis

However, when transaction data from the e-NAM platform for the period January-December 2017[1] was collected, it was observed that various types of commodities were reported as traded through the e-NAM platform (Table 4.4). From personal communication with mandi officials in these mandis revealed that transactions done offline were entered into the system for reporting purposes. From the table, **two important observations appear- 1. Few mandis had huge market arrivals, while in other mandis, the volume of commodities' arrivals/traded were very low, and 2. In**

[1] Earlier the daily transaction data mandi-wise and commodity-wise was avaialble on e-NAM portal. However, now only past one week data is available in public domain. Moreover, lot-wise transaction information is not available in the public domain.

each mandi, only 2-3 commodities constituted a major transaction (Annexure VI). These are discussed in detail in the latter part of this chapter as well.

Table 4.4: Transaction reported on e-NAM platform for the selected e-NAM mandis for the period January-December 2017

State	e-NAM Mandi	Types of Commodities traded in 2017	Total quantity traded on e-NAM, 2017 (tonnes)
Telangana	Malakpet/ Hyderabad	7	187,623
	Karimnagar	30	14,062
	Nizamabad	87	30,882
	Warangal	161	20,427
Madhya Pradesh	Karond/Bhopal	19	2,054
	Indore	15	1,279
	Dewas	19	1,192
	Sehore	8	617

4.3 Preparedness of e-NAM mandis (Round-II survey)

During the second round, the implementation status was studied based on eleven indicators in 4 states. The indicators are given in Table 4.5. As per guidelines by the government of India, each mandi that gets integrated with the e-NAM platform would receive a grant of ₹30 lakhs for its modernization including the creation of additional facilities, trading platform, internet, etc. The effective way of implementing the assaying system is through making the process simpler and automatic with provision for scaling up. The process should be made simpler such that it should take minimum time so that all the lots during peak season can be assayed. The process should be automated so that bulk materials during peak can be handled effectively. Assaying infrastructure should be adequate to handle the peak period rush.

From the Table 4.5 and Figures (4.2 to 4.5) below, it is evident that the current facilities created at these mandis might not be sufficient to give confidence to the buyer-traders. In one of the mandis, when we asked about how the assaying lab conduct analysis, hesitantly they agreed to demonstrate the procedure. The mandi official with the help of casual semi-skilled labour were counting the damaged grain of one sample of groundnut manually. It took more than 20-25 minutes in shelling, counting, and weighing the grains. This makes a case that if the same procedure is followed for all the commodities, it would be impossible to sample and assay all the lots arriving in the mandi during peak season. As shown in Fig 4.4, during peak days, the number of lots arriving at each mandi varies between 500 to 5000.

Table 4.5: Basic infrastructure and process followed in the e-NAM mandis, 2019

Sl.no	Facilities (infrastructure + processes)	e-NAM mandis surveyed during Round -II			
		Shadnagar (Telangana)	**Jabalpur** (M.P.)	**Parbhani** (Maharashtra)	**Kota** (Rajasthan)
1.	Assaying equipment	✓	✓	✓	✓
2.	Warehouse	✓	✓	✓	✓
3.	Cold storage	×	×	×	×
4.	Drier (electrical drier,	×	×	×	×
5.	Only Closed bidding	×	✓/×	×	×
6.	Electronic weighing machines at yard	✓	✓	✓	✓
7.	Gate entry	✓	×	✓	×
8.	Inter-mandi trading	×	×	×	×
9.	Traded price	×	×	×	×
10.	Transferring proceeds	✓	✓	✓	×
11.	Cash transactions	✓	✓ (₹50K)	✓	✓

Source: Field survey (2019)

*Basic assaying equipment like digital moisture meter and electronic weighing machines were available.

A comparison among these markets showed that, in all the selected markets except Kota, the settlement of proceedings takes place through bank account or by cash. In Rajasthan, only cash transaction is entertained. Further, at Jabalpur mandi, to pay for immediate needs like payment towards loading and unloading, transportation, etc. an amount of ₹50,000/- is permitted to pay by cash or cheque, while the rest needs to be routed through the bank. However, farmers at Jabalpur faced problems in the collection of cheque. At Jabalpur, both closed and open auction is adopted. In a separate terminal at Jabalpur mandi, e-NAM is being implemented on a trial basis. While in all other selected markets, open auction is being adopted and after the transaction, the data is inputted into the e-NAM portal.

Fig. 4.2: Manual counting of broken/damaged peanut in the assaying lab of one of the e- NAM mandis

Fig. 4.3: Traders assessing the quality of Red Gram by personally inspecting the lot

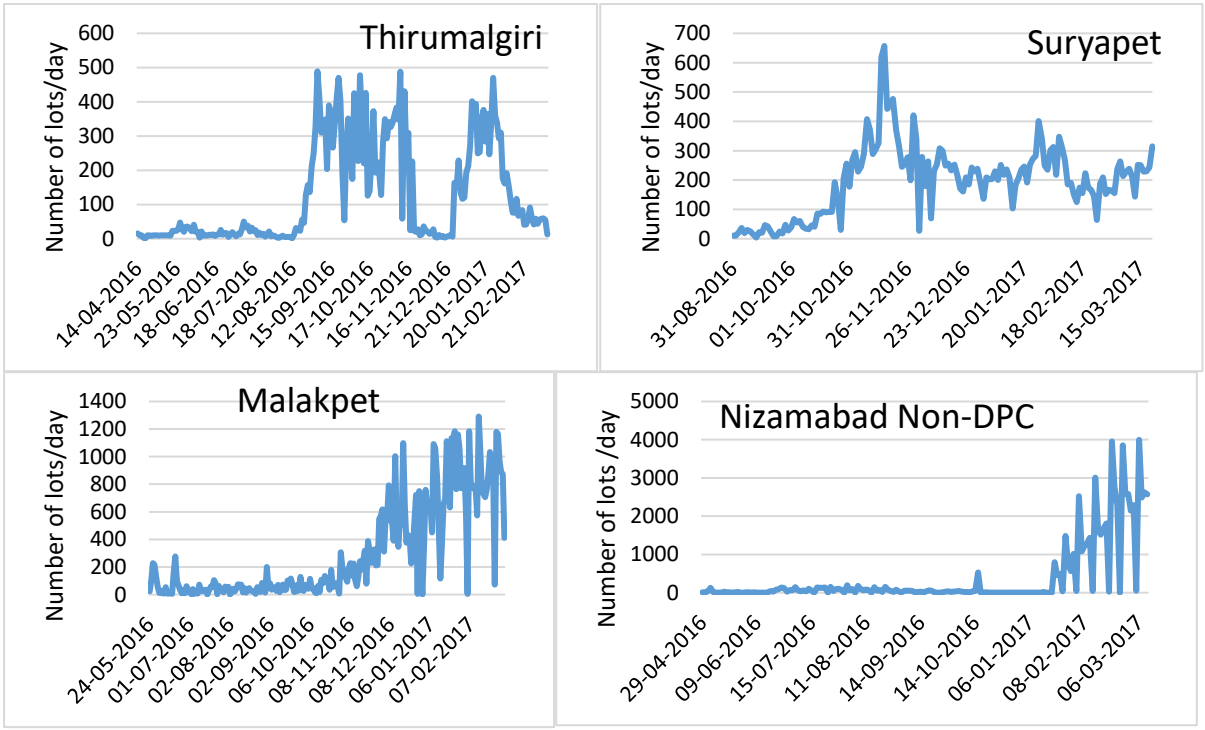


Fig. 4.4: Daily lot arrival in various markets of Telangana, 2016-17

Table 4.6: Tradable parameters for dry chillies

S.No	Tradable Parameters	Range-I	Range-II	Range-III
1	Moisture (% by wt)	up to 10.0	10.1-10.5	10.6-11.0
2	Foreign matter (% by wt)	up to 0.50	0.51-0.60	0.61-0.85
3	Unripe and marked Fruits (% by wt)	up to 1.0	1.1-1.5	1.6-2.0
4	Broken fruits and fragments (% by wt)	up to 3.0	3.1-4.0	4.1-5.0
5	Insect damaged matter (% by count)	up to 0.10	0.11-0.5	0.6-1.0
6	Capsaicinoid content	0.30 -0.25	0.24-0.20	0.19-0.10
7	Uniformity	More uniform	Slightly less uniform	Less uniform
8	Luster	Normal	Medium	Poor

Fig. 4.5: Red chillies kept in gunny bags or as big heap making it difficult to assay the quality mechanically

Further, for a commodity like chillies which are kept in large size bags or heaps and are voluminous (Fig 4.5), there is no equipment available for grading or testing the grades. On the other hand, different parameters to define different grades are quite exhaustive (Table 4.6). Assaying is presently optional and hence, was not followed except for a few lots traded for the record purposes.

4.4 Transaction reported on e-NAM platform

A. Madhya Pradesh (April – December 2016)

The daily transaction data reported on the e-NAM platform were collected for the selected states for the period April -December 2016. Although, these data were not continuous. For instance, for Madhya Pradesh, data was not available from October 2016 to December 2016. In the 5 selected e-NAM mandis in Madhya Pradesh, it may be observed that there was huge variability in the arrival of the commodity in these mandis (Table 4.7). Interestingly, data reported in e-NAM portal shows a significantly high volume of transaction in initial days of April 2016 (immediate after integration of mandi with e-NAM), which later got tapered down (Fig. 4.6) Total 17 commodities were reported on e-NAM portal, out of which, Bengal Gram constituted more than 88% (Fig. 4.7). The daily average (of 5 mandis) modal price (per quintal) of Bengal gram varied from ₹1000-1250 in early April month to peak of ₹9500-10,000 during the middle of October month.

Table 4.7: Monthly traded volume of different commodities reported in selected e-NAM mandis of Madhya Pradesh, 2016 (in Quintals)

APMC	Apr	May	Jun	Jul	Aug	Sep	Oct	Dec	Grand Total	Column1
Dewas						52	360	11	**423**	
Indore						2	88		**90**	
Jabalpur						9	121	4	**134**	
Karond (Bhopal)	1001	525	543	275	44	307	262	286	**3243**	
Sehore						10	186	5	**201**	
Grand Total	**1001**	**525**	**543**	**275**	**44**	**380**	**1017**	**306**	**4091**	

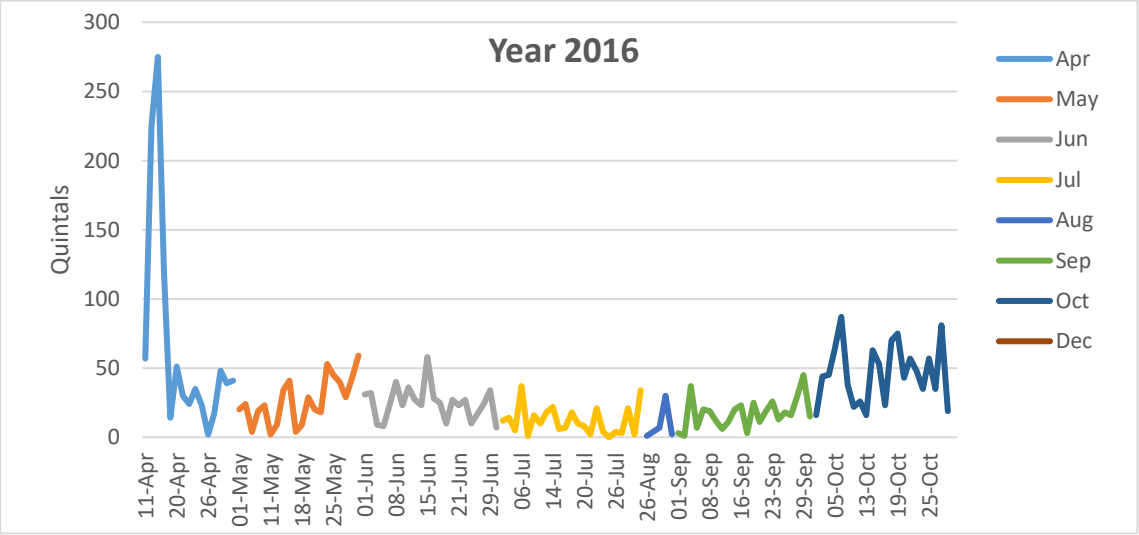


Fig. 4.6: Daily total transaction reported in the 5 selected e-NAM mandis in Madhya Pradesh

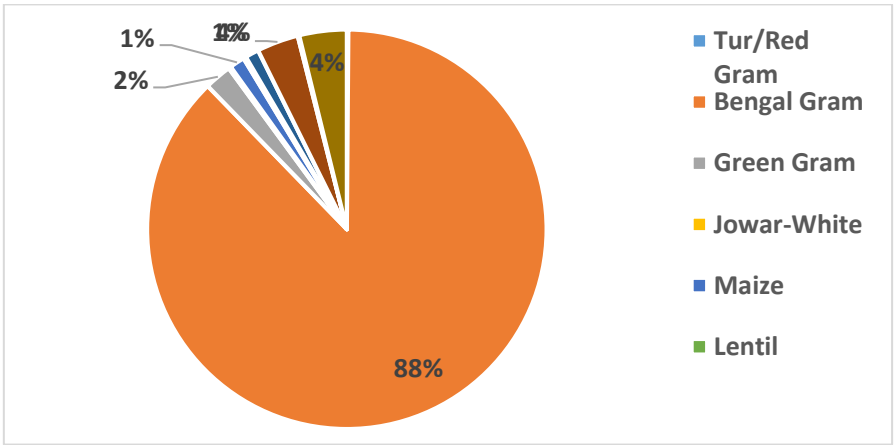


Fig. 4.7: Different commodities traded on e-NAM in selected mandis, 2016

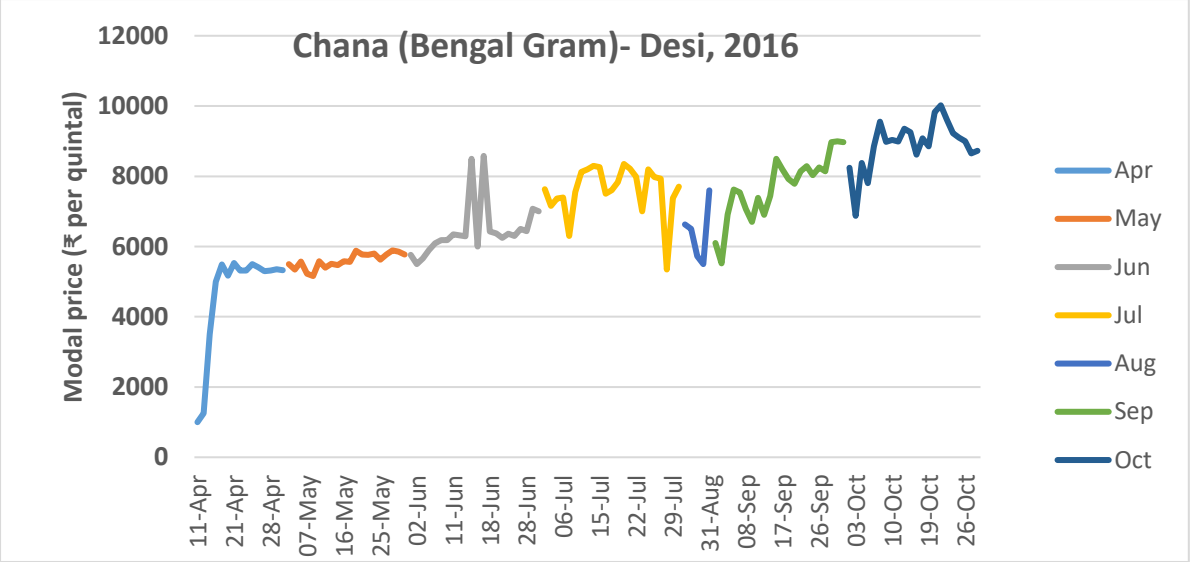


Fig. 4.8: Daily average modal price of Bengal Gram in 5 selected mandi in Madhya Pradesh

B. Telangana (April – December 2016)

The monthly traded commodities in the selected e-NAM mandis in Telangana also exhibited lots of abruptness (Table 4.8). All these e-NAM mandis have an unusually very high volume of transactions in different months of the year 2016. There were more than 50 types of commodities reported on the e-NAM portal, out of which, Paddy and Maize constituted more than 60% of total trade (Fig. 4.10). The daily average (of 5 mandis) modal price (per quintal) of Bengal gram varied from ₹1000-1250 in early April month to peak of ₹9500-10,000 during the middle of October month.

Table 4.8: Monthly traded volume of different commodities reported in selected e- NAM mandis of Telangana, 2016 (in Quintals)

e-NAM Mandi	Apr	May	Jun	Jul	Aug	Sep	Oct	Dec*	Total	Trend
Badepally	140	150	425	160	158	1866	4326	352	**7577**	
Hyderabad/ Malakpet	227	129	1614	683	170	780	927	125	**4655**	
Karimnagar						13	889	6825	**7727**	
Nizamabad	191	4239	12996	2786	1310	2744	612	20	**24898**	
Shadnagar						51	456		**507**	
Suryapeta					51	1720	6247	134	**8152**	
Tirumalgiri	513	1837	1114	945	583	6004	11133	528	**22657**	
Warangal	2379	2232	863	3519	1196	3628	8240		**22057**	
Grand Total	**3450**	**8587**	**17012**	**8093**	**3468**	**16806**	**32830**	**7984**	**98230**	

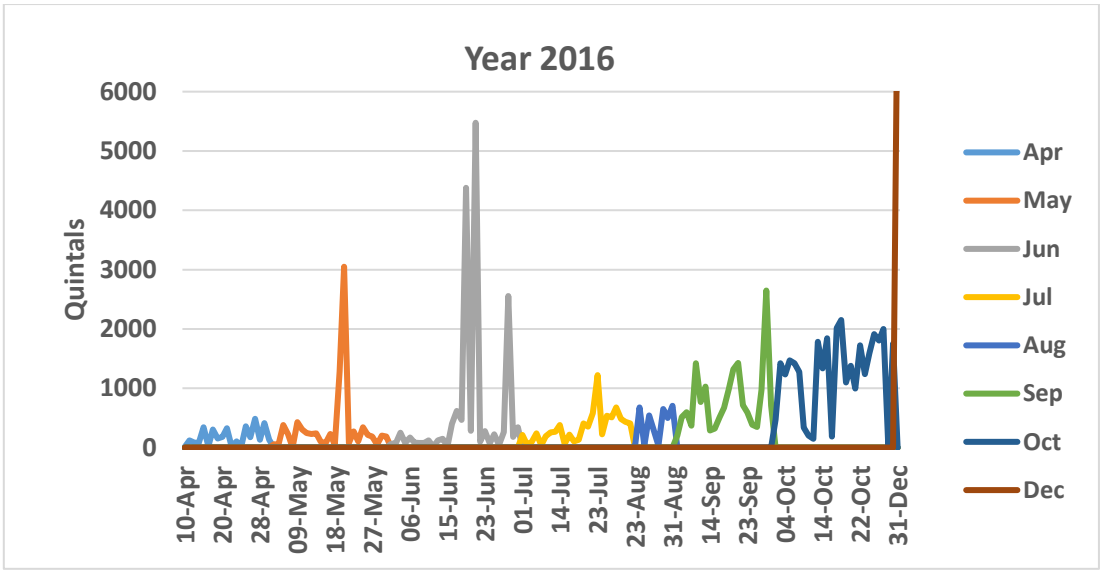


Fig. 4.9: Daily total transaction reported in the selected e-NAM mandis in Telangana

