

**AN ASSESSMENT OF PERFORMANCE OF ELECTRONIC  
NATIONAL AGRICULTURAL MARKETS (e-NAM) IN  
ODISHA**

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**CHANDAN KHANDAGIRI**



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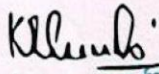
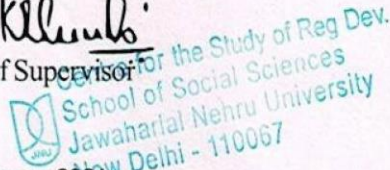
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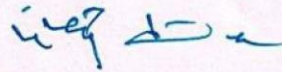
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**DEDICATED TO  
MY  
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TEACHERS**

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## LIST OF ABBREVIATIONS

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E-NAM	Electronic National Agricultural Market
SFAC	Small Farmers Agribusiness Consortium
APMC	Agricultural Produce Marketing Committee
ReMS	Rastriya Electronic Marketing Service
NCDEX	National Commodity and Derivatives Exchange
RMC	Regulated Marketing Committee
OSAMB	Odisha State Agricultural Marketing Board
NIAM	National Institute of Agricultural Marketing
DAFP	Directorate of Agriculture and Food Production
MAPLMA	Model Agricultural Produce and Livestock Marketing Act

## Chapter-1 INTRODUCTION

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### 1.1 Background

For the past two decades, growth in India's agriculture sector was stagnant and investment did not pick up at an expected level (Chand, 2016). The present day young generation is not showing much interest to work in the agriculture sector. The income gap between the farm and non-farm sector has widened due to unequal implementation of reforms in these sectors and there is increase in farmer's suicide over the years (Basu, et al., 2016). But still, the agriculture sector has not lost its importance in overall economic growth and it provides livelihood to a significant proportion of the rural population both directly and indirectly. Agricultural development creates both forward and backward linkages which help to enhance growth in the non-farm sector. Hence, the rapid growth of agriculture and allied sectors in developing economies like India is considered as a pre-requisite for overall economic growth and betterment of the agrarian population (Mathur, 2007).

India's agriculture is considered as one of the core sectors because firstly, it contributes 14.4 per cent of Gross Value Added (GVA) in 2018-19 (Government of India, 2019) and generates employment for approximately 49 per cent of the workforce in 2014 (Government of India, 2015). Secondly, the agriculture sector supplies raw materials to food processing related industries of the economy. But despite being one of the important sectors, various problems continue to inflict the performance of agriculture, from the stage of production to marketing of the products.

Agricultural marketing consists of two words i.e. agriculture and marketing. In a broader sense, agriculture means the use of natural resources through primary production for welfare activities and the marketing includes all those activities started from the point of production to point of consumption (Acharya, 2016). Indian Council of Agricultural Research (ICAR) has defined assembling, processing, and distribution as the three important characteristics of agricultural marketing.

The 1976 XII report of 'National Commission on Agriculture'<sup>1</sup> has defined the concept of agricultural marketing in the following ways:-

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<sup>1</sup> National Commission on Agriculture is an organization of Government of India founded in 1970 by the Ministry of Agriculture. The Commission has formulated laws that regulated markets should be available to farmers within 5km radius.

“Agricultural marketing is a process which starts with a decision to produce a saleable farm commodity, involves all the aspects of market structure or system, both functional and institutional, based on technical and economic consideration, and includes pre and post-harvest operations, assembling, grading, storage, transportation, and distribution.”

An increase in agricultural production does not assure that it will provide better returns to farmers. Because a huge market margin exists between farmer’s price and ultimate consumer’s price in India due to the extensive involvement of the middlemen, long marketing channels, unregulated markets, illiteracy of the farmers, trade malpractices, and interlocking of agrarian markets (Planning Commission, 2011 ; Bhalla, 2007).

Lack of infrastructure, transport facilities, storage facilities, competition, long marketing channels, licensing problems, price fluctuations, absence of proper grading and standardization, financial problems, large sale immediately after harvest, small numbers of the regulated agricultural markets, and asymmetry in market information, etc. are the crucial impediments to bring efficiency in agricultural markets of India (ibid). Agricultural markets are characterized as inefficient in terms of both horizontal and vertical integration (Pavithra et al., 2018). To overcome all these problems of agricultural markets Government of India has initiated the process of integration of different agricultural markets through e-platform.

Availability, access, utilization, and stability are the four important pillars of food security. Agricultural markets play an immense role in providing access to food grain to all the inhabitants of a nation (Singh, 2014). Since the agricultural markets are imperfect in delivery of services, government interventions required to smoothly distribute food grains among the inhabitants. So, government regulation in agricultural marketing is necessary to eliminate exploitation by the middlemen (Chand, 2012).

The main objective behind the introduction of regulated markets was to enhance the share of farmers' income by reducing the margin between producers and ultimate consumer prices. These markets are generally controlled by the government through the Regulated Market Committee (RMC). In India, the first regulated agricultural market was established in 1886 under the Hyderabad Residency Order (Karanjia) for raw cotton by the British government. Berar Cotton and Grain Market Act (1897), Indian Cotton Committee (1917), Bombay Cotton Market Act (1927), Royal Commission on Agriculture (1928), Directorate of Marketing and Inspection (DMI), and Agricultural Produce Grading and Marketing Act (1937) are the major

initiatives taken by the British government to regulate agricultural markets efficiently in the pre-independence India (Acharya, 2004 ; Bisen, 2018).

During 1960s, the Indian economy faced the problem of severe food shortages. The policymakers realized that it was not possible to be self-reliant in food grain production unless competition arises in agricultural marketing and the role of middlemen being eliminated from the marketing system. Essential Commodities Act (ECA) 1955 and Agricultural Produce Marketing Regulation Act (APMRA) 1964 were implemented in various states of India to get rid of all these problems of agricultural marketing (ibid). (List of wholesale, rural primary, and regulated markets in different states and UTs is given in Appendix 1.1)

Just after some years of enactment of these acts, it has covered approximately 98 per cent of total wholesale markets in the country. These policies have improved market efficiency in the sphere of price discovery, reliable weighting, negligible and uniform market fee collection, reduction of physical loss of production, and so on (Acharya, 2006 ; Chand, 2012). A part of the credit for the success of the Green Revolution can also be attributed to existing APMC markets because it had facilitated the farmers to get reasonable prices for their products. But evidence shows that the relevance of the regulated markets have declined over time when India became self-sufficient in food grain production (ibid).

After economic reforms of the 1990s, growth in the output gap between the farm and the non-farm sector has increased because of existing inefficiency in the agricultural markets. It demonstrates that improvement in marketing activities is equally important as efforts made by the government to enhance agricultural production and productivity. Small and marginal farmers suffer a lot due to the existence of inefficiency in the agricultural markets (Chand, 2016).

The involvement of middlemen in agricultural marketing activities has increased due to the interlocking of different agrarian markets. An interlinked market is one in which the parties trade in at least two markets on the condition that the terms of trade between them are jointly determined (Bell and Srinivasan, 2017). Due to the decline in the importance of APMRA different problems have emerged in India's agricultural markets which let to bring inefficiency. To overcome all these problems the central government has implemented e-platform in agrarian markets across different states and union territories of India since 2016.

In India, Karnataka is the first state which has used modern technology to remove all the deficiencies of agricultural marketing through the creation of a unified market structure in the

state. The government of India has implemented the electronic National Agricultural Market (e-NAM) at the national level as a central sector scheme. The e-platform is supposedly to introduce competition and transparency in the system, reduce the role of middlemen, cut down marketing cost, short possible time for marketing, and also help to reduce market margin which will ultimately help to discover efficient prices for agricultural products. Better price discovery through e-platform will push up agricultural prosperity in an upward direction because it inspires the farmers to enhance both the production and productivity of the sector (Pavithra et al., 2018).

The Karnataka state government has integrated various agricultural markets in both vertical and horizontal way (Bisen and Kumar, 2018). Electronic national agricultural market at first introduced in the year 2006-07 for paddy in Mysore regulated market on a pilot basis. Karnataka has introduced Rashtriya e-Marketing service on 22<sup>nd</sup> February 2014 in 27 districts which covered 105 markets. The software that has been used in the e-market in Karnataka was developed by National Commodity and Derivatives Exchange (NCDEX). Rashtriya e-Market Service Private Limited (ReMS) was initiated for facilitating this service (Shelendra, 2013). Gujarat, Andhra Pradesh, Telangana, and Maharashtra have also adopted the Karnataka model in their regulated markets (Pavithra, 2018).

In 14<sup>th</sup> April 2016, when the e-platform was introduced in the Indian agricultural market it covered 21 mandis located in 8 different states and provision was made to trade about 24 commodities through these markets. By October 2017 the government had integrated 470 mandis which was increased to 585 markets located in 16 states and 2 union territories (Sekhar. and Bhatt. 2018). At present, there are 1000 mandis integrated with the electronic platform located in 19 states and 2 union territories according to the Small Farmer's Agri-business Consortium (SFAC) data.

Odisha is a rich state in terms of natural resources and the agriculture sector plays a predominant role in the state economy. As per the latest estimates, the agriculture and allied sector contributes 18.9 per cent to the total Gross Value Added (2018-19) of the state economy and provides livelihood to 48.9 per cent of the working population directly. There are manifold agro-based industries of the state also depend on the agriculture sector for their raw materials (Economic Survey 2018-19, Government of Odisha).

Though Regulated Marketing Committees have been established in Odisha since 1956, still large numbers of farmers used to sell their produces in the nearby private markets because of

the advantage of proximity. The number of regulated agricultural markets are not enough as per the demand in the state. In Odisha electronic national agricultural markets (e-NAM) have been located at ten places in six different agro climate zones. The regulated agricultural markets have been integrated by the Odisha State Agricultural Marketing Board (OSAMB)<sup>2</sup> to increase returns to the farm sector by increasing efficiency in the agricultural marketing system (OSAMB, 2017).

At first regulation in agricultural marketing started with the enactment of the Odisha Agricultural Produce Market Act in 1958. One of the important objectives behind the introduction of agricultural market regulation in the state was to enhance access to the market by farmers so that farm income can increase. But on average only half of the marketable surplus traded through regulated markets and the rest of the products are marketed through other marketing channels in the state (NIAM, 2017).

Odisha state has 428 market yards or sub-market yards under 65 regulated markets. In addition to that, the state government also used to develop temporary market yards to procure paddy through co-operative society. The government of Odisha has also established 43 Biju Krushak Bazar to enhance farmer's accessibility to markets and thereby income (OSAMB, 2019).

## **1.2 Motivation for the Study**

Agriculture helps to reduce poverty, ensure food security, and play a pivotal role to strengthen the industrial as well as service sectors of the Indian economy. Better price realization of agricultural produce inspire farmers to cultivate intensively. There exists a positive relationship between the density of regulated agricultural markets and agricultural productivity (Acharya, 2004).

The government of India has planned to double farmer's income by 2022 and for that, the government has initiated manifold programs which also include the integration of regulated markets through e-platform located in different states. It is presumed that the newly adopted institutional reforms in the sphere of agricultural marketing will be a game-changer to double farmer's income by 2022 (NITI Aayog, 2017).

The electronic marketing system will help to enhance competition and efficiency in agricultural markets to minimize the market margin between farmers and consumers through transparency

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<sup>2</sup> OSAMB was established in 1984 which is the apex institution for agricultural marketing in the state. A separate Directorate of Agricultural Marketing established in 1996.

in the transaction system, and elimination of cartels by the traders. It will ultimately induce the farmers to make more investment in cultivation (Chand, 2016).

But in Karnataka state traders and commission agents together determine a particular commodity price in electronic markets. So, it demonstrates that even in this new platform also cartel takes place. Even after the introduction of this e-platform in agricultural markets, a major part of total marketable surplus transacted through non-e-tendering markets. It has been reported through a field survey that market arrivals and prices of commodities have not increased because of this new system (Narayanan et. al., 2017).

Despite Odisha being one of the important agriculturally dependent states, only 10 markets in the state have this e-platform facility located in six different agro-climatic zones<sup>3</sup>. Total e-markets located in Odisha consist of only 15.38 per cent of total Regulated Agricultural Markets (RMC) of the state. The number of e-markets is very less as compared to other states and union territories in proportion to their total regulated markets which could be one of the important reasons to look into.

Rice and wheat are considered the major crops grown in Odisha. But the policymakers have not included these crops to trade through e-NAM whereas some states have included. That is also one of the important aspects to trace out the reason behind not inclusion of rice and wheat in the e-NAM trading list (OSAMB, 2017).

The studies based on electronic national agricultural markets are very limited at the national level and there is no systematic study conducted in the context of Odisha state so far. Therefore, it is important to trace out the factors that influence farmers to involve in these markets to trade, analyze how e-markets help to discover reasonable price and market efficiency stabilize crop prices, and to evaluate the impact of these markets on different stakeholders.

With this backdrop, the present study will evaluate the performance of e-NAM by comparing the effectiveness of e-NAM to facilitate fair agricultural trade with regulated agricultural markets through various aspects in Odisha state perspective.

### **1.3 Research Questions**

Based on the review of literature the following research questions have been formulated.

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<sup>3</sup> At the time of primary data collection during October and November 2019 there were only 10 regulated agricultural markets of Odisha integrated with e-NAM but in 2020 this number increased to 41 (SFAC, Government of India).



1. How have the electronic national agricultural markets performed in India and Odisha since its inception?
2. Are there socio-economic differences existing among stakeholders associated with regulated agricultural markets and e-NAM enabled markets in Odisha?
3. Has efficiency increased after the introduction of e-NAM in the sphere of price discovery and to reduced price volatility?
4. Has the integration of e-platform helpful to bring transparency in the marketing system and to enhance the farm income of different stakeholders?
5. What are the factors that influence farmers to participate in electronic national agricultural markets in Odisha state?

#### **1.4 Objectives of the Study**

The present study will focus on the following important objectives:-

1. To assess the performance of e-NAM in India and Odisha based on various perspectives.
2. To trace out the socio-economic differences existing among stakeholders of regulated agricultural markets and e-NAM enabled markets.
3. To find out the factors influencing farmers' decision to participate in the e-NAM enabled markets in Odisha.