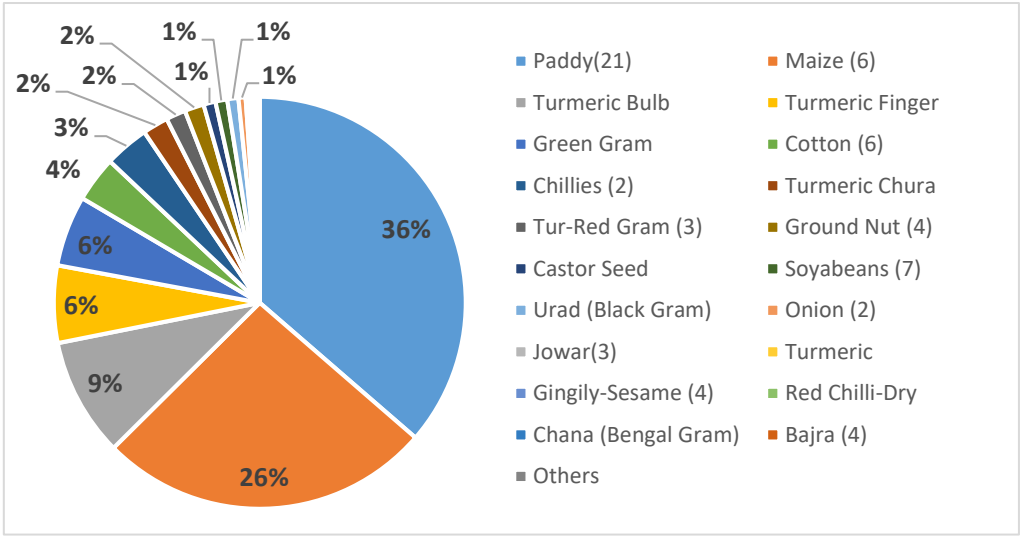
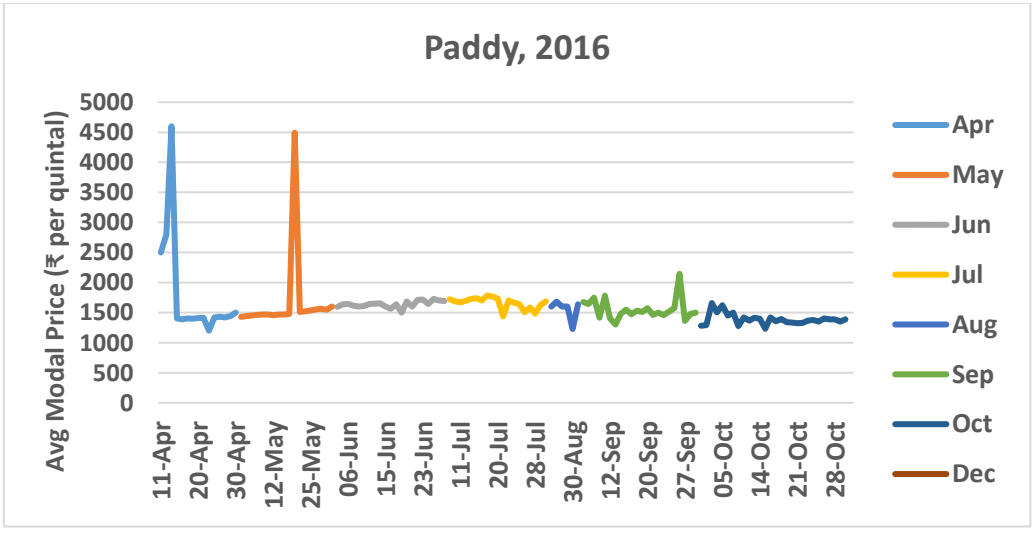


Fig. 4.10: Different commodities traded on e-NAM in selected mandis in Telangana, 2016



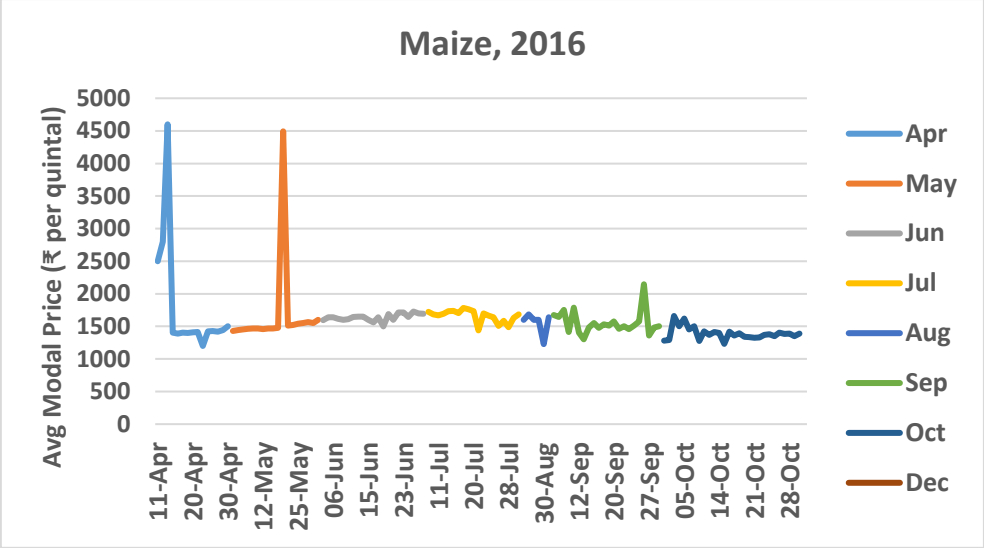


Fig. 4.11: Daily average modal price of Paddy and Maize in selected mandis in Telangana

From the above discussion based on on the two rounds of survey in different e-NAM enabled mandis, it may be concluded that different operations followed in these mandis were as follows which had some limitations, due to which achieving the intended objectives of the e-NAM may be challenging (Fig. 4.12):

(i) **Gate entry:** Gate entry is made as the truck/tractor enters the market yard where farmer name, village, and produce details are entered. All the markets are also having an electronic weightment bridge for weighing the loaded tractors. It is observed that the farmers are not issued permanent IDs in any market selected in the study and every time, a farmer enters the market, it will be regarded as a fresh entry. Therefore, it is not possible to trace the details of all transactions made by the farmer. Further, due to this practice, the statistics like the number of farmers who are members of the market may not be factual.

(ii) **Assaying:** With the funds of the National Agricultural Market scheme, all the markets have developed infrastructure for assaying. The common equipment purchased in this scheme are weighing scale, moisture meter, autoclave, etc. On perusal of these machines/equipment, it is evident that these machines are manually operated and obsolete which takes more time for assaying. **With certain assumptions, it is calculated that it takes roughly 30 minutes to assay a lot with the specifications laid out for eNAM implementation. In the present situation, without the use of modern and automatic assaying machines, it is impossible to assay all the lots even during the normal season. There is a time gap of about 3 to 4 hours from taking a sample to the start of the bidding process before which the assaying process should have been completed. In this time, a maximum of 10 samples can be assayed by one person. Hence, it is a herculean task to assay all the lots and input the information in the portal before bidding.**

(iii) **Online trading:** All the markets studied except Nizamabad were adopting open auction method and the traded price and quantity were entered after the transaction was over. The traders were assessing the quality themselves and noting the bid price on a paper and later, it was entered into the system. Sometimes dummy bids were also generated for record purposes only.

(iv) **Online payment:** Both farmers and traders are not in favour of online payment. However, on the insistence of market authorities, traders/commission agents are routing some of the payment through the online system by NEFT/RTGS/IMPS. Cash transaction is predominant in all markets except Jabalpur where above Rs.50,000, cash transaction is not permitted.

(v) **Gate exit:** The settlement time has considerably reduced in the market were eNAM is implemented. Due to computerization, the settlement activity and generation of various reports, invoices and receipts are much faster. The farmers can leave about 3 to 6 hours earlier due to eNAM implementation depending on the season and market. There is no feedback system to rate the services of the market, commission agent, traders, and other stakeholders.

Similar findings were also reported by Aggarwal et al (2017) when they visited some of the ReMS enabled mandis in Karanataka in 2015-16 and interviewed different stakeholders. It may be noted that ReMS was in operation for the past 3-4 years. They observed that commodity arrivals were recorded at the gate electronically at only 2 out of 10 mandis. In the remaining mandis, it was either not implemented, or abandoned because long lines of trucks waiting for entry disrupted traffic all around. Similarly, e-bidding seemed to have been adopted only for commodities with high arrivals in a mandi on select days only. Further, while all the 10 mandis were in theory, unified, few bids came from traders who were located elsewhere. Though assaying instruments were available in some mandis, they were rarely used. In general, automation of these mandis has happened more successfully than unification.

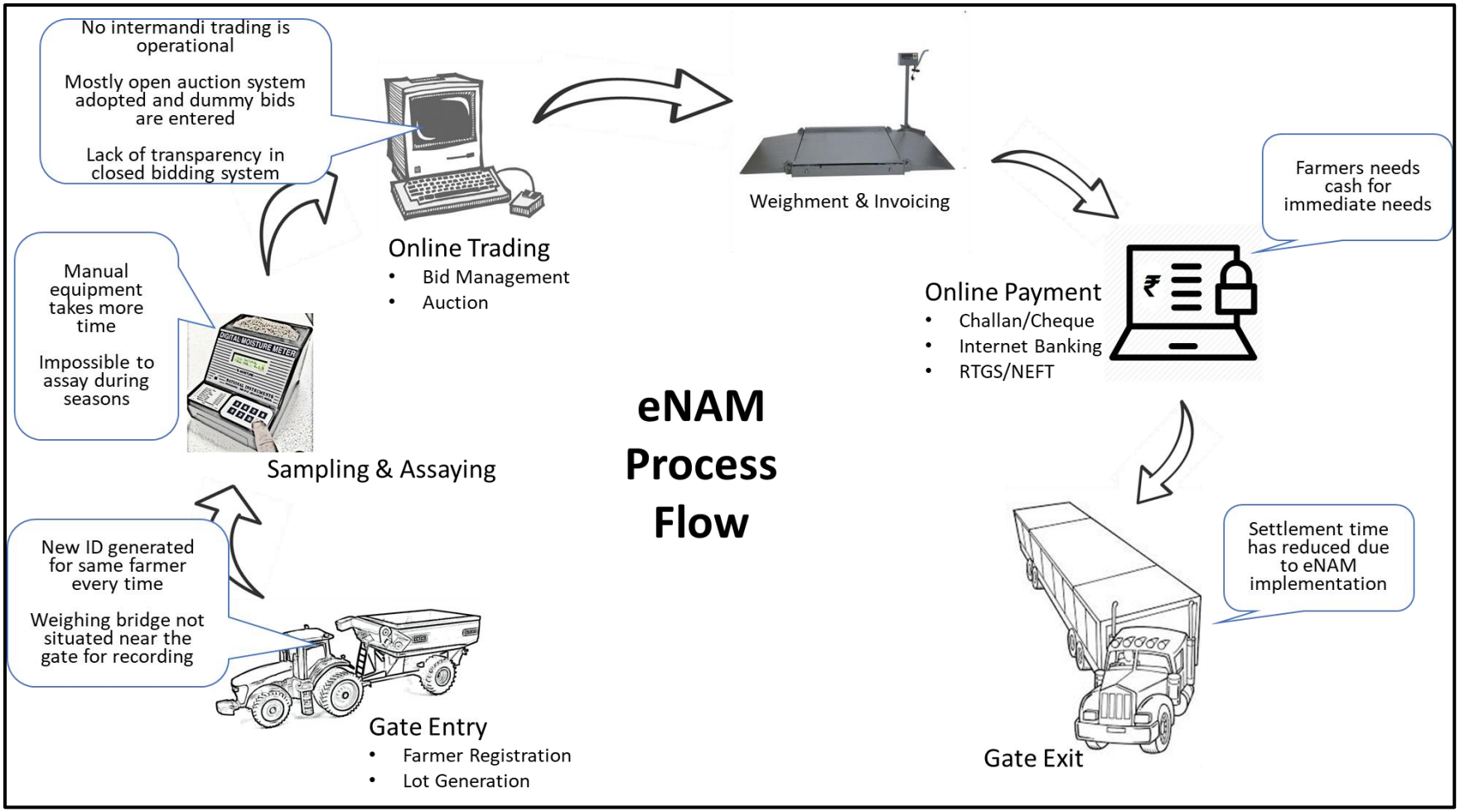


Fig. 4.12. Process flow and the gaps observed at e-NAM mandis under the study

Chapter 5

Benefits from Participation of Smallholders in e-NAM

Long ago, Adam Smith spoke about the importance of markets. Conceptually, the direct sale of farm produce encourages the system of marketing without the role of the middleman by the small and marginal producers. The Model Act 2003 provides the provision of reducing middlemen's role through the establishment of farmers' markets[1]. Improving income of the farmers *inter alia* mainly depends upon market participation i.e. produce offered for sale in the proper market, and market orientation i.e. agricultural production destined for market based on market signals (Pingali and Rosegrant, 1995; Pingali, 1997). In India, more than 85 per cent of farmers are smallholders. Their smaller operational holding lead to several other factors consequently capping of better income realization from farming. These are lower production, smaller marketed surplus, higher transaction cost, lower bargaining power in the output market, higher market and price risk, etc.

Smallholder farmers often have a weaker bargaining position in output marketing. This may be due to lack of options (in terms of alternative buyers), risk aversion, high transportation costs, and the perishable nature of the crops. The risk of not being able to sell their produce due to its perishable nature usually weakens the bargaining power of the farmers, who face Hobson's choice of taking whatever is available or nothing at all (Ranjan, 2017). Even if a farmer does manage to get produce directly to the mandi, there is no guarantee of receiving a better price because these markets are dominated by large traders and auction-based sales among those traders, which could be difficult for individual farmers to compete in. In general, the existing literature relating to middlemen has tended to view middlemen as either fulfilling an important role in the market (Rubinstein and Wollinsky 1985; Biglaiser and Friedman 1994; Li 1998; Van Raalte and Webers 1998; Jori and Leach 2002), or as being purely exploitative (Masters 2008). In India, middlemen "cuts" comprise up to 75% of the agricultural prices, particularly in fruits & vegetables (Bhardwaj and Singh, 2014). Every market has unique characteristics between farmers and traders. It may be as (a) traders are better informed about market conditions than farmers; (b) farmers often trade with the same trader for multiple periods; and (c) the existence of frictions in the market means it is not costless for the farmers to find a different middleman to trade with.

Moreover, several studies from different parts of the world reported the benefits of ICT- and MIS-based services giving advanced market information to the farmers, however, the results have been mixed. Some studies have found that improved access to market information has had a positive impact on farm-gate prices (Buxton et al.,

[1] Punjab (Apni Mandi), Haryana (Apni Mandi), Rajasthan (Kisan Mandi), Andhra Pradesh (Rythu Bazar), Tamil Nadu (Uzhavar Shandy), Maharashtra (Shetkari Bazar) and Orissa (Krushak Bazar).

2014; Courtois and Subervie, 2015; Mitchell, 2017), whereas others have observed no effect (Fafchamps and Minten 2012). In the same context, other studies also reported that market information has a positive effect on farm-gate prices for some types of crops, but no effect for others (Muto and Yamano 2009; Aker and Fafchamps 2015). Though, delivering market price information to farmers does not provide them with additional arbitrage opportunities of the sort that Jensen (2007) analyses among Kerala fishermen or Goyal (2010) finds among soybean farmers in Madhya Pradesh. Moreover, Mitra et al. (2017) asserts that access to price information to potato growers in West Bengal does not necessarily benefit farmers in their negotiations because they have few outside options. The ability of producers to use price information may be limited due to remaining interlocked with particular middlemen or having limited outside options for selling their output. The e-NAM envisages resolving both these issues viz. providing market price information in advance and giving access to the pan-India market for better price discovery.

In this study, the inclusive aspect of participation in mandi and the benefits realized in terms of a better price for their produce was examined from the direct survey as well as through comparing the modal price of the commodities reported on the e-NAM portal and that on AGMARKNET portal for the April 2020 month. To achieve this objective, a total of 446 farmers were randomly selected for the study whose farms fell within a radius of about 50 kilometers from one major mandi selected in each state. These mandis were APMC Jabalpur in Madhya Pradesh, APMC Parbhani in Maharashtra, APMC Shadnagar (Rangareddy district) in Telangana, and APMC Kota in Rajasthan. The category of farmers compared are smallholders (having <5 acres of land) and large farmers[2] (>5 acres of land) and within these groups, selling at e-NAM mandi and outside e-NAM mandi.

5.1. Socio-economic profile of the sample farmers

A perusal on the profile of the sample farmers across the 4 states revealed that the family size ranges from four in Telangana (TS) to seven in Rajasthan (RJ). In all the selected states, the education level of the majority of the sample farmers was below 12th standard (Table 5.1). Telangana state recorded more illiterate farmers, while the average family size is the lowest among all the states under study.

[2] Though, Ministry of Agriculture & Farmers Welfare, Government of India defines Large farmers as having operational holding >10 heactres (25 acres) of land. In the study, since number of farmers with land holding >5 acres were less, we have clubbed all the farmers above >5 acres land in single category and named 'Large farmers'.

Table 5.1: Demographic characteristics of farmers

Sl. No.	District/ District/ State	Sample size (n)	Average family size	Education level of head of household, %			
				Illiterate	Primary	Secondary	Graduation & Above
1	Parbhani/ Maharashtra	110	5.5	19	60	11	10
2	Jabalpur/ Madhya Pradesh	121	5.4	13	30	53	4
3	Kota/ Rajasthan	118	6.8	9	77	2	12
4	Rangareddy/ Telangana	97	4.1	42	46	11	1

Crop production is the major occupation of the respondents in these states. In Maharashtra (MH), it is closer to 100 per cent (Table 5.2). In Telangana (TS), even though pure crop cultivation is the major occupation, the farmers were also following poultry and dairy. Few farmers were involved in non-farm occupation in the form of small business, labour, and service in all the selected states.

Table 5.2: Occupation and land holding of selected farmers (% of sample households)

Sl.	Particulars	MH	MP	RJ	TS	Pooled
I	**Source of Income**					
	1. Agriculture	99.09	88.89	96.23	82.29	91.90
	2. Agri+Poultry+Dairy	0.00	0.00	0.00	2.08	0.48
	3. Business	0.91	3.70	1.89	3.13	2.38
	4. Labour	0.00	0.93	0.94	1.04	0.71
	5. Service	0.00	5.56	0.94	0.00	1.67
II	**Land Holding**					
	1. Marginal farmers (<2.5 ac)	27.27	19.83	72.03	32.99	38.34
	2. Small farmers (2.5- 5 ac)	43.64	40.50	15.25	42.27	34.98
	3. Medium Farmers (5-10 ac)	18.18	17.36	7.63	16.49	14.80
	4. Large farmers (≥10 ac)	10.91	22.31	5.08	8.25	11.88
III	**Sources of Irrigation**					
	1. Bore well	39.25	22.81	11.01	42.86	28.83
	2. Tube well + canal	22.43	57.02	75.23	13.39	38.51
	3. Open well	4.67	8.77	0.00	0.00	3.38
	4. Rainfed	33.64	11.40	13.76	43.75	29.28
IV	**Possession of Tractors**					
	Yes	0.91	27.27	27.96	12.37	17.71
	No	99.09	72.72	72.03	87.62	82.28

In the selected states, smallholders (land holdings up to 5.0 acres) constituted 60 to 87% of total sample households. The marginal farmers constituted over 70 percent in

Rajasthan. The average landholding of Madhya Pradesh farmers were found to be almost double as that of other selected states with an area of about 10 acres (Fig.5.1).