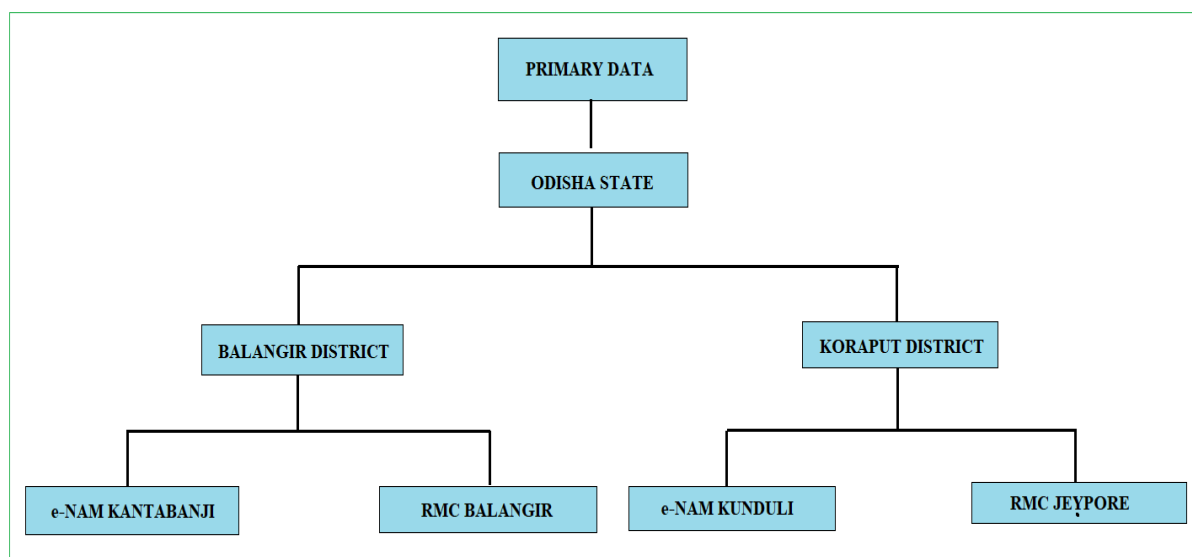
#### **1.5 Data Sources and Methodology**

The present study has used both primary and secondary data for analysis. A primary survey was conducted through well-defined interview schedules. Questions had been framed to understand the importance of different factors that influence farmers and traders to make trade through APMC with e-platform and APMC without e-platform, to measure price discovery, marketing efficiency, and to estimate the impact of these markets on different stakeholders of the agriculture sector.

Secondary data were compiled from various sources published by different agencies of the Government of India and Government of Odisha such as Directorate of Marketing and Inspection, National Institute of Agricultural Marketing (NIAM), Odisha State Agricultural Marketing Board (OSAMB), Directorate of Agriculture and Food Production (DAFP),

Directorate of Economics and Statistics of Odisha (DES, Odisha), and Agricultural Marketing Information Network (AGMARKNET)<sup>4</sup>.

**Figure 1.1** Sampling design of the field survey



A primary survey was conducted in two districts viz. Balangir and Koraput in Odisha. Koraput and Balangir districts are located at 517 km and 316 km away from the state capital Bhubaneswar, respectively. From Balangir districts two markets which consist of one market with e-platform and another market without e-platform was chosen. They are located in Kantabanji and Balangir, respectively. Regulated Market Committee (RMC) Kantabanji is one of the oldest regulated markets in the state established in the year 1964. In Koraput districts also two agricultural markets were selected. They are located in Kunduli and Jeypore. Both these districts come under the KBK (Kalahandi, Balangir, and Koraput) region which is considered as a backward region of Odisha state. Most of the inhabitants of this region depend upon agriculture and forest for their livelihood.

The selection of these districts is based on two important considerations. First, these two districts have geographically located in two different agro-climatic zones of Odisha. Balangir district comes under Western Central Table Land and Koraput district is under Eastern Ghat High Land. Secondly, e-NAM markets located in these districts trade with a large number of commodities, and the volume of trade is also large as compared to other districts where both e-markets and regulated agricultural markets are established.

<sup>4</sup> AGMARKNET is a portal introduced by Directorate of Marketing and Inspection (DMI), of Ministry of Agriculture and Farmers Welfare, Government of India. The main objective behind introduction of this portal is to provide comprehensive information related to agricultural marketing.  
<https://agmarknet.gov.in/>

Thus primary data were compiled from four agricultural markets out of which two are e-NAM enabled markets and the other two are regulated agricultural markets. Purposive sampling method was followed to collect primary data from different stakeholders which includes farmers, traders, and market officials. A field survey was conducted from 20<sup>th</sup> October 2019 to 24<sup>th</sup> November 2019 covering 140 farmers, 40 traders, and 8 market officials. Thus, a total of 188 samples were collected for this study and the reference period for the field survey was the agricultural year 2018-19.

## **Methodology**

Primary and secondary data have been analyzed by using different statistical and econometric tools to empirically prove the specified objectives. Descriptive statistics, ratios, percentages, bar diagrams, and trend lines have been used to understand the performance of e-NAM in comparison to regulated agricultural markets. Both of these marketing systems will be judged based on the different performance indicators related to agricultural marketing infrastructure.

The binary Logit regression model has been used to understand the different factors that influence farmers' decisions to participate in e-NAM enabled markets.

The equation for the Logit regression model can be written as follows.

$$L_i = \ln (P_i/1-P_i) = \beta_1 + \beta_2 X_i + U_i$$

Where  $L_i$  is the Logit,  $U_i$  is the stochastic error term,  $P_i$  is the probability of farmers participating in trade through e-platform and  $X_i$  are the vectors of independent variables. The independent variables are the age of the farmer, age square, years of schooling, computer literacy, distance from farm to the market, and total operated land of the farmer.

To understand volatility in agricultural commodities price the present study has used monthly price data compiled from AGMARKNET for selected crops in various markets of Odisha. The standard deviation of the log  $(P_t/P_{t-1})$  has been used to empirically analyze the trend of price volatility during the time of pre-eNAM and post-eNAM. Where  $P_t$  is the price in the current month and  $P_{t-1}$  is the price in the previous month.

Due to lack of consistent secondary data on arrival and price for both types of markets comparison has been made between four years before the introduction of e-NAM (pre-eNAM) and four years after the introduction of e-NAM (post-eNAM). From June 2012 to April 2016

has been taken as pre-eNAM and May 2016 to May 2020 as post-eNAM for a meaningful explanation.

The changes in market arrivals, prices, competition among traders, transaction cost, transparency, and price determination after the introduction of e-tender systems in agricultural markets have been examined through primary data analysis collected from different sample markets. The Likert scale has also been used to analyze qualitative primary data about different components of e-NAM and regulated agricultural markets.

## **1.6 Plan of Chapters**

The dissertation is divided into six different chapters.

Chapter-I provides background of the study, select review of literature, motivation for the study, and research questions. The chapter also includes objectives of the study, data sources, and methodology which have been used in the present study.

Chapter-II has devoted exclusively to a comprehensive literature review based on the topic. The chapter has conceptually been segregated into five different sections. The first section presents the literature related to the importance of an efficient agricultural marketing system in India. Agricultural policies have a significant influence on the existence of markets. Hence, the second section deals with the analysis of policies undertaken by the Government of India based on an agricultural marketing perspective. The third section deals with the problems and prospects associated with agricultural price policy in India. The fourth section deals with the nature and characteristics of agricultural markets in Odisha state. The last section has devoted to review the literature on e-NAM at the national level, in Karnataka, and Odisha context subsequently.

Chapter-III is designed to demonstrate functions of e-NAM from the point of entry to exit from the market. This chapter shows the performance of electronic national agricultural markets since its inception. Whether arrivals and prices of agricultural products have changed in favour of the agricultural community after the introduction of the e-platform that has been examined with the help of secondary data analysis collected from AGMARKNET. The chapter gives details of empirical analysis regarding whether the e-markets are more efficient or not in the sphere of price discovery, market efficiency, and price instability.

Chapter-IV begins by analyzing the importance of factors of production (farmers and traders) in the agriculture sector and their socio-economic conditions in India. Subsequently, this

chapter explains where the sample districts are placed in the state based on agriculture and market infrastructure. The chapter also designs to capture if there is any socio-economic differences existing among different stakeholders associated with regulated agricultural markets and electronic national agricultural markets.

Chapter-V demonstrates if there are any infrastructural differences between e-NAM enabled markets and regulated agricultural markets to understand the changes in the status of agricultural markets in the state. This chapter empirically estimate the factors that influence farmers and traders to participate in e-markets which will help to undertake future policy initiatives in the respective markets. This chapter also explains the qualitative aspects of agricultural markets by analyzing primary data through Likert scale.

Chapter-VI provides summary and conclusion of the study. The conclusions are based on the major findings from the core chapters. The chapter also includes policy implications which are based on data analysis in the chapters, results, and knowledge acquired from the field survey.

## Chapter-2 REVIEW OF LITERATURE

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### 2.1 Background

Dr. M. S. Swaminathan considered as the “Father of India’s Green Revolution” has made a statement that “if farm ecology and economics go wrong, nothing else will have a chance to go right in agriculture.” Here, right economics means the author has symbolized the importance of proper remunerative price to the farming community. In other words, the statement indicated the crucial role of an efficient marketing system for achieving higher agricultural prosperity.

This chapter has been subdivided into five different sections. The first section deals with the importance of government regulated agricultural markets in India. This section also explains the requirement of regulation in agricultural marketing and the different characteristics of traditional and modern marketing systems in India. Agricultural policies have a significant influence on the existence of agricultural markets. Hence, the second section deals with the policies and reforms that have been undertaken by the Government of India since independence.

The agricultural markets play a pivotal role to make a balance between producer's and consumers' prices. Better agricultural crop prices incentivize the farmers to cultivate intensively. Hence, the third section deals with the policies related to the agricultural prices in India. The fourth section explains the nature of agricultural marketing systems in Odisha state. The government has introduced Information Technology (IT) in agricultural marketing to enhance competition among traders and reduce collusion and thereby minimize the gap between the producer’s price and the ultimate consumer’s price. So, the last section of this chapter deals with specific issues related to e-NAM at the national level, Karnataka, and Odisha state context subsequently.

### 2.2 Importance of Agricultural Markets in India

Agriculture is considered the oldest profession in the world. The concept of marketing originated from agriculture. In traditional society, agricultural produces were being exchanged for goods and services. But, later on, agricultural trade was taking place by exchanging money. At present, the concept of agricultural marketing is much broader than traditional trading. The market creates a link between the agriculture and non-agriculture sector and the linkage is both backward and forward in nature (Acharya, 2016).

Markets also play an important role to reduce risk by making a proper balance between the demand and supply of agricultural products and thereby protect the interest of both producers

as well as consumers from the adverse effect of price instability. To get an efficient agricultural marketing system it is necessary to make investment in infrastructure which includes both physical as well as institutional (Acharya, 2007).

Rapid growth in agriculture is also important to achieve the first two objectives of United Nations Sustainable Development Goals (SDGs): elimination of poverty and hunger through ensuring food security to all the inhabitants of the nation. An efficient agricultural marketing system is also important to achieve sustainable economic development (Government of Odisha, 2018). The first fundamental theorem of welfare economics also explains that a competitive marketing system can help for the efficient allocation of resources to maximize aggregate welfare (Barret, 2005).

Investment in agriculture on the ground of production, processing, marketing, distribution, utilization, and trade are crucial to solve problems like the incidence of extreme rural poverty, unemployment, and food insecurity. It demonstrates that an efficient agricultural marketing system is considered as a pre-requisite for sustainable agrarian development which helps for optimum utilization of resources, increase farm income, widening markets, growth of agro-based industries, and enhance the share of agriculture sector in national income through value addition, employment generation, and efficient price discovery thereby improve the standard of living of the agrarian community (Yadav, 2010).

In most of the developing countries of the world, the agricultural markets are characterized by poor communication facilities, dominance of small landholders, geographical remoteness, asymmetry in information, inadequate market infrastructure, inefficient market regulations, and limited opportunities to access institutional credit. These factors are considered as the crucial impediments in accessing the agricultural markets by the smallholders (FAO, 2013). The role of private sector investment is important to improve agricultural marketing infrastructure in the country (Annual Report, 2018-19).

The marketable or marketed surplus is a basic indicator for the requirement of a well efficient agricultural marketing system. India was not self-sufficient in food grain production before the mid-1960s. But especially, after the introduction of the Green revolution (use of modern technology, irrigation and HYV seeds) the marketed surplus has increased significantly that required to bring transparency and efficiency in the agricultural markets (Bhalla, 2007). Foodgrain production has increased from 50.82 million tonnes in 1950-51 to 285.17 million

tonnes in 2018-19 in India (Ministry of Agriculture and Farmers Welfare, Government of India, 2019).

The regulations in agricultural marketing activities in India can be traced to the Bengal famine which had occurred due to inadequate government intervention (Sen A., 1981). The government intervention is necessary for agricultural marketing activities to protect the sector from market failure. But at the present circumstance, sometimes market failure used to occur because of excessive government interventions. The structure of agricultural marketing in the country has been changing in many ways since the adoption of the APMC Act in 1960s. The main reasons behind the changes are huge marketable surplus, increased urbanization, personal income, and shift in food demand pattern. These components are responsible for the change in degree and form of government intervention in agricultural marketing activities in India (Acharya, 2006). The state withdrew from agricultural market interventions especially in the context of price discovery seen as a necessary condition to get the right price and it is also important to create an efficient marketing system (Timmer, 1986).

During the 1960s and 1970s, the main objectives behind government intervention in agricultural marketing activities were to “get the right price” but during the 1980s the objectives were changed to “get right institutions”. Macroeconomic and sector-specific policies play a crucial role to provide proper incentives and to protect micro-level decision takers like farmers from severe constraints (Barret, 2005).

The existence of inter-locking of agrarian markets is a major problem that led to the exploitation of agriculturalists in India. Bell and Srinivasan (1989) have defined inter-locking of agrarian markets as "An interlinked transaction are one in which the parties trade in at least two markets on the condition that the terms of all trade between them are jointly determined".

In a poor agrarian economy like India financial constraint of the farmers is more severe which force them to have an unequal relationship and increases the dependence on landlords, creditors, and employers. This leads to unequal access to different factors of production in the agricultural markets by the farmers. Fragmented and the presence of unequal access to different factors of production are the key reasons for the emergence of interlocking among different markets. This influences badly the socio-economic conditions of cultivators (Bardhan, 1980).

In a micro sense, the role of agricultural marketing extends from production to consumption. But in the macro sense, it also influences price determination, the decision of farmers to make long-term investment, enhance the welfare of both producers and consumers, and help to bring



efficiency in production and distribution. Hence, agricultural marketing policies can be considered as an integral part of the development policies especially in the context of developing countries like India (Chand, 2012).