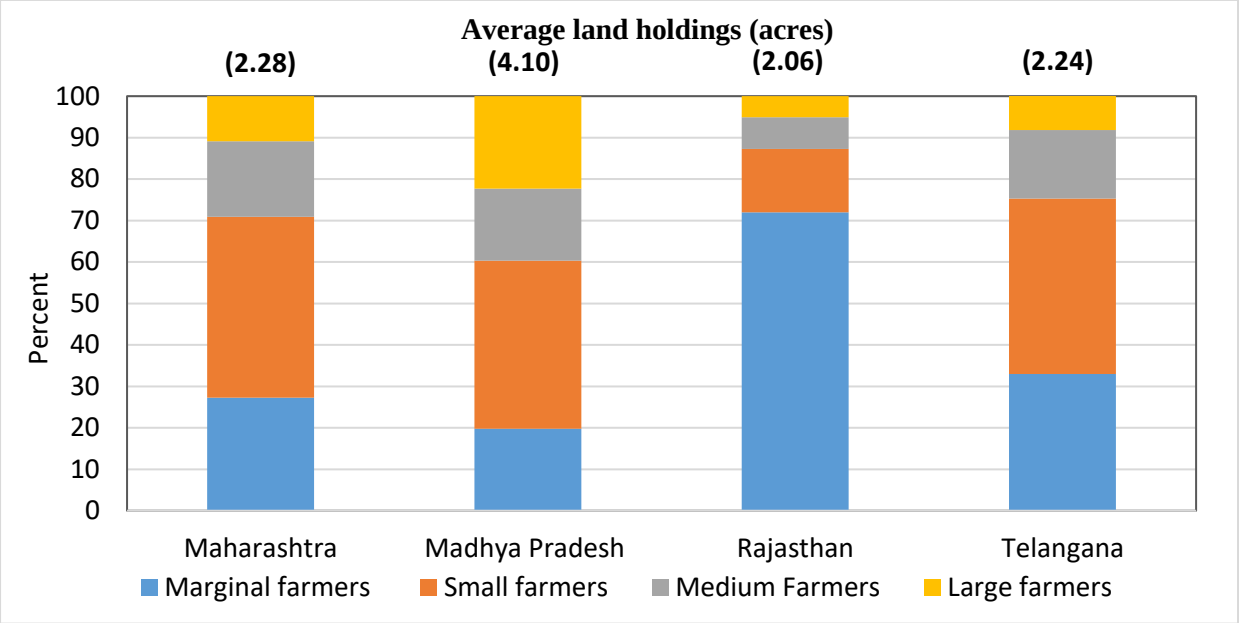


Fig. 5.1: State-wise distribution of sample farmers

5.2 Inclusiveness of smallholders in APMC markets

To examine the participation and inclusiveness of smallholder farmers in selected e-NAM mandi across 4 states, the production pattern, marketed surplus and disposal pattern of major crops of the sample farmers were analyzed.

5.2.1 Cropping pattern and marketed surplus in Madhya Pradesh

The farmers in Madhya Pradesh, cultivated mainly 4 crops- paddy, wheat, black gram, and chickpea (Chana/Bengal Gram), which together occupied 77% of gross cropped area. Landholding size has not much influence on the choice of the crops, except for large farmers who mainly prefer wheat over chickpea (Table 5.3). The perusal of total production and marketed surplus (share of total production sold) of these farmers presented in Table 5.4 shows that though smallholder farmers produce almost half as compared to that by the large farmers as far as 4 major crops (except wheat) are concerned, however, the marketed surplus is almost same for the same commodities/produce. Wheat being staple cereals, smallholders are retaining about one-third of the total production for home consumption. It may be inferred in two ways- one, either the smallholders are consuming very few food items or they are depending more on the public distribution system for food grains in the region.

Table 5.3: Cropping pattern of sample farmers in Madhya Pradesh

Crops	% of gross cropped area			
	Smallholders (<5 acres)	Medium farmers (5-10 acres)	Large farmers (>10 acres)	Overall
Wheat	27%	27%	35%	32%
Paddy	21%	18%	17%	18%
Black gram	16%	22%	14%	16%
Chickpea	14%	13%	9%	11%
Maize	3%	5%	7%	6%
Green Gram	2%	2%	6%	4%
Field pea	6%	2%	3%	4%
Others*	10%	11%	9%	9%

*include lentil, sugarcane, red gram, finger millet, groundnut, sesamum, mustard, etc.

Table 5.4: Average total production and marketed surplus of sample farmers in Madhya Pradesh

Crop/ Commodity	Smallholder farmers (landholding < 5 acres)			Large farmers (landholding ≥5 acres)		
	n	Average Total Production (Q)	Average Marketed surplus (% of col 3)	n	Average Total Production (Q)	Average Marketed surplus (% of col 6)
1	2	3	4	5	6	7
Black gram	19	12.58 (16.54)	83%	25	28.23 (51.11)	80%
Chickpea	31	10.90 (10.52)	81%	31	23.47 (22.24)	83%
Paddy	23	58.34 (121.37)	90%	32	70.22 (78.01)	87%
Wheat	36	41.56 (75.58)	66%	44	123.69 (226.62)	81%

Figures within parentheses are the standard deviation.

Normally small farmers sell their produce in many installments to meet their urgent cash needs. Fig 5.2 exhibits a clear difference in the selling pattern of the commodities after harvest by the smallholder farmers vis-à-vis large farmers in Madhya Pradesh state. In the case of wheat, more than 55% of smallholders sold the produce within 2-3 weeks after harvest, while 80% of the large farmers sold after 4 weeks of harvest. In the case of paddy, though the majority sold after 4th weeks, however, the proportion of farmers selling the produce early is significantly high for smallholder farmers. The trend is similar for the other two major crops.

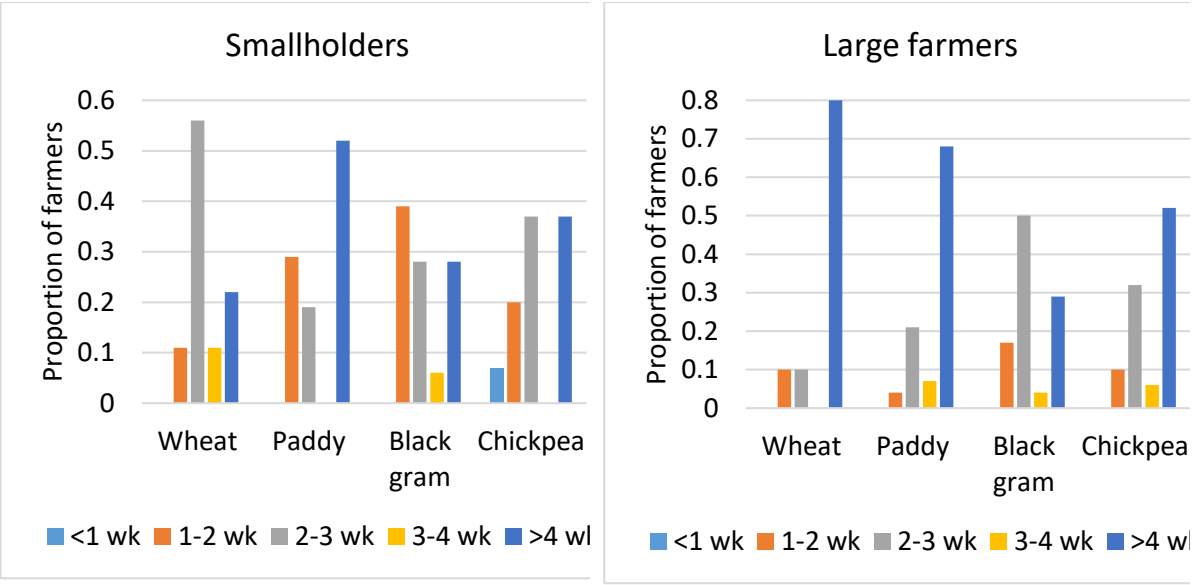


Fig. 5.2: Disposal pattern of different crops by sample farmers in Madhya Pradesh (selling after harvest in weeks)

Table 5.5: Commodity disposal pattern and price received by the sample farmers in Madhya Pradesh

Commodity	% of total farmers selling respective crops in e-NAM mandi (n)	Selling price in mandi		Selling price outside mandi*	
		Avg.Price (₹/q)	Range (₹/q)	Avg.Price (₹/q)	Range (₹/q)
Smallholder farmers (landholding <5 acres)					
Black gram	78% (14)	3279	2600-3800	2875	2400-3600
Chickpea	60% (18)	3483	2800-4500	3162	2000-4500
Paddy	52% (11)	1602	1250-1750	1643	1400-1790
Wheat	65% (22)	1647	1250-1950	1623	1450-2025
Large farmers (landholding ≥5 acres)					
Black gram	75% (18)	3064	2300-4000	3000	2200-3800
Chickpea	65% (20)	3598	2600-4600	3491	1600-4600
Paddy	39% (11)	1646	1500-1750	1661	1400-1750
Wheat	43% (19)	1767	1600-2015	1767	1320-2000

*Outside mandi includes selling to village traders or in local market

The disposal pattern of major commodities by two different groups of farmers around Jabalpur mandi in Madhya Pradesh was studied. It was observed that the majority of smallholder farmers in the samples are selling their major products in the e-NAM mandi i.e. Jabalpur (Table 5.5). This may be due to the vicinity of the wholesale mandi to the farmers. In contrast to this, the majority of large farmers are selling paddy and wheat outside the mandi. This is an opposite trend than other studies in the past have reported across the country. Another important observation was that on average farmers realized better prices when they sold their produce in the mandi, barring few exceptions like paddy. This may be due to large types of varieties grown by the farmers, which gets masked in the mandi. Apart from better price in the mandi, the variation in price realization was higher outside the mandi. Moreover, it may be noted that we couldn't get a clear picture of which farmers sold their produce through the e-NAM platform.

5.2.2 Cropping pattern and marketed surplus in Maharashtra

The farmers in Parbhani district of Maharashtra cultivated mainly 4 crops- sugarcane, soybean, chickpea (Chana/Bengal Gram), and sorghum, which together occupied about 80% of the gross cropped area. There was a distinct preference for sugarcane by the smallholder farmers, while medium and large farmers preferred soybean, chickpea and pigeon pea (Table 5.6). Although there were more than 15 types of crops grown by the farmers in the region, which occupied less than 5% of the cropped area each.

Table 5.6: Cropping pattern of sample farmers in Maharashtra

Crops	% of gross cropped area			
	Smallholders (<5 acres)	**Medium farmers (5-10 acres)**	**Large farmers (>10 acres)**	**Overall**
Sugarcane	45%	10%	12%	25%
Soybean	21%	38%	35%	29%
Chickpea	11%	19%	13%	15%
Sorghum	6%	5%	13%	8%
Cotton	6%	4%	3%	5%
Wheat	4%	6%	3%	4%
Pigeon Pea	3%	10%	5%	5%
Others*	4%	8%	16%	9%

*include green gram, cowpea, horse gram, turmeric, black gram, brinjal, garlic, maize, papaya, amaranthus, etc.

The perusal of total production and marketed surplus of these farmers presented in Table 5.7 shows that out of these major crops grown, only sorghum is retained for home consumption by all the farmers. Other crops are sold almost completely. Fig 5.3 exhibits the selling pattern of the commodities after harvest by the smallholder

farmers vis-à-vis large farmers in the study region of Maharashtra state. Farmers irrespective of land size, tock their produce and resort to sell it after a few weeks of harvest. Sugarcane is one crop that can't be stored, therefore is shown as mostly selling immediately.

Table 5.7: Average total production and marketed surplus of sample farmers in Maharashtra

Crop/ Commodity	Smallholder farmers (landholding < 5 acres)			Large farmers (landholding ≥5 acres)		
	n	Average Total Production (Q)	Average Marketed surplus (% of col 3)	n	Average Total Production (Q)	Average Marketed surplus (% of col 6)
1	2	3	4	5	6	7
Chickpea	26	6.40 (6.33)	93%	22	13.89 (9.89)	97%
Cotton	21	7.31 (5.96)	100%	11	7.27 (4.98)	100%
Sorghum	21	5.42 (5.24)	49%	23	7.67 (6.15)	62%
Soybean	51	9.52 (8.35)	94%	42	104.33 (537.03)	99%
Sugarcane	18	1068.33 (2251.36)	100%	16	1360.13 (1366.71)	100%

Figures within parentheses are the standard deviation.

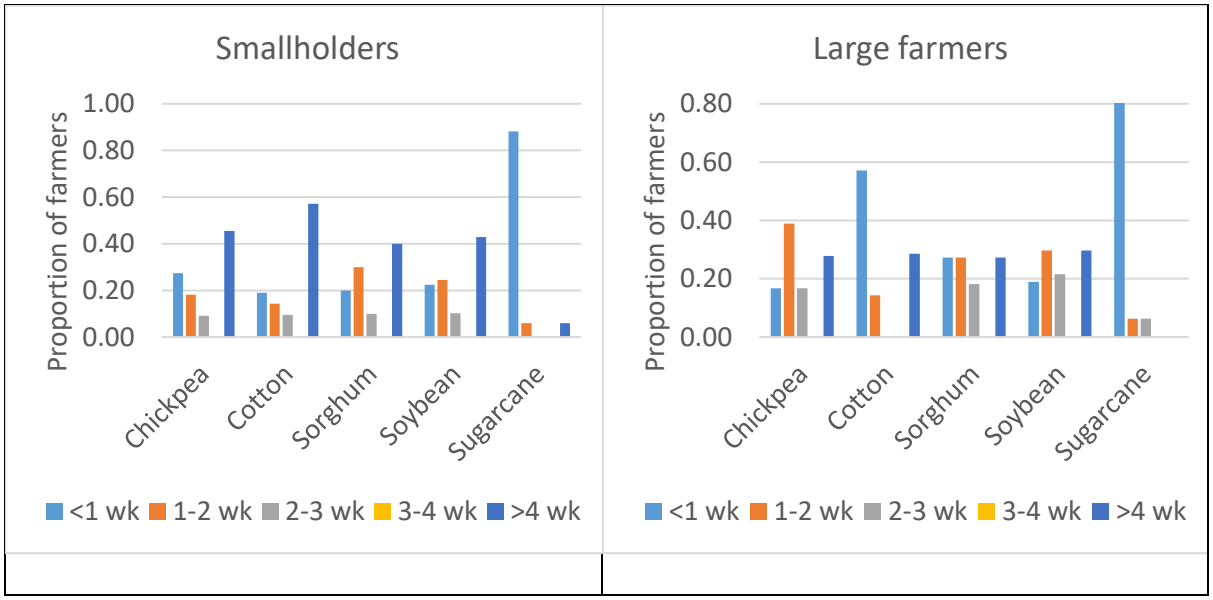


Fig. 5.3: Disposal pattern of different crops by sample farmers in Maharashtra (selling after harvest in weeks)

The selling behaviour of smallholder farmers in Maharashtra varies distinctly. Table 5.8 shows that the proportion of smallholder farmers selling the major commodities in e-NAM mandis is significantly lower than that of large farmers. Almost 30-40% of sampled smallholders sold their produce outside the mandi. In the region, smallholder farmers realized better farm gate prices outside the mandi. While the trend inverse in case of large farmers, who received better prices in the mandi. Besides, smallholder farmers also received a lower price for the same commodity in the mandi as compared to that of large farmers.

Table 5.8: Commodity disposal pattern and price received by the sample farmers in Maharashtra

Commodity	% of total farmers selling respective crops in e-NAM mandi (n)	Selling price in mandi		Selling price outside mandi*	
		Avg.Price (₹/q)	Range (₹/q)	Avg.Price (₹/q)	Range (₹/q)
Smallholder farmers (landholding <5 acres)					
Chickpea	61% (12)	3617	2400-4300	3667	2900-4000
Cotton	67% (14)	4907	3800-6000	4967	4000-5400
Sorghum	92% (10)	1810	1600-2700	-	-
Soybean	59% (29)	3155	2500-5400	3211	2800-3900
Large farmers (landholding ≥5 acres)					
Chickpea	81% (17)	3765	2800-5000	3250	3200-3400
Cotton	100% (11)	4850	3200-5400	-	-
Sorghum	89% (13)	2008	1400-3900	1700	1600-1800
Soybean	86% (38)	3228	2700-5000	2825	3000-3800

*Outside mandi includes selling to village traders or in local market

5.2.3 Cropping pattern and marketed surplus in Rajasthan

Agriculture in Rajasthan is highly diversified. The survey conducted in Kota district of Rajasthan revealed that most of the farmers are smallholders, but they cultivate more than 20 types of crops. Among them, major crops are- paddy, wheat, soybean, mustard, and garlic, which together occupied 85% of the gross cropped area. With little variation, these crops are preferred by all the farmers in the region (Table 5.9). The perusal of total production and marketed surplus of the sample farmers are presented in Table 5.10. It is evident that except wheat, for all other crops grown by the farmers are mainly sold, with marketed surplus more than 90%. Wheat being the staple cereal, about 50% of the produce is retained by the households for home consumption.

Table 5.9: Cropping pattern of sample farmers in Rajasthan

Crops	% of gross cropped area			
	Smallholders (<5 acres)	**Medium farmers (5-10 acres)**	**Large farmers (>10 acres)**	**Overall**
Wheat	29%	32%	32%	30%
Soybean	25%	17%	20%	23%
Paddy	10%	11%	34%	14%
Mustard	14%	11%	3%	12%
Garlic	6%	7%	8%	6%
Chickpea	4%	13%	--	5%
Black gram	3%	7%	1%	3%
Others*	9%	--	--	6%

*include Coriander, Barley, Tomato, Spinach, Cauliflower, Jowar, Cabbage, Maize, Groundnut, Onion, Potato, Green Gram, Chilli, Okra, Marigold, Linseed, etc.

Table 5.10: Average total production and marketed surplus of sample farmers in Rajasthan

Crop/ Commodity	Smallholder farmers (landholding < 5 acres)			Large farmers (landholding ≥5 acres)		
	n	**Average Total Production (Q)**	**Average Marketed surplus (% of col 3)**	**n**	**Average Total Production (Q)**	**Average Marketed surplus (% of col 6)**
1	2	3	4	5	6	7
Garlic	40	17.99 (11.56)	97%	15	31.40 (22.78)	96%
Mustard	47	15.35 (18.83)	98%	10	18.70 (10.87)	90%
Paddy	24	38.83 (23.23)	98%	9	68.28 (64.08)	99%
Soybean	62	12.50 (16.06)	84%	10	29.00 (27.48)	83%
Wheat	84	45.10 (53.83)	52%	18	73.75 (73.79)	45%

Figures within parentheses are the standard deviation.

Moreover, there is a distinct difference in the disposal pattern of these commodities between smallholder farmers and large farmers. Almost 40-50% of smallholder farmers sell their produce within a week after harvest, while large farmers retain it back to sell later avoiding the glut situation in the market (Fig 5.4). However, there is a silver line in the selling behaviuor of the farmers, which has not been seen in any other states in India. All the farmers, irrespective of farm size category, they sell most of their harvest in APMC mandi only, except for some green vegetables (Table 5.11). Moreover, there is a huge variation in the price realization by the farmers for different

commodities. In some commodities, the average selling price is higher for smallholder farmers, while in commodities like paddy and wheat, large farmers got a better price.

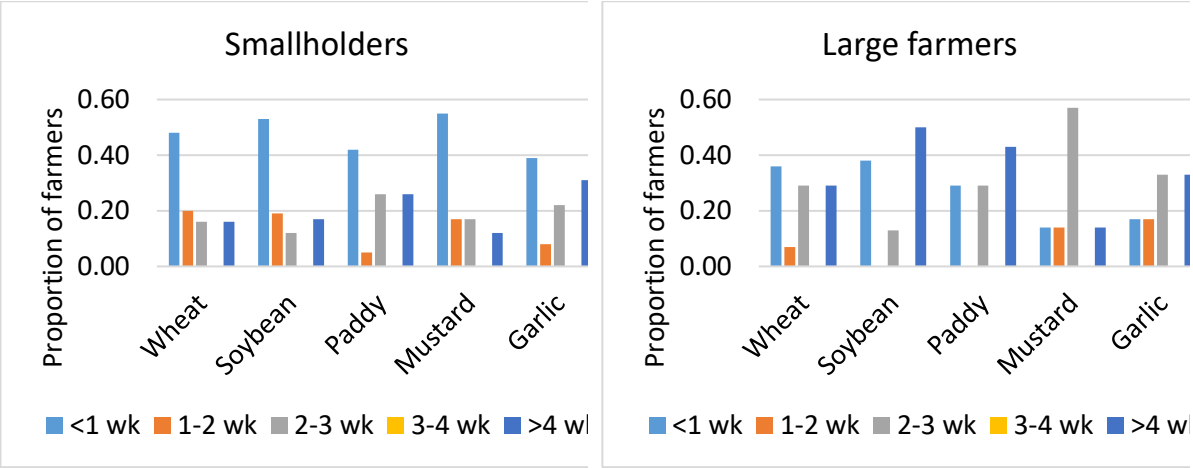


Fig. 5.4. Disposal pattern of different crops by sample farmers in Rajasthan (selling after harvest in weeks)

Table 5.11: Commodity disposal pattern and price received by the sample farmers in Rajasthan

Commodity	% of total farmers selling respective crops in e-NAM mandi (n)	Selling price in mandi		Selling price outside mandi*	
		Avg.Price (₹/q)	Range (₹/q)	Avg.Price (₹/q)	Range (₹/q)
Smallholder farmers (landholding <5 acres)					
Garlic	100% (38)	2693	200-6000	-	-
Mustard	100% (44)	3140	2500-3600	-	-
Paddy	100% (23)	2291	2000-3000	-	-
Soybean	100% (60)	3178	1500-7000	-	-
Wheat	100% (79)	1647	1400-3000	-	-
Large farmers (landholding ≥5 acres)					
Garlic	100% (14)	1336	500-8000	-	-
Mustard	100% (9)	2900	1500-3600	-	-
Paddy	100% (9)	2333	2000-3000	-	-
Soybean	100% (10)	2765	2500-3500	-	-
Wheat	100% (17)	2708	-	-	-

*Outside mandi includes selling to village traders or in local market

5.2.4 Cropping pattern and marketed surplus in Telangana

Telangana falls under semi-arid tropics. The survey was conducted in the Rangareddy district around Shadnagar e-NAM mandi. The farmers in the study area cultivated several crops, however, two crops- maize and cotton dominated the cropping pattern

(Table 5.12). Paddy is the third most important crop. These 3 crops are cultivated by almost all the farmers in the region.

Table 5.12: Cropping pattern of sample farmers in Telangana

Crops	% of gross cropped area			
	Smallholders (<5 acres)	**Medium farmers (5-10 acres)**	**Large farmers (>10 acres)**	**Overall**
Maize	52%	32%	37%	44%
Cotton	35%	58%	48%	43%
Paddy	8%	8%	7%	8%
Tomato	1%	1%	4%	2%
Chilli	1%	1%	4%	1%
Others*	3%	0%	0%	2%

*include red gram, sorghum, horse gram, okra, ridge guard, chickpea, green pea.

The perusal of total production and marketed surplus of the sample farmers given in Table 5.13 indicated that cotton and maize, both the crops are grown by the farmers only for marketing purposes. While small farmers keep about two-third of paddy produced, as compared to 25% by the large farmers. Interestingly, large farmers have a high variation in the total production of these 3 crops, which may be due to variation in landholding size.

Table 5.13: Average total production and marketed surplus of sample farmers in Telangana

Crop/ Commodity	Smallholder farmers (landholding < 5 acres)			Large farmers (landholding ≥5 acres)		
	n	**Average Total Production (Q)**	**Average Marketed surplus (% of col 3)**	**n**	**Average Total Production (Q)**	**Average Marketed surplus (% of col 6)**
1	**2**	**3**	**4**	**5**	**6**	**7**
Cotton	52	11.94 (13.93)	100%	24	38.23 (45.97)	100%
Maize	59	15.07 (30.89)	90%	21	38.74 (67.12)	100%
Paddy	25	22.75 (24.33)	35%	10	30.80 (20.78)	75%

Figures within parentheses are the standard deviation.

The selling behaviour of the farmers in the study region of Telangana state has reflected a unique feature. Here, smallholder farmers have shown better maturity than their counterparts. As some of the smallholders kept some stock to sell their produce after 2-3 weeks of harvest. Contrastingly, all the large farmers in the region sold their stock of maize, cotton as well as paddy immediately after harvest. It may be due to the region that these farmers realized better prices at the time of harvest as compared to the previous year. Another important feature observed in Telangana was

smallholder farmers realized a better price for their produce in the mandi as compared to that of large farmers. However, when they sold the commodity outside mandi, then large farmers had better bargaining power than those of smallholders (Table 5.14). Apart from this, the majority of the cotton growers sold their stock outside the mandi. For the other two crops, mandi was the main market place for more than 50% of the farmers.

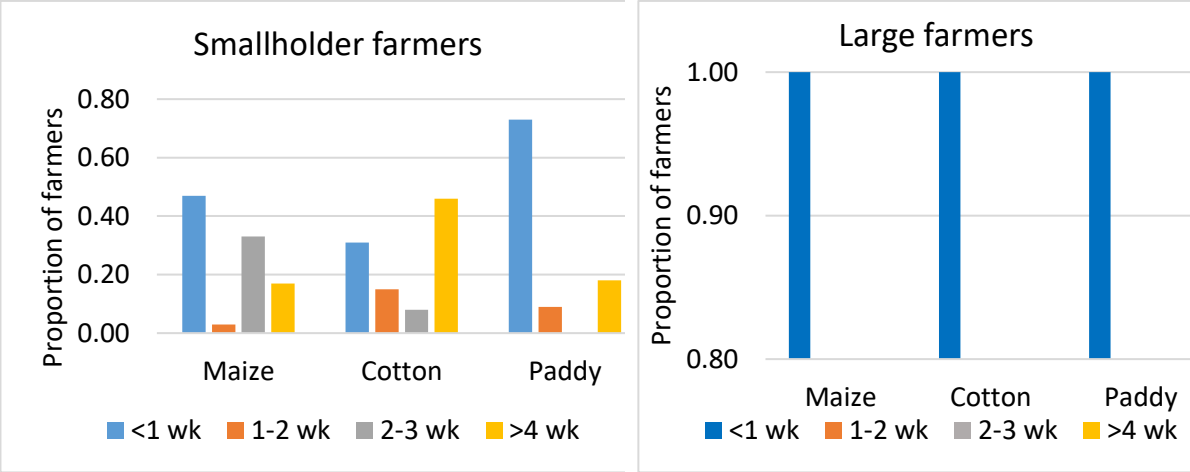


Fig. 5.5: Disposal pattern of different crops by sample farmers in Telangana (selling after harvest in weeks)

Table 5.14: Commodity disposal pattern and price received by the sample farmers in Telangana

Commodity	% of total farmers selling respective crops in e-NAM mandi (n)	Selling price in mandi		Selling price outside mandi*	
		Avg.Price (₹/q)	Range (₹/q)	Avg.Price (₹/q)	Range (₹/q)
Smallholder farmers (landholding <5 acres)					
Cotton	35% (15)	4830	2100-6000	5204	4000-6000
Maize	76% (32)	1461	700-1700	1490	1200-1800
Paddy	55% (6)	1567	1300-1750	1530	1300-1800
Large farmers (landholding ≥5 acres)					
Cotton	13% (3)	4267	2000-5400	5036	1600-5500
Maize	59% (10)	1489	1300-1700	1543	1200-1700
Paddy	67% (6)	1467	1250-1600	1483	1350-1600

*Outside mandi includes selling to village traders or in local market

From the above-mentioned observations, it may be concluded that the smallholder participation in the e-NAM mandis has considerably improved, when we compare the literature. Although, it is difficult to ascertain the causality relationship from the current dataset. While selling through traders are the second most preferred channel

for the farmers in the study region, some were disposing their produce at the village itself by selling it to village merchant at a discounted price than the market. It was found that these farmers sold their produce due to low volume and to avoid risks related to marketing the produce like price fluctuations in the mandi, urgent requirement of cash, and risks associated with transportation. However, we could also observe that farmers in Rajasthan, where transportation facility was good and mandis was in the vicinity, all the farmers preferred to sell all types of commodities in the mandi itself.

5.3 Farm-gate price reported on e-NAM and Agmarknet platforms

The commodity trade data at APMCs of Telangana, Madhya Pradesh, Uttar Pradesh and Rajasthan from Agmarknet and eNAM web portals for the April 2020 were analyzed. These are high-frequency data related to rabi season crops containing commodity-wise transactions on a daily basis. Though due to COVID-19 pandemic, there was high uncertainty about the mandi operation in March month this year. Therefore, we restricted to April month of the year 2020 only. It probably explains that either Agmarknet datasets do not capture the transaction information from all those mandis where transactions happen through e-NAM in these states. We observed similar reporting in other states as well. The total number of observations/entries collectively stand at 1,07,622 which includes 7,745 eNAM entries.

Table 5.15. shows the number of APMC mandis and the commodities traded there in the selected states. It also gives an idea about how many APMC mandis are reporting transaction information on both the platforms- AGMARKNET (http://agmarknet.gov.in/) and e-NAM (https://enam.gov.in/) portals during the same period. The commodities include both field crops as well as fruits and vegetables. While all the five states have trade data in the Agmarknet portal, From the data harvested from both the portals, it was found that APMC mandis in **Maharashtra has reported trade details only for the period April 08-21, 2020**. While Madhya Pradesh, Rajasthan, and Uttar Pradesh have trade data in the eNAM portal for a large number of APMCs and for all the days of April month 2020. **In Telangana, only one APMC viz. Sadasivpet has trade details in eNAM and only for April 27-30, 2020**. It is quite evident from the table that the number of APMCs reporting on the eNAM in Rajasthan is more than that on the Agmarknet. All other states have less number of eNAM APMCs reporting than that on the Agmarkent. Sadasivpet APMC in Telangana is reporting trading on e-NAM only for two commodities- onion and maize. The number of commodities covered under eNAM is less than that of Agmarknet in all the selected states except Maharashtra, where it stands at 58 under eNAM and 57 under Non-eNAM. The number of commodities is as per the entries made in the portals. Different varieties traded differently are considered as different commodities for analysis purposes.

Table 5.15: Number of APMCs and commodities traded on eNAM and Non-e-NAM in selected states during April 2020

State	eNAM		Non-e-NAM	
	No. of APMCs	No. of commodities	No. of APMCs	No. of commodities
Madhya Pradesh	26	24	249	64
Maharashtra	44	58	57	57
Rajasthan	149	44	116	58
Telangana	1	2	32	32
Uttar Pradesh	85	66	232	104
Grand Total	**304**	**107**	679	**135**

The entries were processed to find how many entries are common under both the portals w.r.t. date, APMC, and commodity. So, out of 1,07,622 entries, only 3,269 entries were found to be common, i.e., a particular commodity on a day has been traded in an APMC on both eNAM and Non-eNAM platforms. There are 209 APMCs in all in the selected states which are trading 129 commodities under both eNAM and Non-eNAM platforms as reported in Agmarknet and eNAM portals. A maximum number of commodities are reported from Uttar Pradesh with 54 in these portals. Here, fruits and vegetables are also traded which is increasing the number. The detailed list of APMCs trading under both the platforms, only under eNAM, and only under Non-eNAM are shown in Annexure VIII. Similarly, the commodities trading under both the platforms, only under eNAM, and only under Non-eNAM are shown in Annexure IX. As already mentioned, in Telangana only one APMC, i.e., Sadasivpet APMC is showing trading of Onion and Maize under both the platforms.

Table 5.16: Number of common APMCs and traded commodities between eNAM and Non-eNAM platforms in selected states during April 2020

State	No. of APMCs	No. of commodities
Madhya Pradesh	23	17
Maharashtra	13	27
Rajasthan	95	29
Telangana	1	2
Uttar Pradesh	77	54
Grand Total	**209**	**129**

Though an APMC is trading under eNAM, it doesn't need to be trading all the eNAM listed commodities. It was attempted to identify the commodities which are being traded under eNAM by the maximum number of eNAM APMCs in each of the selected states. Figure 5.6 shows the top 10 commodities in terms of percent of APMCs trading under eNAM in the selected states. It may be noted that we could not find any regular transaction of any commodity in e-NAM mandis of Telangana state. In other

states, few commodities are commonly traded in almost all the e-NAM and non-e-NAM mandis. In Uttar Pradesh, the state with the maximum number of APMC mandis integrated with e-NAM has mostly green vegetables which have been reported to be traded commonly in all the e-NAM mandis.

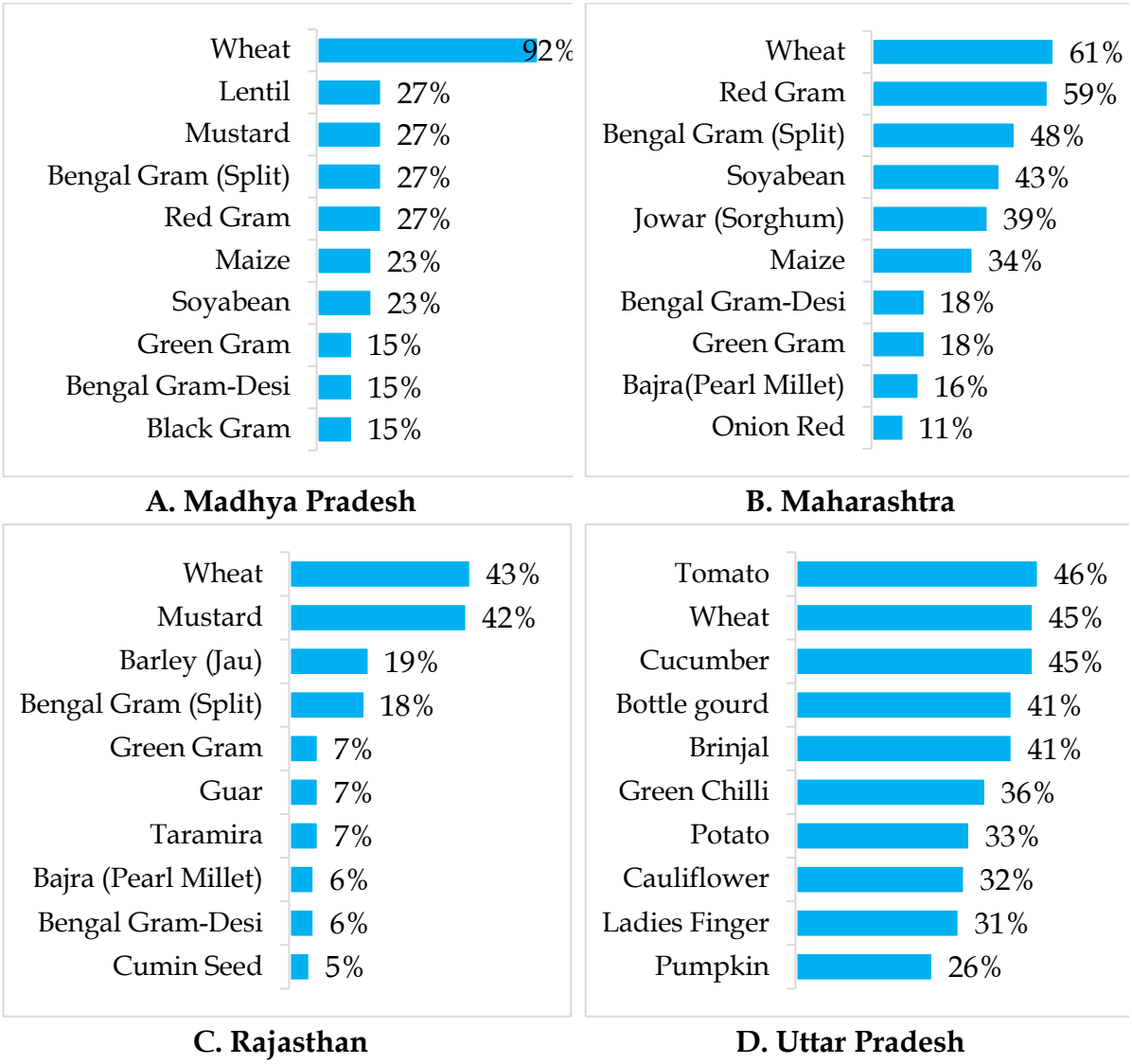


Fig. 5.6: Top 10 Commodities traded by majority of APMCs under eNAM in selected states, April 20203

The daily modal price of major commodities that are traded in both eNAM as well as non-eNAM platforms are compared and presented as Box and whisker plots for the selected states (Figures 5.7). In Madhya Pradesh, the average of the daily modal price (ADMP) for lentil is found to be higher in eNAM than Non-eNAM during April 2020, whereas for other commodities, it is less. In Maharashtra, tur/red gram and soybean have higher ADMP under eNAM. In Rajasthan, the ADMP is found to be higher for barley, moong/green gram and mustard under eNAM. In Telangana, non-eNAM had

[3] Pulses mentioned in the report are traded as whole, unless stated otherwise

a higher price for onion. In Uttar Pradesh, vegetables were found to be top traded among the e-NAM APMCs, but in all the cases, non-eNAM has a higher modal price.

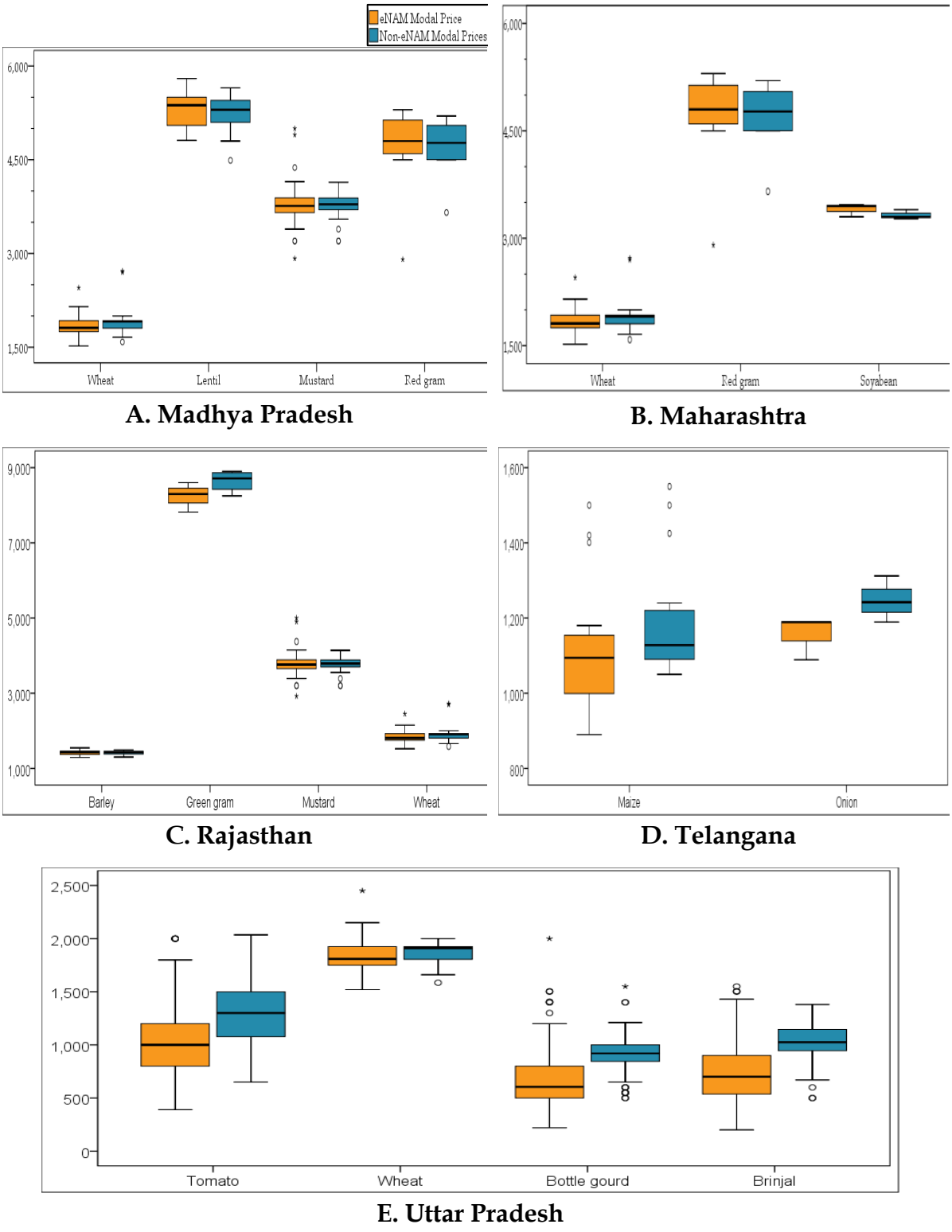


Fig. 5.7: Comparison of average daily modal price (ADMP) of traded commodities through e-NAM and non-e-NAM options in the same mandis (₹/q)

An independent sample t-test was used to test the difference in mean value of average daily modal price (ADMP) under eNAM and non-eNAM for major commodities. The p-value in the case of mustard in Rajasthan and all major commodities in Uttar Pradesh viz, bottle gourd, brinjal, tomato, and wheat is less than 0.05 ($p<.05$). It indicates a statistically significant difference in ADMP between eNAM and non-eNAM (Table 5.17). Levene's test for equality of variances shows that variance between the two groups i.e., eNAM and non-eNAM are equal for wheat in Rajasthan and tomato in Uttar Pradesh ($p>.05$).