Restriction to sell outside the regulated markets, long-distance covered by farmers to access market, inadequate market infrastructure, no uniformity in market fee collection, inefficient to enhance competition among traders, no regular election to formulate market committee are the some of the biggest challenges associated with the regulated agricultural markets in India (Acharya, 2004).

### **2.3 Progress of Agricultural Marketing Policies in India**

Agricultural Produce Marketing Act (APMC) and Essential Commodities Act (ECA) are introduced by the government of India in the 1960s to bring efficiency in marketing activities. At the end of the 1950s, there were 236 regulated markets in India which have increased to more than 6600 at present (Government of India, 2017). The act suggests removing restrictions on licenses, stock limits, inclusion of private markets, direct marketing, contract farming, and free movement of agricultural products (Reddy, 2018).

The divergence between the growth of the farm and the non-farm sector has been growing since the economic liberalization in 1991. The reason behind this is the asymmetry in the implementation of strategies which also include policies related to agricultural marketing. Due to problems in the functioning of regulated agricultural markets, the Government of India introduced the Model APMC act in 2003, reforms in essential commodities act, e-NAM, and Model Agricultural Produce and Livestock Marketing Act in 2017. But the implementation of these reforms is not even across the states. The government has made the objective to double farmer's real income by 2022 and for that the introduction of e-NAM is one of the major initiatives. But the ground reality to implement these policies involved many challenges that need to be solved to get success (Chand and Singh, 2016 ; Reddy, 2018).

The Government of India has introduced the Model Agricultural Produce and Livestock Marketing Act (Promotion and Facilitation) in 2017. This act restricts the power of regulated agricultural market committee within the market area only. It will help to remove some of the existing barriers of marketing which will help to increase competition among the traders. The incorporation of livestock in APLMA is a welcome step. The act has specified that market fee should not exceed 1 per cent for fruits and vegetables and 2 per cent for food grains. It also promotes the integration of electronic national agricultural markets in a large number of

regulated markets. The act gives freedom to the farmers to sell their produce in any market (Government of India, 2017).

State Trading Enterprises (STEs) are the government and non-government organizations aimed to protect the interest of both producers and consumers from adverse effects of price fluctuations through encouraging exports and imports. The importance of STEs in agricultural trade is more as compared to non-agricultural trade because through this many countries of the world trying to achieve manifold objectives such as domestic price support, efficiency in agricultural markets, and availability of food at an affordable price to the low-income population (ensure food security). In India NAFED, MMTC, STC, and FCI are some of the examples of STEs (Vlontzs, 2006).

#### **2.4 Agricultural Price Policies in India**

Agricultural price policy plays an important role to attain higher economic growth with equity. It helps the farmers to get a better price for their products which promote investment, the use of modern technology, and increase productivity. The role of efficient agricultural price policy is important to achieve food security at both national and household levels which has been a major objective of the government (Dev, et. al., 2010).

Price volatility is a major problem in the agricultural markets of India. In simple terminology, volatility means variations in economic variables over a period of time. Agricultural price volatility means fluctuations in its prices in both upward and downward directions over a period of time. Some economists argued that small variations in price are the basic requirement for the smooth functioning of the markets but when price fluctuation is very high and unpredictable that creates problems for prosperity in the sector (Aye, 2015). Crop price stability is important to maintain overall economic stability mostly in developing countries (Barret, 2005).

Both producers and consumers especially poor inhabitants are adversely affected by the fall and rise in food prices. Food expenditure usually constitutes a very high share of the total budget of the poorest households. The effect of rise in agricultural commodities prices is felt more strongly on poor households because they often consume less processed food. Frequent agricultural price volatility is a bad indicator because of its adverse consequences on agricultural growth and income of small and marginal farmers who constitute the bulk of the farming community. Volatility in the agricultural market arises because of low price and

income elasticity, unstable agricultural production, lack of information, and asymmetry in the formulation of agricultural policies (Sekhar, 2004).

The price discrimination theory of microeconomics postulates that discrimination mainly prevails in the markets because of differences in elasticity of demand for products and the existing distance between different sub-markets. The success of price discrimination assumes that consumers or buyers should not move from dearer markets to cheaper markets to purchase goods (Varian, 2010). But if the objectives of e-NAM are satisfied then, it will bring equality in the elasticity of demand for homogeneous agricultural products as the distance does not matter in e-platform and it will help to protect the farmers and consumers from adverse effects of price discrimination.

Minimum Support Price (MSP) is the price announced every year by the Government of India and recommended by the Commission for Agricultural Cost and Price (CACP) to protect the interest of farmers from distress sale in the bumper production year. If the market price falls below the MSP the government purchases entire crops from the farmers at a pre-determined price. The procurement price is the price at which the government purchase crops from the farmers to maintain buffer stock and for the public distribution system. These policies are the major initiatives that have been initiated by the government to protect the interest of the farmers from distress sale (Chand, 2003).

There are three methods used by CACP to calculate MSP such as A2, A2+FL, and C2. A2 includes all explicit costs (seeds, chemicals, fertilizer, hired labour, irrigation, fertilizer, and fuel) which constitute both in terms of cash and kind. A2+FL includes explicit cost and the imputed value of family labour and C2 method includes all actual expenses including the imputed value of family labour and interest paid. The Government of India has been fixing MSP based on A2+FL which partially include the cost of production. For many years farmers have been demanding to fix MSP based on C2 method (Bathla and Kiran, 2018).

## **2.5 Agricultural Marketing System in Odisha**

Orissa Agricultural Produce Market Act (OAPMA) was introduced in the year 1956. During the time of 2<sup>nd</sup> Five Year plan, there were only 15 regulated agricultural markets in Odisha. At present, there are 68 regulated agricultural markets and 428 market yards working under the direct control of Odisha State Agricultural Marketing Board (OSAMB). The average number of villages covered under each regulated market in the state is 424 and at the national level, it is 258. The average area served by each APMC market is 2324 square km in the state which is

below the national average. Hence, the state government should take necessary actions to establish more number of agricultural markets (Kathayat, 2019).

Transparent and efficient price discovery are the important objectives of the agricultural markets. Open auction sale procedure cannot be used in many regulated markets because of small arrivals, lack of infrastructure, small numbers of traders, long-distance, small production, transportation problem, and lack of well efficient trained market staff in Odisha. The market fee collected from stakeholders is also not uniform in different markets of the state. Most of the small and marginal farmers prefer to sell their produces in village periodic markets due to the advantage of proximity and less marketing load. But the majority of the periodic markets do not have even basic infrastructure facilities. Farmer's linkage with the markets is not good, because of inefficient and weak market institutions in the state (NIAM, 2017).

The issues of small quantity of output can be solved with the formation of Farmers Producers Organizations (FPOs). There is much price volatility in regulated markets because of the small transaction and limited integration of markets. This adversely affects farmers to receive reasonable price for their crops. Market information is important for the farmers to make a huge investment in cultivation. But very few regulated markets in the state disseminate crop-related information on the notice board. Electronic markets will provide information to everyone which helps to reduce marketing costs (ibid).

In Odisha, intermediaries enjoy some social and economic power which influences farmers to sell their produces through private agricultural markets at less than the reasonable price. Lack of required investments and poor management systems are important reasons for the existence of inefficient agricultural markets in the state. Evidences from Koraput district of the state shows that there is a need to redesign newly introduced programs like e-NAM for better implementation at the ground level (Chatterjee S. et. al., 2020).