Table 5.17: Average of daily modal price of traded commodities under eNAM and Non-eNAM mandis during April 2020

Commodity	eNAM			Non-eNAM		
	n*	Average of daily modal Price (₹/q)	SD	n*	Average of daily modal Price (₹/q)	SD
Madhya Pradesh						
Lentil	6	4935	95.66	13	4868	180.07
Mustard	8	3532	359.16	19	3567	271.01
Tur (RG)	5	4334	807.29	7	4965	1531.03
Wheat	24	1801	99.55	50	1816	90.30
Maharashtra						
Tur (RG)	6	5044	300.46	7	4893	280.15
Soyabean	3	3407	92.92	6	3371	74.86
Wheat	2	1782	26.16	6	1804	105.38
Rajasthan						
Barley (Jau)	38	1414	62.18	49	1408	54.40
Moong (GG)	15	8112	663.84	56	8029	775.00
Mustard	99	3802	203.73	141	3789	127.69
Wheat	79	1749	113.30	99	1790	73.11
Telangana						
Onion	3	1156	57.74	3	1248	61.70
Uttar Pradesh						
Bottle gourd	203	693	258.05	271	934	160.03
Brinjal	195	741	269.96	271	1037	153.85
Tomato	244	994	330.39	323	1305	275.10
Wheat	183	1856	75.40	197	1925	84.48

RG: Red Gram, GG: Green Gram; n*: Number of observations

In all these commodities, the ADMP under eNAM is significantly less than that in non-eNAM. For instance, in the case of wheat in Rajasthan, the ADMP is ₹1,749/q under eNAM and ₹1,790 under non-eNAM. Similarly, the difference in the case of vegetables in Uttar Pradesh is quite high which is up to ₹311/q less under eNAM as in the case of tomato. The rest of the commodities in each state has a statistically insignificant

difference in ADMP (Annexure X). The lower ADMP realization could be attributed to various factors including the participation of the same traders in the bidding process, thereby, not promoting competition among the buyers.

From the above discussion based on farmers' survey as well as analysis of transaction data reported on e-NAM portal and that on Agmarknet portal, it may be concluded that the expected price advantage through e-NAM is not yet realized in a significant and consistent manner in all the e-NAM mandis and all the states. Secondly, although the survey was conducted in close vicinity of the prominent APMC mandi which is integrated to e-NAM since the last 3-4 years in 4 states, still a significant number of smallholder farmers are out of this transformation in the marketing system. This may be due to either the incentives offered by participating in the e-NAM is significant enough to trigger interest among them, or they are almost unaware of the benefits being offered through e-NAM trade. Some e-NAM mandis, particularly in Uttar Pradesh has shown trading almost all kinds of green vegetables, standardization, and grading of which is currently a challenging task. In the absence of that the trade is expected to be limited by the local traders only. This may be the reason that price outside e-NAM is significantly higher for these vegetables in the same mandis. On the other hand, staple crops such as cereals and pulses provide less incentive for farmers to commercialize than high-value crops such as fruits and vegetables. This is because there is little product differentiation that fetches premium prices (Berdegué, 2002; Hellin et al., 2009). Still, the commercialization of staple crops is necessary to facilitate shifts away from a semi-subsistence system to market-based production of high-value commodities (Barrett, 2008). It is also possible that when the scope of any intervention is broadened to the whole community, only very few farmers take full advantage of the intervention while most farmers did not, resulting in an overall negative pattern of results. Therefore, to extend the full benefit of the structural changes introduced in the agricultural market in terms of e-NAM, there is a need for revisiting of the implementation process as well as bringing some more additional features into the system in the interest of smallholder farmers in India.

Chapter 6

Conclusions and Policy Recommendations

Agricultural markets are governed by the Agricultural Produce Market Committee (APMC) in most of the states in India. It is regulated by the Agricultural Produce Markets Regulation Acts (APMRA). Over the years, several reforms have been introduced in the APMC Act, the most important was the APMC Model Act (2003). However, the adoption of these reforms has been highly skewed across the states. Although agriculture and agricultural marketing is a state subject, the GoI decided to create a national agriculture market (NAM) by integrating all the existing APMCs markets in the country through a common electronic platform named e-NAM. The e-NAM was launched in July 2016 and by end of the year, 250 APMC mandis across 10 states were integrated to the e-NAM platform, the number further increased to 1000. The e-NAM is a compulsory delivery based trading platform, which enables the farmers to realize the best possible price. In order to understand the effectiveness of e-NAM, particularly on the smallholders' participation and price realization due to e-NAM, the present study was conducted during 2017-2020 in 4 major states (Madhya Pradesh, Maharashtra, Rajasthan and Telangana). The field survey was conducted in two stages- first in 2017 and second in 2019. Besides, secondary data about transactions, live trading on e-NAM, and prices of the commodities were collected from the websites, https://agmarknet.gov.in/ and https://www.enam.gov.in/.

Status of e-NAM implementation in India

As of 15th May 2020, total 1000 APMC mandis across 18 states and 3 Union Territories (UTs) have been integrated to the-e-NAM. Among different stakeholders, 1.28 lakhs traders and 70,969 commission agents are registered in these E-NAM mandis to help the transaction of 1005 registered FPOs and 1.66 crore registered farmers on the e-NAM platform. As of 30 April 2020, a total trade volume of 3.41 crore metric tonnes & 37 lakh numbers (Bamboo & Coconut) worth approximately ₹ 1.0 lakh crore have been recorded on the e-NAM platform. A total of 150 commodities have been identified to be traded through e-NAM. The list includes almost all types of agricultural commodities- from green leafy vegetables to tender coconut and flowers like gladiolus and carnation. On the other hand, more than 5 quality parameters have been identified as essential to be assayed to categorize the commodity into 3 different grades before trading on e-NAM.

Preparedness of e-NAM mandis

The level of preparedness in implementing various components of e-NAM in the states of Madhya Pradesh, Maharashtra, Rajasthan, and Telangana were studied. These components were the generation of Unique Lot ID at entry gate, sampling from heap/lot, e-auction, assaying, best price-SMS sent to the farmers, electronic weighments, generation of sale receipt, online payment and permit/ gate exit, etc. It

was observed that a unique lot ID is generated in most of the cases in these mandis. But, sampling of a lot is being done in a limited number. These mandis are not well equipped with assaying machines and technical manpower to conduct assaying of all the lots. With the given facilities, it is very difficult to assay all the lots even during normal season and enter the information in the portal before bidding. During the second stage of the survey in 2019, traders were bidding on the e-NAM platform after personally verifying the lots of major commodities in the mandis and only for those farmers who were interested to trade through e-NAM. Regarding online payment, most of the farmers and traders are not in favour of this. Normally, farmers need cash to make payment for transportation and/or sundry purchases from the market. Though on the insistence of market authorities, traders route partial payment through an online system by NEFT/RTGS/IMPS.

Interestingly, despite above operational challenges, when the daily transaction on e-NAM platform in the year 2017 was analyzed for the 4 states, it was found that large number (40 to 200 types, including different varieties of the same commodity) and volume of commodities were reported as traded through e-NAM in the selected states. Besides, only 4-5 commodities constituted almost 50% of the total transaction volume in each mandi. Further, there was a huge variation in the peak transacted volume of the same commodity in a month across the mandis within the state. The reported data on the e-NAM portal were also inconsistent in terms of arrival and traded quantity, prices of traded commodities (minimum, maximum & modal values), etc. Such information indicates that the transaction information has been manually entered into the e-NAM portal after the offline transaction completed.

Live trading on e-NAM

The e-NAM is contemplated to streamline the uniform procedures across the integrated markets, promoting transparency in an auction process, and access to a nationwide market for the farmer, with prices commensurate with the quality of his/her produce. It is necessary to have live trading through e-NAM platform for which few aspects are pre-requisites: 1) uploading of detailed information (quality and quantity without seller's name) of each lot of the commodities on the e-NAM portal, 2) specific pre-defined timing of opening and closing of each e-NAM mandi, 3) intra-mandi trading licenses for the buyers/traders, 4) guarantee for quality disclosed on the trading platform, 5) warehouses for pre- or post-trade stocking of the commodity, etc. However, when live trading information in selected mandis was observed during April 2020, several mismatch in information was found like several mandis live trading through e-NAM portal, different trading hours for different mandis and commodities, absence of quality specification of commodities traded, etc.

Benefits from participation of smallholders in e-NAM

The participation of smallholders in e-NAM mandi and the benefits realized in terms of a better price for their produce was examined from field survey around one e-NAM mandi in 4 selected states as well as through comparing the modal price of the

commodities reported on the e-NAM portal and that on AGMARKNET portal for the April 2020 month. There was a clear difference in the selling pattern of the commodities after harvest by the smallholder farmers vis-à-vis large farmers. Moreover, the majority of smallholder farmers were found selling their major produce in the e-NAM mandi, which might be due to the vicinity of the mandi to the farmers. In some commodities, the average selling price was higher for smallholder farmers inside mandi as compared to selling outside mandi. However, there was a negative correlation between lot size and the traded price of the commodity, which reflects that the smallholders normally received a lower price than the large farmers. Further, the comparison of the average modal price of the same commodity traded in the same APMC mandis through non-e-NAM (data collected from Agmarknet) and e-NAM portals indicated no significant price advantage through e-NAM in all the states under study. This may be due to the same and limited number of traders bidding for the commodities through e-NAM as well as through open auction. Therefore, to extend the full benefit of the structural changes introduced in the agricultural market in terms of e- NAM, there is a need for revisiting the implementation process as well as bringing some more additional features into the system in the interest of smallholder farmers in India.

Policy recommendations for improving the effectiveness of e-NAM

A. Strategic level

1. The e-NAM should be managed completely as a separate business which shall be responsible for managing the unified electronic trading platform without any glitches, while each mandi should be treated as one of its clients on the pattern of hospitality aggregators such as OYO hotels or Ola/Uber taxi service.
2. Each e-NAM mandi should act as Strategic Business Unit (SBU) i.e. profit center which focuses on product offering and market segment. All the seller-farmers may be made a shareholder in this SBU according to their contribution in sale or share purchase. These mandis should be encouraged to create product differentiation & offering, and marketing plan.
3. All efforts should be made to reduce the role of traders and commission agents (CAs), who take away a major chunk of the values from the farmers and the mandis. The roles offered by the traders and CAs should be performed by the respective mandi itself.
4. Each e-NAM mandi should start with 100% online transaction with only 1 or 2 major commodities initially, and after gaining experience & expertise, it should expand to high value and perishable commodities.
5. All e-NAM mandis shall have essentially own or linked with WDRA accredited warehouses/cold storages according to the major commodities transacted in the mandi.

6. The **e-NAM mandi should allow any bulk buyer with proper KYC without having a trading license** as well to have efficient price discovery in favor of farmers.
7. The e-NAM should be fully integrated with Artificial Intelligence and the Internet of Things (IoT) to provide real-time information as well as analytics to different stakeholders when and wherever s/he wants.
8. In the medium to long run, as the government intends to integrate 22,000 mandis including rural markets and APMC mandis, the strategy should be to create new mandis in the line of Smart Micro-Mandi* (brief about it is given at the end).
9. All the unit level (lot-wise) transaction data should be made accessible for academic and research purposes with proper registration.

B. Tactical level

1. Efforts should be made to develop a mobile app in the vernacular language which can be used by the farmer-sellers. Specific slot may be given to the farmers through the app, who intends to sell their commodities. The farmers may input the details of the lot on the mobile app well in advance before coming to the mandi.
2. All information related to mandi timing, online trading timings- opening and closing (commodity-wise, if it is different) should be standardized and well-publicized.
3. All e-NAM mandis should be LIVE at a specific time on all working days, even if there is no seller on a particular day. Prior notification shall be mandatory for the closure of the mandi.
4. Within the state, all e-NAM mandis should have the same opening and closing timing. However, to manage the arrivals, different commodities may be given different opening and closing hours for trade on e-NAM platform.
5. The e-NAM mandi should start a campaign for registration of all the prospective farmer-sellers during lean season.

C. Operational level

1. Entry Gate receipt/ Lot ID may be automatically generated on arrival by QR code scanning, as the details about the commodities and lots along with the grade quality might have been entered into the system through the mobile app.
2. There may be separate gate entry for those farmer-sellers who have not entered the lots' details in the mobile app.
3. If the farmers bring some more commodities other than e-NAM tradable commodities, they may be allowed to sell conventionally i.e. offline.
4. Minimum quality specifications for each commodity to be traded through the e-NAM platform should be communicated to the farmers. The farmers shall be asked to declare their lots according to the grade standard on the mobile app.

5. On arrival in the mandi, random sampling should be carried out for the lots, and quality assaying should be done. Each farmer shall be rewarded with the **Five-Star Quality Rating System** based on deviation from the self-declared quality of the commodities brought to the mandi. Continuous Excellent performers may be rewarded in annual function.

6. The details of the commodities/lots should be automatically and seamlessly uploaded on the e-NAM bidding platform. However, it shall be reflected on the trading platform only after physically approved by the mandi officials.
7. All possible commodities may be listed in the system and high priority commodities should appear on top in the given mandi. It will eliminate the possible error in the manual entering the name.
8. After awarding the highest bidder and ensuring the full payment to the sellers' account, the commodities may be transported through third party logistic partners or if buyers wish, it may be kept in the warehouse safely on a storage charge basis.

***Smart Micro-Mandi (SMM):** According to the estimate, India needs about 28,000 Smart Micro-Mandis to provide accessibility to all the farmer-producers. The four basic pillars of the model are: 1) Proximity of the SMM to the farmer (proposed 5-6 km), 2) Assaying -based grading and mixing of the lot (milkization), 3) Dematerialization & Pledge Financing (for instant partial payment to the farmers), and 4) End-to-end digitization. Application of modern technologies like AI, IoT, Data Science, Sensor-based imaging would make these micro-mandi smart. Inter-mandi or national trading of agricultural commodity is only possible, if the quality of each lot are assayed correctly and displayed on the portal. The brief of Smart Micro-Mandi can be accessed on https://naarm.org.in/wp-content/uploads/2018/09/E_Policy_Brief_SMM04082018.pdf.

References

Acharya, S.S. & Agarwal, N.L. (2009), Agricultural Marketing in India. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd

Acharya, S.S. (2006), Agricultural Marketing Reforms: Status and Road Map. A Paper for National Institute for Agricultural Marketing, Jaipur. For use by the Working Group on Agricultural Marketing Reforms, Contract Farming and Agro Processing, Constituted by the Sub-Committee of National Development Council, Government of India. . Jaipur: National Institute for Agricultural Marketing.

Acharya, S.S. and N.L. Agarwal (2011), Agricultural Marketing in India, Fifth Edition, Oxford and IBH Publishing Co., New Delhi, p.12.

Aker, J., and M. Fafchamps. (2015). Mobile Phone Coverage and Producer Markets: Evidence from West Africa. World Bank Economic Review 29 (2): 262–92.

Barrett, C.B., 2008. Smallholder market participation: concepts and evidence from eastern and southern Africa. Food Policy 33 (4), 299–317.

Bates, R. H. (2014). Markets and states in tropical Africa: The political basis of agricultural policies. Berkley/London: University of California Press.

Berdegué, J., (2002). Learning to beat Cochrane's treadmill. Public Policy, Markets and Social Learning in Chile's Small-Scale Agriculture. In: Leeuwis, C., Pyburn, R. (Eds.), Wheelbarrows Full of Frogs: Social Learning in Rural Resource Management, pp. 333–348.

Bhardwaj, M., and R. K. Singh. (2014) "India Targets Middlemen in Food Chain as Inflation Bites." Reuters. Available online at https://in.reuters.com/article/india-inflation-farming/indiatargets-middlemen-in-food-chain-as-inflation-bites-idINKBN0FG0H020140711.

Biglaiser, G., and J.W. Friedman. (1994). Middlemen as Guarantors of Quality. International Journal of Industrial Organization 12 (4): 509–31.

Bisen JP & Ranjit Kumar. (2018) Agricultural marketing reforms and e-national agricultural market (e-NAM) in India: a review, Agricultural Economics Research Review. 31(conf.issue): 167-176

Buxton, A., D. Seville, J. Shriver, P. Robbins, R. Best, and S. Ferris (2014). "Linking Smallholder Farmers to Markets and the Implications for Extension and Advisory Services | Agrilinks." MEAS Disccusion Paper Series 4, USAID, Washington, DC. Available online at https://agrilinks.org/library/linking-smallholderfarmers-markets-and-implications-extension-and-advisory-services.

Chand R (2016) e-Platform for National Agricultural Market. Economic & Political Weekly 11(28): 15-18

Chand R and Singh J (2016) Study Report on Agricultural Marketing and Farmer Friendly Reforms across Indian States and UTs. NITI Aayog, New Delhi.

Chand R. (2017). Doubling Farmers' Income: Rationale, Strategy, Prospects, and Action Plan. NITI Policy paper No. 1/2017. NITI Aayog, Government of India, New Delhi.

Chengappa, P. G., Arun, M., Yadava, C. G., & Kumar, H. M. (2012). IT Application in Agricultural Marketing Service Delivery—Electronic Tender System in Regulated Markets. *Agricultural Economics Research Review*, *25*(conf), 359-372.

Courtois, P., and J. Subervie (2015). "Farmer Bargaining Power and Market Information Services." American Journal of Agricultural Economics 97:953–977. doi: 10.1093/ajae/aau051.

DFI (2017) *Report of the Committee on Doubling Farmers' Income*, Vol IV, *Post-production interventions: Agricultural Marketing.* Ministry of Agriculture & Farmers Welfare, Government of India.

Draganska, M., D. Klapper, and S. B. Villas-Boas (2010). "A Larger Slice or a Larger Pie? An Empirical Investigation of Bargaining Power in the Distribution Channel." Marketing Science 29:57– 74. doi: 10.1287/mksc.1080.0472.

Ebata A and Hernandez MA (2017) Linking smallholder farmers to markets on extensive and intensive margins: Evidence from Nicaragua. Food Policy, 73: 34-44.

Fafchamps, M., and B. Minten. (2012). Impact of SMS-Based Agricultural Information on Indian Farmers. World Bank Economic Review 26 (3): 383–414.

FAI (2019). *Fertilizer statistics 2018-19*. The Fertilizer Association of India, New Delhi.

GOI (2013) *Final Report of Committee of State Ministers, In-charge of Agriculture Marketing to Promote Reforms*. Ministry of Agriculture, Government of India.

GOI (2020) *Agriculture-farming and allied activities exempted from Lockdown*. Press Information Bureau, Government of India. 28-March-2020.

Goyal, Aparajita. (2010). "Information, Direct Access to Farmers, and Rural Market Performance in Central India." American Economic Journal: Applied Economics 2 (3): 22–45.

Hellin, J., Lundy, M., Meijer, M., (2009). Farmer organization, collective action and market access in Meso-America. Food Policy 34 (1), 16–22

Jensen, Robert.(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.

Jori, A., and J. Leach. 2002. Middlemen and the Allocation of Heterogeneous Goods. International Economic Review 43 (2): 347–61.

Key, N., Sadoulet, E. and de Janvry, A. (2000). Transactions costs and agricultural household supply response. American Journal of Agricultural Economics, 82(2), 245-259.

Lele, U. (1977). *Cooperatives and the Poor: A Comparative Perspective*. International Cooperative Alliance.

Levi R, Rajan M, Singhvi S, and Zheng Y. (2002) The impact of unifying agricultural wholesale markets on prices and farmers' profitability. *PNAS*, 117(5): 2366-2371 (Feb 4, 2020).

Li, Y. (1998). Middlemen and Private Information. Journal of Monetary Economics 42 (1): 131–59.

Masters, A. (2008). Unpleasant Middlemen. Journal of Economic Behavior and Organization 68 (1): 73–86.

Mitchell, T.(2017) "Is Knowledge Power? Information and Switching Costs in Agricultural Markets." American Journal of Agricultural Economics, 99(5): 1307-1326. doi: 10.1093/ajae/aax035.

Mitra, S., D. Mookherjee, M. Torero, and S. Visaria. (2017) "Asymmetric Information and Middleman Margins: An Experiment with Indian Potato Farmers." Review of Economics and Statistics. doi: 10.1162/REST_a_00699

Muto, M., and T. Yamano. 2009. The Impact of Mobile Phone Coverage Expansion on Market Participation: Panel Data Evidence from Uganda. World Development 37 (12): 1887–96.

NCF (2007): Report of National Commission on Farmers, Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India.

Nigel Key, Elisabeth Sadoulet and Alain De Janvry. (2000). Transaction cost and household supply response. American Journal of Agricultural Economics,82(2):245-259. doi.org/10.1111/0002-9092.00022

PIB (July 31, 2015). *Promotion of National Agricultural Market.* Press Information Bureau. Government of India. Available online at https://pib.gov.in/newsite/PrintRelease.aspx?relid=123996

Purohit, P. (2013). *Regulations of Agricultural Markets and Economic Performance: Evidence from Indian States*. PhD thesis submitted to the University of Manchester, United Kingdom.

Ranjan R. (2017) Challenges to Farm Produce Marketing: A Model of Bargaining between Farmers and Middlemen under Risk. *Journal of Agricultural and Resource Economics*, 42(3): 386-405 .

Rao NC, Sutradhar R and Reardon T. (2017) Disruptive Innovations in Food Value Chains and Small Farmers in India. *Indian Journal of Agricultural Economics,* 72(1): 24-48.

Riley, H. & Staatz, J. (1981), Food System Organisation Problems in Developing Countries. Agricultural Development Council Report, Michigan State University, New York ADC Report no. 23

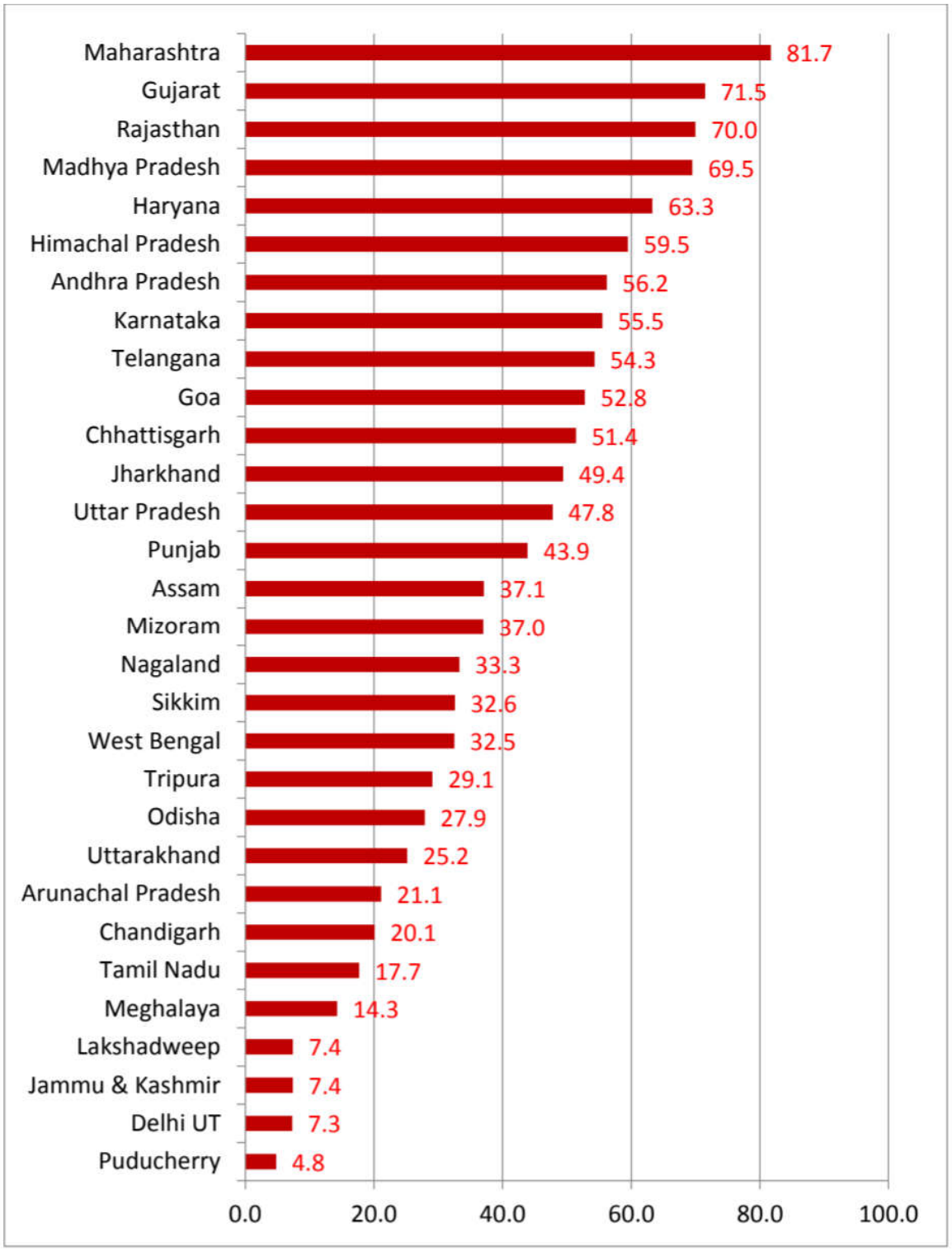
Rubinstein, A., and A. Wollinsky. 1985. Equilibrium in a Market with Sequential Bargaining. Econometrica 53: 1133–50.

Schultz, T.W. (1976), Transforming Traditional Agriculture: New York: Arno Press.

Van Raalte, C., and H. Webers. 1998. Spatial Competition with Intermediated Matching. Journal of Economic Behavior & Organization 34: 477–88.

ANNEXURE

Annexure I: States' score in terms of Agri Marketing and Farmer Friendly Reforms



Source: Chand and Singh (2016)

Annexure II : State-wise progress of marketing reforms at the end of 2016

S. No.	Area of marketing reforms	States adopted the suggested area of marketing reforms
1.	Establishment of private market yards/ private markets managed by a person other than a market committee	Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Gujarat, Goa, Himachal Pradesh, Karnataka, Maharashtra, Mizoram, Nagaland, Orissa (excluding for paddy/rice), Rajasthan, Sikkim, Telangana, Tripura, Punjab, UT of Chandigarh, Jharkhand, Uttarakhand, West Bengal.
2.	Establishment of direct purchase of agricultural produce from agriculturist (Direct Purchasing from producer)	Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Gujarat, Goa, Haryana (for specified crop through establishment of Collection Centres) Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Mizoram, Nagaland, Rajasthan, Sikkim, Telangana, Tripura, Punjab (only in Rule), UT of Chandigarh (only in Rule), Jharkhand, Uttarakhand and West Bengal.
3.	Establishment of farmers/ consumers market managed by a person other than a market committee (Direct sale by the producer)	Arunachal Pradesh, Assam, Chhattisgarh, Gujarat, Goa, Himachal Pradesh, Karnataka, Maharashtra, Mizoram, Nagaland, Rajasthan, Sikkim, Tripura, Jharkhand, Uttarakhand and West Bengal.
4.	Contract Farming Sponsor shall register himself with the Marketing Committee or with a prescribed officer in such a manner as may be prescribed	Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Goa, Gujarat, Haryana Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Madhya Pradesh, Mizoram, Nagaland, Orissa, Punjab (separate Act), Rajasthan, Sikkim, Telangana, Tripura and Uttarakhand.
5.	To promote and permit e-trading	Andhra Pradesh, Chhattisgarh, Gujarat, Jharkhand, Haryana, Himachal Pradesh., Karnataka, Rajasthan, Sikkim, Goa, Madhya Pradesh, Maharashtra, Mizoram, Telangana, Uttarakhand and Uttar Pradesh.
6.	Single point levy of market fee across the State	Andhra Pradesh, Rajasthan, Gujarat, Goa, Haryana, Himachal Pradesh, Chhattisgarh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Mizoram, Nagaland, Sikkim, UT of Chandigarh, Punjab, Telangana, Uttar Pradesh and Uttarakhand
7.	Single trading license valid across the State	Andhra Pradesh, Chhattisgarh, Goa, Gujarat, Haryana, Himachal Pradesh, Karnataka, Rajasthan, Madhya Pradesh, Maharashtra, Mizoram, Nagaland, Telangana, Sikkim and Uttar Pradesh

Source: Rao et al. (2017)

Annexure III: Production and market arrivals of major foodgrains, oilseeds & vegetables

Commodity	Production during 2016-17 (in 'million tonnes)	AGMARKNET arrivals 01/07/2016-30-06/2017 (in '000 tonnes)	AGMARKNET mandi arrivals w.r.t. production (%)	Marketed surplus ratio (%)
Cereals	251.34	76.01	30	67 - 88
Pulses	18.67	5.68	30	86 – 95
Major oilseeds	30.02	9.32	31	71- 94
Major vegetables	87.90	28.35	32	71- 91

Source: DFI (2017)

Annexure IV: List of 150 commodities allowed for trading on e-NAM

FOOD GRAINS/ CEREALS	FRUITS	VEGETABLES	MISCELLANEOUS
1. Arhar 2. Arhar Dal Split 3. Bajra 4. Barley 5. Basmati rice 6. Buck Wheat 7. Chana Dal Split 8. Chana whole 9. Horse Gram 10. Jowar 11. Kabuli Chana 12. Lobia 13. Maize 14. Masoor whole 15. Moong Dal Split 16. Moong whole 17. Moth 18. Oats Raw 19. Paddy 20. Ragi 21. Rajma 22. Urad Dal Split 23. Urad whole 24. Wheat 25. White Peas	1. Amla 2. Apple 3. Apricot 4. Banana 5. Ber 6. Cherry Red / Black 7. Custard apple 8. Grapes 9. Guava 10. Jackfruit 11. Jamun 12. Kinnow 13. Lemon 14. Litchi 15. Mango 16. Musk melon 17. Orange 18. Papaya 19. Papaya Raw 20. Peach 21. Pear 22. Pineapple 23. Plum 24. Pomegranate 25. Raw Mango 26. Sapota 27. Stawberries 28. Sweet orange 29. Watermelon	1. Banana Raw 2. Beetroot 3. Bhindi/Okra 4. Bitter gourd 5. Bottle gourd 6. Brinjal 7. Cabbage 8. Capsicum 9. Carrots 10. Cauliflower 11. Cluster beans 12. Colocasia vegetable 13. Coriander leaves 14. Cucumber 15. Drumstick 16. Fenugreek Leaves 17. Garlic 18. Ginger 19. Green chillies 20. Ivy gourd 21. Jimikand (Suran) 22. Lobia Pods 23. Mustard leaf 24. Onion 25. Pea 26. Pointed gourd 27. Potato 28. Pumpkin 29. Reddish 30. Ribbed celery 31. Ridge Gourd 32. Safed Petha 33. Sem 34. Snake Guard 35. Spinach 36. Sweet Corn 37. Sweet potato 38. Tapioca 39. Tinda 40. Tomato	1. Areca nut (betel nut) 2. Bamboo 3. Betel leaves 4. Carnation 5. Chhappan Kaddu 6. Coconut 7. Coconut with Husk 8. Cotton 9. Gladiolus 10. Groundnut with pods 11. Guar seed 12. Isabgol 13. Jaggery 14. Jute Seeds 15. Mahua flower 16. Mahua Seed 17. Marigold 18. Nutmeg Whole 19. Persimmon 20. Raisins 21. Raw Cashew nut 22. Raw Jute 23. Rittha 24. Rose Cut Flower 25. Saffron 26. Tamarind 27. Tender coconut 28. Tuberose 29. Walnuts Inshell
OILSEEDS	**SPICES**		
1. Castor seed 2. Cotton Seed 3. Kusum seed 4. Linseed 5. Mustard seed 6. Neem Seeds 7. Nigar Seed 8. Peanut kernel 9. Pongam seeds 10. Sal Seed 11. Sesame seed 12. Soyabean 13. Sunflower seed	1. Ajwain 2. Black Pepper Whole 3. Cardamoms Whole 4. Cloves Whole 5. Coriander whole 6. Cumin 7. Dried Raw Mango Slices 8. Dry Ginger 9. Fennel seed 10. Fenugreek seed 11. Large cardamom 12. Red chilli 13. Tejpata 14. Turmeric		

Source: https://enam.gov.in/web/commodity/commodity-list (accessed on 27.04.2020)

Annexure V: Essential quality parameters for assaying of the samples under e-NAM

A. MAJOR FOODGRAINS

Essential quality parameters	Permissible limit (maximum) for different quality parameters for **Range-3 (lowest grade)** commodities **(% by weight)**					
	Maize	**Paddy**	**Bajra, Jowar, Ragi**	**Wheat, barley**	**Chana, Rajma**	**Arhar, Moong, Masoor, Urad, White peas**
Moisture	16.0	20.0	16.0	14.0	14.0	14.0
Foreign matter	3.0	6.0	1.0	4.0	3.0	2.0
Admixture/Other edible grains	3.0	20.0	6.0	10.0	4.0	3.0
Immature & shrivelled	15.0	7.0	8.0	7.0		3.0
Damaged/Discoloured grains		8.0	10.0	7.0	7.0	5.0
Weevilled grains*	10.0		6.0	10.0	10.0	10.0

* % by count

Optional parameters: Uric acid, Aflatoxin, Protein content, Minimum test weight,

B. MAJOR OILSEEDS

Essential quality parameters	Permissible limit (maximum) for different quality parameters for **Range-3 (lowest grade)** commodities **(% by weight)**				
	Mustard seed	**Soybean**	**Peanut Kernel**	**Sunflower seed**	**Sesame seed**
Oil content	36.0	13.0		22.0	35.0
Moisture	10.0	12.0	7.0	5.0	7.0
Foreign matter	4.0	3.0	2.0	6.0	2.0
Damaged seeds	5.0	7.0	5.0	6.0	3.0
Immature & shrivelled			4.0		
Weevilled seeds*		5.0			
Other edible seeds	1.0	6.0			20.0#
Argemone seeds	Absent				
Optional	Allyl iso thiocynate	Green seed, Protein	Aflatoxins		

* % by count #In case of sesame seeds, it is admixture of other varieties of the seed

C. MAJOR FRUITS

	Essential quality parameters	Permissible limit (maximum) for different quality parameters for **Range-3 (lowest grade)** commodities **(% by weight)**				
		Apple	**Orange**	**Pomegranate**	**Mango**	**Jackfruit**
(i)	Size (Diameter in mm of the equatorial section)	Upto 50	55-80	Upto 65		
	Size by weight (in gm)				Up to 100	
(ii)	Defects (% by count) (… of total surface area)					
	- Dry Healed Hail (2-5 sq.cm)	20				
	- Russetting (2-5 sq.cm)	6				
	- Soft Patch (2-5 sq.cm)	6				
	- Cut skin/Bruising (10 to 30 mm)				20%	
	- Discoloration (0.5 to 5 sq cm)		10%			
	- Slight bruising/minor cut/ (0.5 to 2 sq cm)		10%	10%		
	- Irregular Shape & maturity development					6%
	- Skin defects					10%
(iii)	Range Acceptance	80%	85%	85%	80%	80%

D. TOP VEGETABLES

	Essential quality parameters	Permissible limit for different quality parameters for **Range- 1 & 3 (best to lowest)** commodities		
		Onion (Range 1➔3)	**Potato** (Range 1➔3)	**Tomato** (Range 1➔3)
(i)	Defects (% by count) (Max)			
	- Cut (5-15mm long)	5.0 ➔ 15.0		
	- Double split	2.0 ➔ Above 8.0		
	- Sprouted	2.0 ➔ Above 8.0		
	- Rooting	2.0 ➔ Above 8.0		
	- Cracks/cut (5 mm to 20mm)	5% ➔ >10%		2.0 ➔ >3.0
	- Sunburn (for 1-3 sq.cm of surface area)			2.0 ➔ >3.0
	- Greening (1-3 sq cm of total surface area)		5% ➔ >10%	
	- Holes		1.0 ➔ >2.0	
	- Mechanical injury		2.0 ➔ >3.0	2.0 ➔ >3.0
	- Discolouration (Green /Green Top/ Blotchy) (for 1-4 sq.cm of surface area)			3.0 ➔ >5.0
(ii)	Size (maximum diameter in mm of the equatorial section)	65 ➔ 25	70 ➔ 25	65 ➔ 45
(iii)	Range Acceptance		90% ➔ 80%	95% ➔ 85%

E. GREEN VEGETABLES

	Essential quality parameters	Permissible limit for different quality parameters for **Range- 1 & 3 (best to lowest)** commodities				
		Bottle gourd (Range 1➔3)	**Brinjal** (Range 1➔3)	**Cabbage** (Range 1➔3)	**Cauliflower** (Range 1➔3)	**Green Chillies** (Range 1➔3)
(i)	Weight (Max)	750 gms ➔ <350 gms				
(ii)	Defects (% by count) (Max)					
	- shape/color & stains (1-4 sq cm of the surface area)	5.0 ➔ 15.0				
	- rubbing and handling (1-4 sq cm of the surface area)	5.0 ➔ 15.0				
	- Bruising/ Scars/ Scratches (1-3 sq cm of total surface area)		3.0 ➔ 7.0		3.0 ➔ 7.0	
	- Wooliness (1-10 sq cm of total surface area)				3.0 ➔ 7.0	
	- Bruising (5-10 mm of total surface area)					3.0 ➔ 7.0
	- Colour (Including sun spots) (05-10 mm of total surface area)					3.0 ➔ 7.0
	- Burst Head			3.0 ➔ 7.0		
	- Mechanical/ Physical Injury			3.0 ➔ 7.0		
(iii)	Range Acceptance	95% ➔ 85%	95% ➔ 85%	95% ➔ 85%	95% ➔ 85%	95% ➔ 85%