## **2.6 Electronic National Agricultural Markets (e-NAM)**

Primary agricultural markets are not efficient with regards to price discovery because of the segmented market, a large number of middlemen, and asymmetry in information. One of the important objectives behind the introduction of e-NAM in agricultural marketing activities is to provide safeguards to farmers from distress selling.

A few developing countries have also adopted an electronic platform system to smoothly run the agricultural markets. China has launched an e-commerce platform in vegetable markets since 2015. The main objective behind the introduction of this platform is to match the balance

between demand and supply and thereby stable price in the economy. Its online service started from quality assessment certification to online payment. East African Community Common Markets (EACCM) and Common Markets for Eastern and Southern Africa (COMESA) are examples of electronic agricultural markets from Africa.

#### i) Macro Level Evidences

Agricultural marketing is a state subject in India. In other words, states have the right to formulate rules and regulations related to agricultural marketing. Due to this some contradictions arise between the centre and states regarding the amendment of agricultural marketing policies. The National Commission on Farmers (NCF) was constituted on 18<sup>th</sup> November 2004 under the chairmanship of Dr. M.S. Swaminathan who had recommended to create a single market for the farmers. The commission also had recommended that agricultural marketing should be on the concurrent list (Government of India, 2017).

The states and UTs like Bihar, Kerala, Manipur, Daman Diu, Lakshadweep, Andaman, and Nicobar Island, have not adopted the APMC act. Due to the absence of regulated agricultural markets individuals have established private markets in Bihar. The small and marginal farmers of the state are very happy because of the advantage of the proximity of these markets. Cooperative societies have taken the responsibility to manage agricultural markets in Kerala. Electronic national agricultural markets have been established in those states where the APMC act was adopted (NIAM, 2015).

Motivation, ability, compatibility, and observability are the four important requirements of e-NAM. In open auction markets, there exists a social relation between farmers and traders. Sometimes it helps the farmers to receive money for the product even before the harvest of the crop. In electronic markets, there is no direct link between farmers and traders which has broken the social relationship among stakeholders. The policymakers should strengthen the institutional source of loans so that farmers will get the loan at an affordable rate of interest in the required time (NIAM, 2015 ; Reddy, 2018).

Regulated agricultural markets have legal and institutional barriers. In this marketing system, farmers have the right to sell their produce at the nearby markets. In some states, farmers are not allowed to sell at all the markets within the state. But the electronic agricultural market is an example of a common market. Electronic national agricultural markets will bring success for both farmers as well as traders. But the preparedness of the government is not good. It is

required to make a large investment in cold storage, warehousing, laboratories, grading facilities, efficient manpower for the success of e-NAM (Roy et. al. 2017).

Rajasthan is a leading state to implement e-NAM in India. The state constitutes 14.40 per cent of e-NAM affiliated markets in India which is largest as compared to other states and union territories. The e-NAM enabled markets have a positive influence on both institution and infrastructure development in the state. Improvement has taken place in the sphere of arrivals, price discovery, and level of competition among the traders after the implementation of e-NAM in the state. But still, there are challenges exist which need to be solved for the success of e-NAM (NIAM, 2019).

Farmer's participation in agricultural markets is influenced by marketing cost and returns. A significant proportion of farmers used to sell their produces through village private traders in India due to less marketing cost, marketing load, and the advantage of proximity. It will help a lot to increase average arrival into the markets and price of crops if these farmers return to sell their produce at e-NAM enabled markets (Reddy, 2018).

The opportunity cost of time for the farmers is very high. Electronic markets used to take lots of time for trade which is a major constraint. So, the policymakers should introduce an alternative process of trade which will use less time to trade. Some of the farmers fear the recovery of loans once the money is deposited in their bank account (ibid). There should be integration between information flow, product flow, and cash flow for the success of e-NAM (Dey, 2016).

Farmers Producer Organizations (FPOs) incentivize small and marginal farmers a lot by aggregating farm produces which reduce marketing cost because of the economics of scale. Collective actions of the farmers through FPOs also help to increase the bargaining power of the farmers (NIAM, 2017).

## ii) Experiences from Karnataka

Karnataka is another leading state to bring reforms in agricultural marketing activities. The state enacted the Regulated Agricultural Marketing Act in the year 1966. Karnataka State Agricultural Marketing Board<sup>5</sup> is the apex institution deals with agricultural marketing reforms in the state. The regulated markets in the state were following a manual tender system to provide a reasonable price to the farmers. But there were some problems like more time requirements, price manipulation by the traders, lack of competition, and mistakes during

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<sup>5</sup> Karnataka State Agricultural Marketing Board (KSAMB) established in 1<sup>st</sup> September 1972.

entering price slip (NIAM, 2013). So, to overcome all these obstacles the state government has introduced information technology in agricultural marketing and thereby formulate a “one-state one- market” (Pavithra et. al., 2018).

Studies have shown that about 80 per cent of farmers believed that transparency has increased in price discovery after the introduction of e-platform in Karnataka and majority of the farmers also satisfied with the training provided by the market officials. Approximately two-thirds of the sample traders also believe that e-platform helps to save time. But e-platform does not have much influence on the reduction of marketing cost and margin. It helps a lot to preserve all transaction data. But the studies show that about 25 per cent of the sample farmers were not aware of the e-market which is a major challenge to successfully implement e-markets in the state (NIAM, 2017 ; Pavithra, et al., 2018).

Large numbers of farmers convey their happiness about e-NAM because it helps to reduce transaction costs, malpractices activities, and increase online fund transactions. The majority of sample traders are happy with the training and existing infrastructure facilities in these markets of Karnataka state. They also believe that the system did not adversely affect their relationship with the farmers. But some of the stakeholders also express that there is a need to enhance market infrastructure. The authors suggested that the electronic market is more successful in large markets and not in small markets. After the introduction of e-platform in agriculture marketing both arrival and revenue have increased but along with market expenditure. All crops have not been included in e-platform to trade which is a major hurdle (Pavithra, et al., 2018).

Studies also show that arrivals and prices of agricultural products have not been increasing because of the introduction of the new system. The price of agricultural products has increased because of drought or poor rainfall in the region which led to decline in total food grain production. But different mandi officials in Karnataka are happy with the introduction of the e-tendering system (Narayanan et al., 2017).

Awareness among the farmers is necessary for the successful working of the e-market in any state or at the national level. Education and computer literacy are considered as the important determinants to participate in the e-platform by the traders. There is a need to upgrade more infrastructure facilities and employ better efficient market officials in these markets to enhance opportunities for the stakeholders (Chengappa, 2012).

### iii) Experiences from Odisha

In Odisha state, only 9.57 per cent out of total market yards are integrated with the electronic platform which is much lower than other states. The long-distance from the agricultural field to markets is a major constraint to access agricultural markets by the small and marginal farmers because it increases the cost of marketing. The overall mean distance covered by the farmers for regulated agricultural markets is 16 km in the state (NIAM, 2015).

Farmers are the main stakeholders of agricultural markets. Most of the farmers wish to sell their produce immediately after harvest because of lack of a place to store and required for instant cash to repay old debt, labour wage, make expenditure on social ceremonies, and children's education. Hence, the farmers in the state prefer open auction markets for sale. Electronic national agricultural markets do not follow an open auction procedure for trade. But still, a large proportion of sample farmers gave their consent to accept e-NAM (NIAM, 2017).

It can be understood that there is both positive and negative believe among the researchers about the implementation status of e-NAM. But it is also true that most of the researchers believe that theoretically e-NAM is a very good concept to transform the agricultural marketing system in the right direction. But unawareness among farmers and traders about e-NAM, lack of market infrastructure, and to convince the stakeholders for online trading are the major obstacles for successful implementation of e-NAM at ground level.

To sum up, the concept of the electronic national agricultural market is newly introduced in India. There are only a few research papers available assessing the performance of these markets at the national and state level. There is no empirical study available about e-NAM in the context of Odisha state so far. So, it is important to find out the factors that influence farmers and traders to participate in e-NAM. Odisha is an agricultural-based state in terms of both contributions to state GDP and the proportion of population employed in the sector. But the number of regulated markets integrated with e-NAM is much lower as compared to other states such as Rajasthan, Madhya Pradesh, and Uttar Pradesh.

Rice and wheat are the major crops grown by the farmers of Odisha and a considerable part of Gross Cropped Area (GCA) devoted towards the cultivation of these crops. But the government of Odisha has not included these crops to trade through e-NAM enabled markets. So, there is a need to trace out the obstacles and enhance literature which will ultimately help to implement appropriate policies to strengthen e-NAM in the future.

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## **Chapter-3 ANALYSIS OF PERFORMANCE OF ELECTRONIC NATIONAL AGRICULTURAL MARKETS**

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### **3.1 Introduction**

Agriculture is considered the mainstay of the Indian economy and the development of the sector influence well-being of a large part of the population. After independence, the successive government's focus has been to protect the interest of farmers with the introduction of manifold reforms in different aspects of agriculture. During the mid-sixties, most of the states had adopted the Agricultural Produce Marketing Committee (APMC) Act which led to the introduction of an organized agricultural marketing system in the country. The reason behind the introduction of APMC Act was to make more efficient agricultural markets so that farmers can get reasonable prices for their produces (Chand, 2003 ; Dev et. al., 2010).

Until the mid 1960s, the objectives of food grain economy were confined to the import of food grains and its distribution because there was food deficit in the country. But after the adoption of modern technology, high yielding variety seeds, fertilizer, and pesticide the role of the government has increased manifold in the sphere of subsidy, institutional credit, agricultural research and development, creation of efficient agricultural markets, and efficient price policy. The efficient agricultural price policy is considered a pre-requisite to reduce both intra and inter-regional disparities and also help to achieve sustainable growth in the sector (Krishnaji, 1990).

India has secured the first position in the production of milk and pulses, second position in fruits and vegetables, tea, sugarcane, and cotton, and third position in cereals in the world. India occupies the second position in global food production after China, but at the same time also secured the 102<sup>nd</sup> position in Global Hunger Index (GHI) out of 117 countries in 2019 behind its neighboring countries like Nepal, Pakistan, and Bangladesh. Data shows that one in five individuals in the country lives below the poverty line. This demonstrates the existing problem in the food distribution system, the financial inability of the inhabitants to access food, and simultaneously shows the unavailability of well efficient agricultural marketing system (Bisen and Kumar, 2018).

Agricultural price volatility is a major concern for developing countries like India. On the one hand, this creates problems for the farmers to make long-term investments because agricultural income is a major source of livelihood for them. An immediate increase in agricultural price does not help much to farmers because there is a lag exists in supply response to price change. On the other hand, it also creates problems for poor people because they spend a large part of

their income on food. So, a very high price of agricultural products creates problems to achieve food security in developing countries like India. Agricultural markets play a pivotal role to make a balance between demand and supply. So, there is a need to establish an efficient marketing system for the smooth function of the food economy (Aye, 2015).

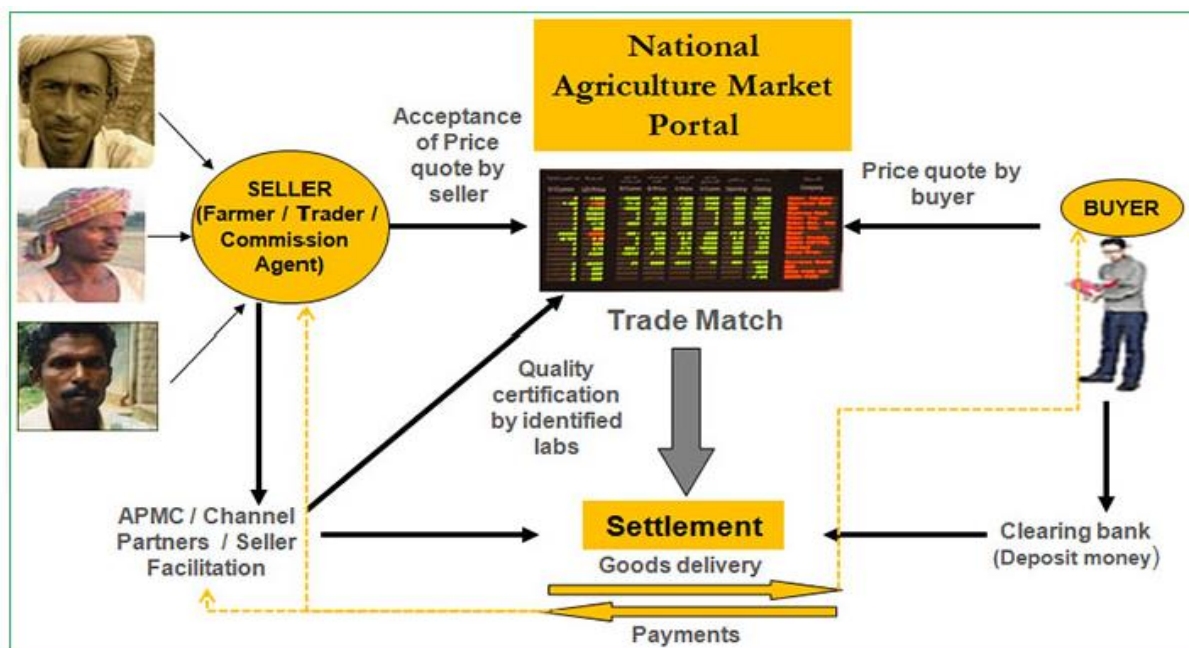
Minimum Support Price (MSP) is meant to prevent farmers from distressed selling, whereas the procurement price is formulated to enhance investment and growth in the agriculture sector. The first objective of the agricultural price policy is to decrease the divergence between the producer's price and the consumer's price (Bhalla, 2007). But the price policies that have been adopted by the government for the last some decades have mostly benefited to wheat and rice. Hence, the arable land devoted to the cultivation of pulses, oilseeds, and coarse grain in some states has declined to some extent as compared to earlier (Chand, 2012).

But due to the existence of fragmented markets, inadequate market infrastructure, information asymmetry, post-harvest wastage, high incidence of market fees, malpractices by the traders, and license problems farmers are not getting a better price for their produces. So, to overcome all these deficiencies the Government of India had introduced Model Agricultural Produce Marketing Act in 2003. The act suggests removing the restrictions on the movement of agricultural commodities, single market fee collection, private markets, public-private partnership, encouragement of contract farming, and introduction of ICT in agricultural marketing activities. The Government of India proposed to introduce electronic National Agricultural Markets (e-NAM) in the year 2014-15 union budget with the theme "One nation, one market" (NIAM, 2019 ; Chengappa, P et. al., 2012).