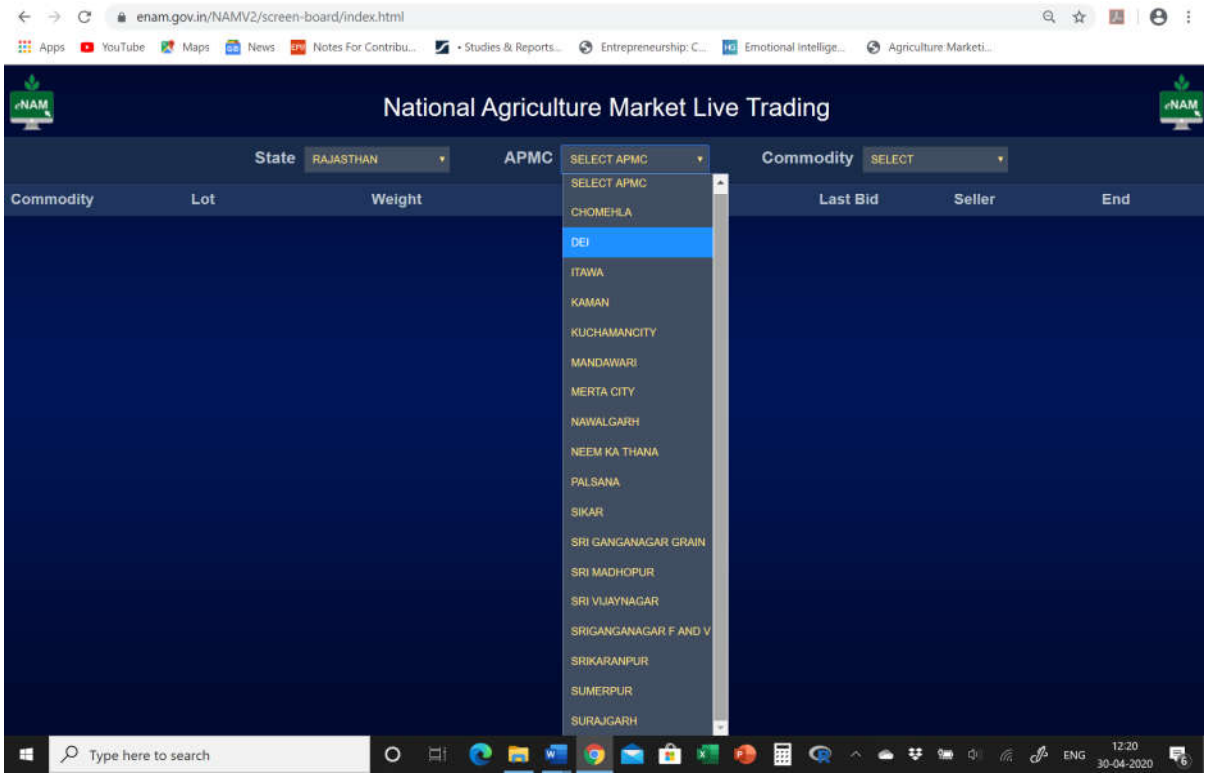
Sampling: - (i) 5 % or minimum one container shall be randomly selected for sampling (ii) 10 Nos shall be drawn from each selected container and shall be mixed homogenously , called as primary sample (iii) 10 nos. shall be drawn from primary sample called as Laboratory sample.

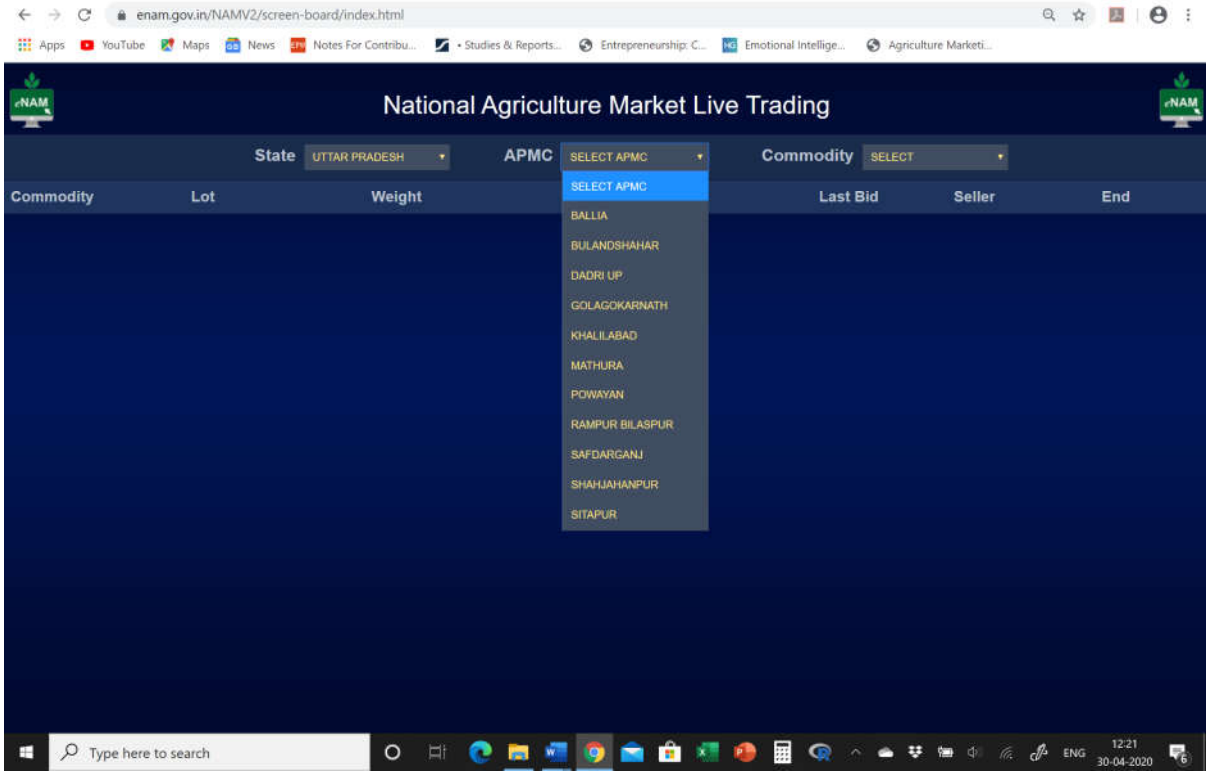
Annexure VI: Transaction of major commodities reported by the selected e-NAM mandis for the period January-December 2017

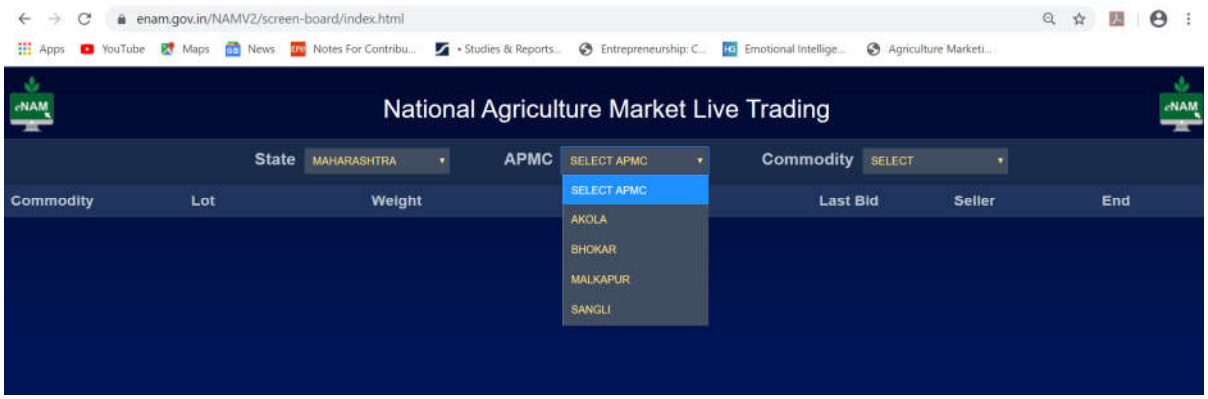
State	e-NAM Mandi	Major commodties (contributing >95% by volume, rank-wise)
Telangana	Malakpet/ Hyderabad	Chillies only
	Karimnagar	Paddy, Cotton, Arhar & Maize
	Nizamabad	Turmeric Finger, Turmeric Bulb, Turmeric Chura, Paddy-MTU 1010, Maize Hybrid, Paddy-BPT, Soya White, Paddy-R.N.R, Turmeric Fingure Old, Onion White
	Warangal	Cotton-Bags, Maize Local, , Chilli-Teja, Chilli-Wonderhot, Chilli-341, Turmeric Finger, Arhar Whole (Red Gram), Cotton-Loose, Paddy-MTU 1010, Chilli-Deepika, Chilli-Desi, Turmeric Bulb, Chilli-Thaalu, Maize-New, Ground Nut, Chilli Teja A/C, Green Gram, Paddy-R.N.R, Paddy-Vijayamasoori
Madhya Pradesh	Karond/Bhopal	Wheat, Chana (Bengal Gram)-Desi, Soya-Yellow, Arhar Whole (Red Gram), Urad (Black Gram), Lentil (Masoor), Chana (Bengal Gram), Maize, Moong Whole (Green Gram)
	Indore	Urad (Black Gram), Moong Whole (Green Gram), Masoor, Peas Green, Arhar (Red Gram), Mustard
	Dewas	Chana (Bengal Gram)-Desi, Maize, Arhar Whole (Red Gram), Lentil (Masoor), Mustard, Urad (Black Gram), Peas Green
	Sehore	Chana (Bengal Gram)-Desi, Maize NK-6240, Maize-New, Masoor

Source: e-NAM portal downloaded during October 2018.

Annexure VII: e-NAM mandis showing live trading in major states (as on 30.04.2020: 12:14hrs)



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BHOKAR
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SANGLI
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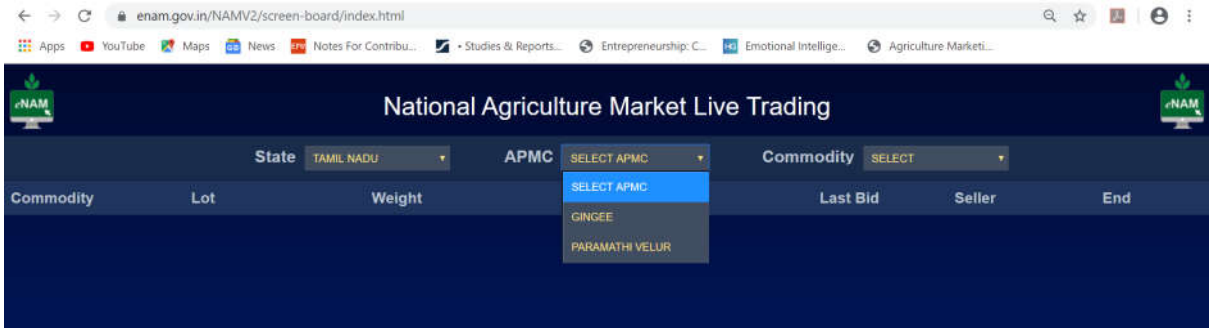
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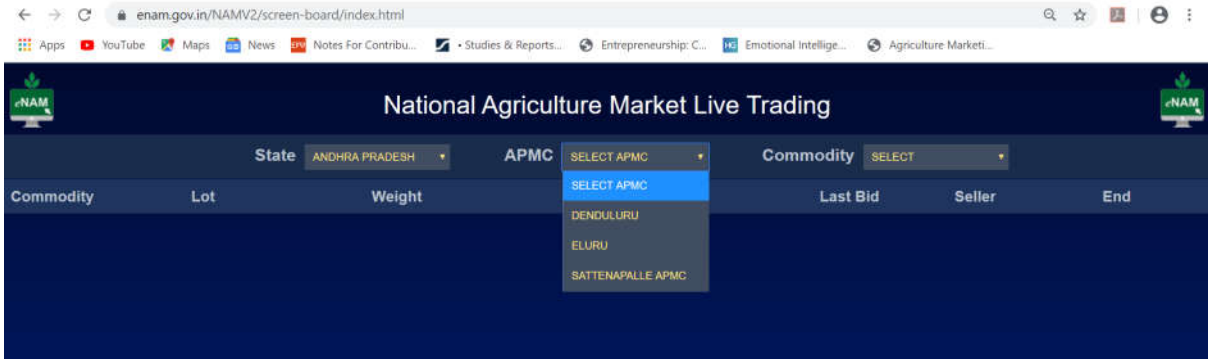
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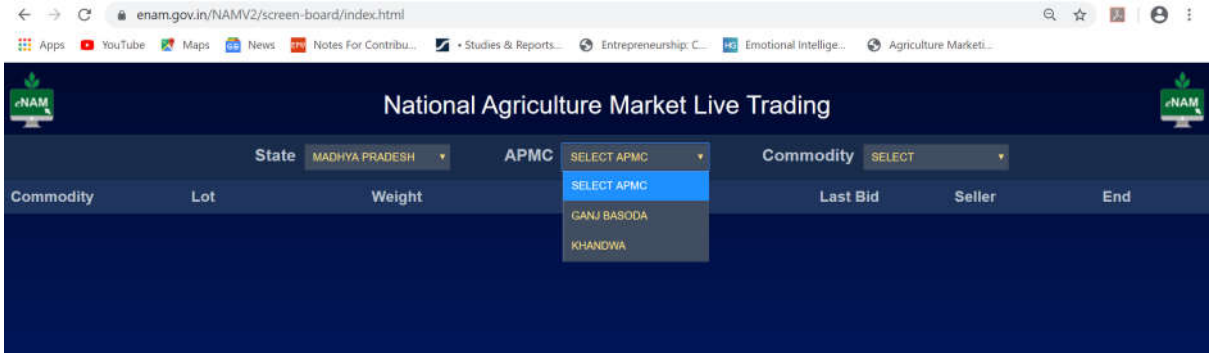
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KHANDWA
Commodity Lot Weight Last Bid Seller End

Annexure VIII: List of APMC mandis reported trading details on e-NAM and Agmarknet (Non-eNAM) portal during April 2020

Madhya Pradesh

APMCs trading through both eNAM and Non-eNAM platform

Ashta	Dewas	Morena	Seoni
Bareli	Ganjbasoda	Obedullaganj	Shujalpur
Betul	Harda	Pipariya	Tikamgarh
Bina	Indore	Rewa	Timarni
Chhatarpur	Khandwa	Satna	Vidisha
Chhindwara	Khirakiya	Sehore	

Note: Although these APMCs are reported both in Agmarknet and E-NAM portal, but in most of the cases, the commodities traded differed.

APMCs trading only through eNAM

Mandsaur	Surendra Singh Chouhan	Uday Farmers Producer Limited

APMCs trading only through Non-eNAM platform

Agar	Baikunthpur	Bhitarwar	Dhar
Ajaygarh	Bakswaha	Bhopal	Dindori
Alampur	Baktara	Bhopal(F&V)	Gadarwada
Alirajpur	Balaghat	Biaora	Gairatganj
Amarpatan	Balwadi	Bijawar	Gandhwani
Amarwda	Bamora	Binagaj	Garhakota
Ambaha	Banapura	Binaganj	Gautampura
Anjad	Banda	Budhar	Ghansour
Anuppur	Bankhedi	Burhanpur (F&V)	Gohad
Aron	Banmorkalan	Chaakghat	Gorakhpur
Ashoknagar	Barad	Chanderi	Gotagaon
Ashoknagar (F&V)	Barghat	Chhapiheda	Gotegaon
Babai	Begamganj	Chhindwara (F&V)	Gulabganj
Badamalhera	Beohari	Chhpara	Guna
Badarwas	Berachha	Dabra	Guna(F&V)
Badnagar	Berasia	Damoh	Hanumana
Badnawar	Bhander	Damoh (F&V)	Harda(F&V)
Badnawar (F&V)	Bhargat	Datia	Harpalpur
Badod	Bhensdehi	Deori	Harsood
Badwani	Bhikangaon	Devandranagar	Hata
Bagli	Bhind		Hoshangabad

Ichhawar	Kolaras	Neemuch	Semriharchand
Isagarh	Kotma	Niwadi	Sendhwa
Jabalpur(F&V)	Kumbharaj	Paatan	Sendwa
Jaisinagar	Kurawar	Pachaur	Sevda
Jaora	Kurwai	Palari	Shadora
Jatara	Lahar	Pandhana	Shahagarh
Javad	Lakhnadon	Pandhurna	Shahdol
Javera	Lalbarra	Panna	Shahpura(Jabalpur)
Jawar	Lashkar	Patharia	Shajapur
Jeerapur	Lashkar(F&V)	Pawai	Shajapur(F&V)
Jhabua	Lateri	Petlawad	Shamshabad
Jobat	Loharda	Pichhour	Sheopurbadod
Jora	Machalpur	Piplya	Sheopurkalan
kailaras	Magroni	Piprai	Shepurbadod
Kalaipal	Mahidpur	Pohari	Shivpuri
Kalapipal	Maksi	Porsa	Shivpuri(F&V)
Kannod	Maksudangarh	Porsa(F&V)	Shyampur
Kareli	Manawar	Prithvipur	Sidhi
Karera	Mandla	Raghogarh	Silvani
Karhi	Mandsaur (F&V)	Rahatgarh	Simariya
Kasrawad	Mehar	Raisen	Siroli
Katangi	Mehgaon	Rajgarh	Sironj
Katia	Mhow	Rajnagar	Sitmau
Katni	Momanbadodiya	Ramnagar	Sonkatch
Keolari	Morena(F&V)	Rannod	Soyatkalan
Khachrod	Mow	Ratlam	Susner
Khaegaon	Multai	Ratlam(F&V)	Suthalia
Khandwa (F&V)	Mungawali	Rehati	Suvasra
Khaniadhana	Nagda	Rehli	Syopurkalan (F&V)
Khargapur	Nagod	Sabalgarh	Udaipura
Khategaon	Nainpur	Sanawad	Ujjain
Khatora	Nalkehda	Sanwer	Ujjain(F&V)
Khetia	Narsinghgarh	Sarangpur	Umariya
Khilchipur	Nasrullaganj	Satna(F&V)	Vijaypur
Khujner	Naugaon	Saunsar	
Khurai		Segaon	

Maharashtra

APMCs trading through both eNAM and Non-eNAM platform

Achalpur	Dound	Sangli(Phale, Bhajipura Market)	Varora
Akola	Kolhapur	Sinner	Yeola
Aurangabad	Pimpalgaon	Vani	
Bhokardan	Rahuri		

APMCs trading only through eNAM

Akot	Daryapur	Malkapur	Shirur
Amaravathi	Digras	Mangrulpeer	Solapur
Anjangaon Surji	Dondaicha	Nagpur	Surya Farmer Producer Co.Ltd
Baramati	Gevrai	Nasik	
Barshi	Gondiya	Parbhani	Tumsar
Basmat	Kalamb	Shahada	Udgir
Beed	Khamgaon	Shegaon	Vaijapur
Chopada	Lonar	Shirpur	Wardha

APMCs trading only through Non-eNAM platform

Alibagh	Kalamnuri	Pachora	Shrirampur
Bhajipura Market)	Kalvan	Pachora (Bhadgaon)	Tasgaon
Gangakhed	Kalyan	Paithan	Umari
Ghansawangi	Karjat	Paranda	Vadgaonpeth
Hadgaon	Khed	Patan	Vai
Hadgaon (Tamsa	Lasalgaon	Pen	Varud
Jalgaon	Lasur Station	Pulgaon	Vita
Jalgaon (Masawat)	Mumbai	Purna	Washim
Junnar (Narayangaon)	Murbad	Rahata	Washim (Ansing)
Junnar(Otur)	Murtizapur	Roha	ZariZamini
	Murud	Satara	
	Nandura	Shrigonda	

Rajasthan

APMCs trading through both eNAM and Non-eNAM platform

Abu Road	Baran	Bijoliya	Chomu
Ajmer(F&V)	Barmer	Bikaner (Grain)	Chomu(F&V)
Aklera	Bayana	Bikaner(F&V)	Churu
Alwar	Beawar	Bilara	Dausa
Anoopgarh	Bhadara	Bundi	Deeg
Anta	Bhawani Mandi	Chaksu	Degana
Atru	Bhinmal	Chhabra	Deoli
Balotra	Bijay Nagar	Chirwa	Dholpur

Fatehpur	Kekri	Nokha	Sri Karanpur
Gajsinghpur	Kesarisinghpur	Padampur	Sri Madhopur
Gharsana	Khajuwala	Pali	Sri Vijayanagar
Goluwala	Khanpur	Pilli Banga	Sriganganagar
Hanumangarh	Kherli	Pratapgarh	Sriganganagar (F&V)
Hindoun	Kishangarh Renwal	Raisingh Nagar	Sujangarh (Churu)
Itawa	Kota	Rajasamand	Sumerganj
Jaipur(Bassi)	Kotputli	Ramaganj Mandi	Surajgarh
Jaisalmer	Kuchaman City	Rawatsar	Suratgarh
Jaitaran	Lalsot(Mandabari)	Rawla	Tonk
Jaitsar	Lunkaransar	Sadulpur	Udaipur
Jalore	Mahua Mandabar (Mahua)	Sadulshahar	Udaipur(F&V)
Jhalarapatan	Merta City	Sanchor	Uniyara
Jhunjhunu	Nadwai	Sangriya	
Jodhpur(F&V) (Bhadwasia)	Nagar	Sawai Madhopur	
Jodhpur(Grain)(Phalodi)	Nimbahera	Sikar	
	Nohar	Sojat Road	

APMCs trading only through eNAM

Ajmer Grain	Chottisadri	Khairthal	Palsana
Bajju	Deedwana	Kota F And V	Phalodi
Bandikui	Dei	Krishak Vikas Agro Producer Company Limited	Piparcity
Banswada	Diwak Mata Farmer Producer Company Ltd	M. Kishangarh	Rajdhani Mandi Kukarkhera
Barisadri	Dooni	Mahuwa Rj	Rani
Barodamev	Dungarpur	Malpura	Raniwara
Bassi	Fatehnagar	Mandalgarh	Ratangarh
Begu	Gangapur City	Mandawari	Ridmalsar
Bhagat Ki Kothi	Gangapur-Rj	Nagour	Sardar Shahar
Bharatpur	Guda Godji	Navjeevan Farmer Producer Company Limited.	Shahpura
Bhilwara	Jaipur Grain	Nawalgarh	Sri Dungargarh
Bonli Samrudhh Agro Producer Company Limited	Kaman	Neem Ka Thana	Sumerpur
Chittorgarh	Kapasan	Niwai	Vikram Singh Rajawat
Chomehla	Keshoraipatan		

APMCs trading only through Non-eNAM platform

Alwar(FV)	Bheenmal (Ranlwada)	Jodhpur(F&V) (Paota)	Kishan Renwal (Fulera)
Atru(Kawai Salpura)	Bijolia	Jodhpur(Grain) (Bhagat Ki Kothi)	Kishan Renwal (Sambhar)
Bhandara	Chhabra (Chhipabadod)	Kakri	Madanganj Kishanganj
Bhawani Mandi (Choumehla)	Hanumangarh Town	Kama	Renwal(Sambhar)
Bhawani Mandi (Raipur)	Hanumangarh (Urlivas)	Khedh(Bodaramev)	
		Khedli(laxmangarh)	

Telangana

APMCs trading through both eNAM and Non-eNAM platform

Sadasivpet

APMCs trading only through eNAM - NIL

APMCs trading only through Non-eNAM platform

Amangal	Devarkonda(Dindi)	Ibrahimputnam	Nalgonda
Banswada	Devarkonda (Mallepalli)	Khanapur	Neredcherla
Bodhan	Gadwal	Kodad	Pitlam
Bowenpally	Gudimalkapur	Koratla	Sangareddy
Charla	Halia	Kothagudem	Shadnagar
Chityal	Huzurnagar	Mahboob Manison	Suryapeta
Devarakonda	Huzzurabad	Miryalaguda	Varni
Devarkonda		Nakrekal	Yellareddy

Uttar Pradesh

APMCs trading through both eNAM and Non-eNAM platform

Achalda	Chhibramau (Kannuj)	Lakhimpur	Rasda
Akbarpur	Dadri	Lucknow	Robertsganj
Aligarh	Etah	Mahoba	Safdarganj
Amroha	Fatehpur	Mainpuri	Sahiyapur
Anandnagar	Firozabad	Mathura	Sambhal
Atarra	Golagokarnath	Meerut	Sandila
Auraiya	Hapur	Milak	Shadabad
Azamgarh	Hardoi	Mirzapur	shahabad(New Mandi)
Badayoun	Hasanpur	Mohamadabad	shahganj
Bahraich	Jahangirabad	Muskara	Shahjahanpur
Ballia	Jalalabad	Najibabad	Sitapur
Balrampur	Jalaun	Naugarh	Tikonia
Banda	Jaunpur	Nautnava	Tulsipur
Barabanki	Kanpur(Grain)	Nawabganj	Tundla
Basti	Karvi	Noida	Ujhani
Bharthna	khair	Paliakala	Unnao
Bharuasumerpur	Khalilabad	Pilibhit	Varanasi(F&V)
Buland Shahr	Konch	Puranpur	Wazirganj
Chandausi	Kopaganj	Raibareilly	
Chandoli		Rampur	

APMCs trading only through eNAM

Arif Hasan	Mahmudabad	Powayan
Deoria	Naveen Kisan Producer Company Ltd	Rohit Bhatt
Hathras		Sahjanwa Apmc

APMCs trading only through Non-eNAM platform

Achnera	Dhanura	Katra	Rampurmaniharan
Agra	Dibiapur	Kayamganj	Richha
Ait	Dudhi	Khairagarh	Risia
Ajuha	Etawah	Khatauli	Rudauli
Aliganj	Faizabad	Khekda	Rura
Allahabad	Farukhabad	Khurja	Saharanpur
Anoop Shahar	Fatehabad	Kiratpur	Sahpur
Anwala	Fatehpur Sikri	Kishunpur	Saidpur
Atrauli	Gadaura	Kosikalan	Salon
Awagarh	Gangoh	Kuara	Samsabad
Baberu	Ganjdudwara	Kurara	Sandi
Babrala	Gazipur	Lalganj	Sardhana
Bachranwa	Ghaziabad	Lalitpur	Sehjanwa
Badda	Ghiraur	Madhoganj	shahaswan
Bagpat	Gonda	Maigalganj	Shahpur
Bahedi	Gopiganj	Mau	Shamli
Bangarmau	Gopralganj	Maudaha	Shikohabad
Banthara	Gorakhpur	Mauranipur	Sikanderabad
Baraut	Gulavati	Mawana	Sikandraraau
Bareli	Gurusarai	Mehmoodabad	Sikarpur
Barhaj	Haathras	Mihipurwa	Sirsa
Baruwasagar	Hamirpur	Misrikh	Sirsaganj
Bewar	Hargaon (Laharpur)	Moth	Siyana
Bharwari	Jafarganj	Mugrabaadshahpur	Soharatgarh
Bhehjoi	Jagnair	Muradabad	Sultanpur
Bijnaur	Jahanabad	Muradnagar	Sultanpurchilkana
Billsadda	Jangipura	Muzzafarnagar	Tanda
Bilsi	Jarar	Naanpara	Thanabhawan
Bindki	Jasra	Nakud	Tilhar
chaandpur	Jasvantnagar	Nanuta	Utraula
Charra	Javer	Orai	Uttaripura
Chirgaon	Jayas	Parikshitgarh	Varanasi(Grain)
Chitwadagaon	Jhansi	Partaval	Varipaal
Chorichora	Jhijhank	Payagpur	Vilaspur
Choubepur	Kadhle	Pratapgarh	Vishalpur
Dankaur	Kairana	Pukhrayan	Visoli
Dataganj	Kamlaganj	Purwa	viswan
Devariya	Kannauj	Puwaha	
Devband	Kasganj	Raath	

Annexure IX: List of commodities reported trading details on e-NAM and Agmarknet (Non-eNAM) portal during April 2020

Madhya Pradesh

Commodities traded through both eNAM and non-eNAM

Red Gram (Whole)	Black Gram (Whole)	Maize	Soyabean
Pearl Millet	Green Gram (Whole)	Mustard	Wheat
Barley	Lak(Teora)	Paddy (Basmati)	
Bengal Gram Dal	Lentil (Whole)	Peas(Dry)	
Bengal Gram (Whole)	Linseed	Sesamum	

Commodities traded only through eNAM

Buckwheat	Green Peas	White Peas
Chana (Bengal Gram)-Desi	Mustard Leaf	
Chana Bengal Gram-Dollar	Soya Seeds (White)	

Commodities traded only through non-eNAM

Ajwan	Coriander(Leaves)	Kabuli Chana(Chickpeas-White)	Paddy(Dhan)(Common)
Amaranthus	Corriander seed	Karbuja(Musk Melon)	Papaya
Apple	Cotton	Lemon	Peas Wet
Banana	Cucumbar(Kheera)	Mahua Seed(Hippe seed)	Pomegranate
Banana - Green	Drumstick	Mango	Potato
Bhindi(Ladies Finger)	French Beans (Frasbean)	Mango (Raw-Ripe)	Pumpkin
Bitter gourd	Garlic	Masur Dal	Ridgeguard(Tori)
Bottle gourd	Ginger	Onion	Spinach
Brinjal	Grapes	Orange	Sponge gourd
Cabbage	Green Chilli		Tinda
Capsicum	Guar		Tomato
Carrot	Indian Beans (Seam)		Water Melon
Cauliflower			

Maharashtra

Commodities traded through both eNAM and non-eNAM

Red Gram (Whole)	Corriander seed	Maize	Ridgeguard(Tori)
Pearl Millet	Cotton	Mustard	Sesamum
Bitter gourd	Cucumbar(Kheera)	Onion	Soyabean
Bottle gourd	Garlic	Paddy(Dhan)(Common)	Sunflower
Brinjal	Gur(Jaggery)	Pomegranate	Tomato
Cabbage	Jowar(Sorghum)	Rice	Turmeric
Cauliflower	Lak(Teora)		Wheat

Commodities traded only through eNAM

Ajwan	Chana Bengal Gram-Dollar	Mousambi(Sweet Lime)	Tur/Arhar-Red
Bengal Gram Dal	Chana Gulabi	Onion Red	Tur/Arhar-White
Black Gram (Whole)	Chana Pkv3	Onion White	Turmeric Bulb
Black Gram Dal (Urd Dal)	Green Gram (Whole)	Orange	Turmeric Chura
Capsicum	Groundnut	Paddy 6445	Turmeric Finger
Castor Seed	Jowar-White	Raisin	Turmeric Fingure Old
Chana (Bengal Gram)-Desi	Jowar-Yellow	Soya Seeds (White)	Wheat-Bhansi
	Kusum Seed	Tur/Arhar-Mixed	White Peas

Commodities traded only through non-eNAM

Apple	Chilly Capsicum	Guar	Peas Wet
Bengal Gram (Whole)	Coconut	Lime	Potato
Bhindi(Ladies Finger)	Coriander(Leaves)	Linseed	Sugar
Cardamoms	Cummin Seed(Jeera)	Mango	Tamarind Fruit
Carrot	Drumstick	Mango (Raw-Ripe)	Water Melon
Cashewnuts	Ginger	Methi Seeds	
Chikoos(Sapota)	Grapes	Methi(Leaves)	
Chili Red	Green Chilli	Onion Green	

Rajasthan

Commodities traded through both eNAM and non-eNAM

Pearl Millet	Cotton	Jowar(Sorghum)	Sesamum
Barley	Cummin Seed(Jeera)	Lemon	Soyabean
Bengal Gram (Whole)	Garlic	Lentil (Whole)	Taramira
Bhindi(Ladies Finger)	Grapes	Maize	Tomato
Black Gram (Whole)	Green Gram (Whole)	Methi Seeds	Wheat
Castor Seed	Groundnut	Mustard	
Coriander(Leaves)	Guar	Onion	
Corriander seed	Isabgul (Psyllium)	Potato	

Commodities traded only through eNAM

Ajwan	Chana Bengal Gram-Dollar	Linseed	Paddy 6445
Bengal Gram Dal	Fennel Seed	Methi(Leaves)	Paddy(Dhan)(Common)
Chana (Bengal Gram)-Desi	Horsegram - Red	Moth	Wheat-Bhansi
	Karbuja(Musk Melon)	Onion Red	
		Paddy 1002	

Commodities traded only through non-eNAM

Apple	Cauliflower	Mango	Raddish
Red Gram (Whole)	Chikoos(Sapota)	Mint(Pudina)	Soanf
Banana	Cluster beans	Moath Dal	Spinach
Bitter gourd	Cucumbar(Kheera)	Orange	Tinda
Bottle gourd	Green Chilli	Papaya	Water Melon
Brinjal	Indian Beans (Seam)	Pineapple	
Cabbage	Lime	Pomegranate	
Carrot	Long Melon(Kakri)	Pumpkin	

Telangana

Commodities traded through both eNAM and non-eNAM

Maize	Onion

Commodities traded only through eNAM- NIL

Commodities traded only through non-eNAM

Amla(Nelli Kai)	Cabbage	Field Pea	Potato
Red Gram (Whole)	Capsicum	French Beans (Frasbean)	Pumpkin
Beetroot	Carrot	Green Chilli	Raddish
Bhindi (Ladies Finger)	Cauliflower	Groundnut	Ridgeguard(Tori)
Bitter gourd	Cluster beans	Mango (Raw-Ripe)	Snakeguard
Bottle gourd	Colacasia	Onion Green	Sweet Potato
Brinjal	Cucumbar(Kheera)	Paddy(Dhan)(Commo n)	Tomato
	Drumstick		Yam (Ratalu)

Uttar Pradesh

Commodities traded through both eNAM and non-eNAM

Apple	Corriander seed	Lentil (Whole)	Pointed gourd (Parval)
Pearl Millet	Cucumbar(Kheera)	Little gourd (Kundru)	Pomegranate
Banana	Garlic	Maize	Potato
Barley	Ginger	Mango	Pumpkin
Beetroot	Grapes	Mousambi (Sweet Lime)	Raddish
Bhindi(Ladies Finger)	Green Chilli	Mustard	Ridgeguard(Tori)
Bitter gourd	Green Gram (Whole)	Onion	Sesamum
Black Gram (Whole)	Green Peas	Orange	Spinach
Bottle gourd	Groundnut	Paddy (Basmati)	Tomato
Brinjal	Guava	Paddy(Dhan)(Commo n)	Water Melon
Cabbage	Gur(Jaggery)	Papaya	Wheat
Capsicum	Jack Fruit	Peach	White Peas
Carrot	Karbuja(Musk Melon)		
Cauliflower	Kinnow		
Colacasia	Lemon		

Commodities traded only through eNAM

Chana (Bengal Gram)-Desi	Millet	Paddy 6445
Chana Bengal Gram-Dollar	Onion Red	Squash
Custard Apple	Onion White	Wheat-Bhansi
Lobia	Paddy 1002	Yam (Ratalu)

Commodities traded only through non-eNAM

Red Gram (Whole)	Cowpea(Veg)	Green Gram Dal (Moong Dal)	Peas Wet
Arhar Dal(Tur Dal)	Dry Chillies	Jowar(Sorghum)	Peas(Dry)
Banana - Green	Dry Fodder	Kabuli Chana(Chickpeas-White)	Rice
Bengal Gram Dal	Egg	Khoya	Season Leaves
Bengal Gram (Whole)	Field Pea	Lime	Soji
Ber(Zizyphus/Borehannu)	Firewood	Linseed	Soyabean
Black Gram Dal (Urd Dal)	Fish	Maida Atta	Sponge gourd
Charra	Forest Products	Masur Dal	Sugar
Chikoos(Sapota)	French Beans (Frasbean)	Methi(Leaves)	Tinda
Chili Red	Ghee	Mustard Oil	Turmeric
Cock	Goat	Papaya (Raw)	Wheat Atta
Coriander(Leaves)	Gramflour	Peas cod	White Pumpkin
			Wood

Annexure X: Test for mean difference (Independent samples t-test) in average modal price offered through e-NAM and non-e-NAM process in April 2020

Independent Samples Test[a]												
State				Levene's Test for Equality of Variances		t-test for Equality of Means						
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
											Lower	Upper
Madhya Pradesh	Lentil (Whole)	Modal Price	A	1.375	0.257	0.853	17	0.406	67.31	78.93	-99.23	233.85
			B			1.062	16	0.304	67.31	63.40	-66.81	201.42
	Mustard	Modal Price	A	1.635	0.213	-0.280	25	0.782	-35.22	125.73	-294.17	223.74
			B			-0.249	11	0.808	-35.22	141.39	-348.13	277.70
	Red gram (Whole)	Modal Price	A	0.471	0.508	-0.835	10	0.423	-631.20	756.03	-2315.74	1053.34
			B			-0.925	9	0.378	-631.20	682.06	-2163.34	900.94
	Wheat	Modal Price	A	0.048	0.828	-0.626	72	0.534	-14.50	23.18	-60.72	31.71
			B			-0.604	42	0.549	-14.50	24.00	-62.95	33.94
Maharashtra	Red gram (Whole)	Modal Price	A	0.005	0.948	0.943	11	0.366	151.98	161.09	-202.59	506.54
			B			0.938	10	0.370	151.98	162.04	-207.16	511.11
	Soyabean	Modal Price	A	0.155	0.705	0.630	7	0.549	35.83	56.88	-98.66	170.32
			B			0.580	3	0.598	35.83	61.74	-149.07	220.74
	Wheat	Modal Price	A	0.657	0.448	-0.287	6	0.784	-22.67	79.03	-216.04	170.70
			B			-0.484	6	0.646	-22.67	46.83	-137.28	91.94
Rajasthan	Barley (Jau)	Modal Price	A	0.819	0.368	0.468	85	0.641	5.85	12.52	-19.04	30.75
			B			0.460	74	0.647	5.85	12.73	-19.52	31.23
	Mustard	Modal Price	A	7.149	0.008	0.656	238	0.513	14.05	21.42	-28.15	56.24
			B			0.607	151	0.545	14.05	23.13	-31.65	59.74
	Wheat	Modal Price	A	0.842	0.360	-2.853	176	**0.005**	**-40.07**	14.04	-67.79	-12.36
			B			-2.723	127	0.007	-40.07	14.71	-69.18	-10.96
Telangana	Onion	Modal Price	A	0.005	0.946	-1.886	4	0.132	-92.00	48.78	-227.45	43.45
			B			-1.886	4	0.133	-92.00	48.78	-227.68	43.68
Uttar Pradesh	Bottle gourd	Modal Price	A	28.684	0.000	-12.462	472	0.000	**-240.28**	19.28	-278.17	-202.40
			B			-11.689	316	**0.000**	**-240.28**	20.56	-280.73	-199.84
	Brinjal	Modal Price	A	68.952	0.000	-15.006	464	0.000	-296.41	19.75	-335.22	-257.59
			B			-13.804	284	**0.000**	**-296.41**	21.47	-338.67	-254.14
	Tomato	Modal Price	A	2.602	0.107	-12.228	565	**0.000**	**-311.28**	25.46	-361.29	-261.28
			B			-11.923	467	0.000	-311.28	26.11	-362.59	-259.98
	Wheat	Modal Price	A	38.527	0.000	-8.293	378	0.000	**-68.31**	8.24	-84.51	-52.12
			B			-8.327	377	**0.000**	**-68.31**	8.20	-84.44	-52.18
A-Equal variances assumed, B- Equal variances not assumed												