With this backdrop, the present chapter evaluates the performance of e-NAM in the context of India and Odisha state through comparative assessment between the effectiveness of regulated markets and e-NAM by using secondary data compiled from various sources. But due to the unavailability of required secondary data on price and arrival into both types of markets at AGMARKNET, some parts of the analysis have been made by comparing pre-eNAM and post-eNAM for better assessment of performance.

### 3.2 Characteristics of Electronic National Agricultural Markets

Figure 3.1 Process of trade through e-NAM enabled markets



Source: <http://sfacindia.com/>

The policymakers have formulated special provisions to trade through e-NAM enabled markets. Figure 3.1 demonstrates the unique process of trading through e-NAM enabled markets from the entrance gate to the exit gate.

The first step of trading through the new electronic market begins from the gate entry. During gate entry, a lot ID is generated by the market officials which includes the name and address of the farmer, name of the commodity, number of bags, details of the vehicle, etc. The second step is the quality assessment by the technicians and the weight measurement of the crops.

The third step is to upload details of the crop including the quality assessment certificate on the e-NAM website for e-auction by the registered traders across the country. The view of the detailed auction process is demonstrated on the display board. Recently the policymakers also developed a mobile app through which farmers can trace real-time bidding of the crop. At present, the app is working in six different languages to simplify the process of trade through e-NAM (SFAC, 2017).

The fourth step is the declaration of the highest bid price for the crop and at the end of the auction process, the farmer will get information by SMS to his/her registered mobile number. If the farmer gives his/ her consent to sell the product at that price announced by the trader trading process will move to the next step.

The fifth step is to make final weighting by the market officials before the trader makes payment to the farmer. Payment directly made by the trader to the farmer's bank account through BHIM/RTGS/NEFT/Bank Challan. Direct payment to the farmer's bank account provision was introduced by the policymakers to bring transparency in the marketing system.

The final step is after successful payment by the trader to the farmer. After that market official generates an exit gate pass and the crop is consigned to the trader. The trading process becomes completed after hand over of crops by the market officials to the trader.

### 3.3 Performance of electronic National Agricultural Markets (e-NAM) in India

It is true that in some of the government schemes there is a huge gap exist between policy formulation and actual implication at the ground level. Hence, the present section has devoted to assess the performance of e-NAM at the national level through both qualitative and quantitative data analysis. Table 4.1 explains the major findings from select literature on e-NAM in the context of different states and also at the national level.

**Table 3.1** Summary of selected review of literature on e-NAM

SL. No.	Author(s)	Major Findings
01.	Chengappa et. al. 2012	Education and computer knowledge positively influence to accept e-NAM. It also helps to reduce transaction time.
02.	Chand 2016	Competitiveness and transparency will increase.
03.	Roy et. al. 2017	Large investments required for the success of e-NAM.
04.	Narayanan et al. 2017	Reforms should be on institutions, incentives, and infrastructure.
05.	OSAMB 2017	Inadequate manpower and training are the main constraints.
06.	Roy et. al. 2017	Increased agricultural trade volume after introduction of e-NAM.
07.	NABARD 2018	Financial literacy has increased among the farmers. But it is important to provide training to all the stakeholders.
08.	Pavithra et. al. 2018	e-platform is successful in large market and not in small ones.
09.	NIAM 2019	About 60 per cent of the sample farmers are unaware about e-NAM in Rajasthan.
10.	Meena et. al. 2019	e-NAM will help to enhance agricultural income.

**Table 3.2** List of mandis, farmers, traders, commission agents, and FPOs registered on e-NAM in different states of India

States/UTs	No. of Markets	Distribution of Markets (%)	No. of registered Farmers	Distribution of reg. farmers (%)	No. of reg. Traders	Distribution of reg. Traders (%)	No. of reg. Commission agents	Distribution of Commission agents (%)	No. of reg. FPOs	Distribution of reg. FPOs (%)	Unified licenses by States	Unified licenses by states (%)
Andhra Pradesh	33	3.30	1434354	8.61	3172	2.31	2253	2.90	128	9.17	2746	8.58
Chandigarh	01	0.10	7106	0.04	64	0.05	59	0.08	0	0	0	0
Chhattisgarh	14	1.40	135065	0.81	3046	2.22	227	0.29	16	1.14	30	0.09
Gujarat	122	12.20	865374	5.20	9193	6.69	6726	8.67	68	4.86	15	0.05
Haryana	81	8.10	2717766	16.33	10933	7.96	22406	28.88	128	9.16	33	0.10
Himachal Pradesh	19	1.90	121007	0.73	1943	1.41	1099	1.42	49	3.51	0	0
J&K	02	0.20	-	-	20	0.01	-	-	-	-	0	0
Jharkhand	19	1.90	199453	1.20	1931	1.41	0	0	48	3.43	0	0
Karnataka	02	0.20	-	-	487	0.35	-	-	-	-	0	0
Kerala	06	0.60	-	-	91	0.07	-	-	-	-	0	0
Madhya Pradesh	80	8.00	3012194	18.09	21093	15.36	0	0	52	3.71	2145	6.69
Maharashtra	118	11.8	1164017	6.99	17662	12.86	14369	18.51	240	17.17	0	0
Odisha	41	4.10	64929	0.39	1635	1.19	0	0	81	5.79	1636	5.10
Pondicherry	02	0.20	13111	0.08	138	0.10	0	0	0	0	0	0
Punjab	37	3.70	211842	1.27	1748	1.27	6979	8.99	03	0.21	0	0
Rajasthan	144	14.40	1308470	7.86	14754	10.74	7670	9.88	128	9.16	14753	46.03
Tamil Nadu	63	6.30	207720	1.25	2623	1.91	04	0.005	93	6.65	113	0.35
Telangana	57	5.70	1815637	10.91	5645	4.11	4621	5.95	54	3.86	5645	17.62
Uttar Pradesh	125	12.50	3298276	19.81	34055	24.79	8509	10.96	168	12.02	286	0.89
Uttarakhand	16	1.60	53547	0.32	4650	3.39	2590	3.34	28	2.01	4650	14.50
West Bengal	18	1.80	17834	0.11	2476	1.80	96	0.125	114	8.15	0	0
Total	1000	100	16647702	100	137359	100	77608	100	1398	100	32052	100

Source: <https://enam.gov.in/web/state-unified-license> (As of 30<sup>th</sup> June 2020) Note: “-” means data is not available

Table 3.2 demonstrates the list of registered stakeholders of e-NAM in different states. At present, there are 1000 regulated markets integrated with the e-platform located in 18 states and 3 Union Territories of India. It can be seen from the table that the distribution of e-NAM enabled markets in various states is not equal. Rajasthan has the highest number of markets integrated with the e-platform whereas in Chandigarh it is the lowest. About 51 per cent of total e-NAM enabled markets are located in Rajasthan, Gujarat, Maharashtra, and Uttar Pradesh.

Farmers and traders are integral parts of the agricultural markets. There are 1.66 crore farmers have registered in the e-platform to make the trade through e-NAM. Uttar Pradesh shares the largest numbers of registered farmers whereas it is the lowest in Chandigarh. There is no definite relationship between the number of integrated e-markets in different states and the number of registered farmers.

Table 3.2 reveals that 1.37 lakh traders have registered to make the trade with e-NAM markets. The ratio between traders and farmers in the market is 1:121 approximately at the national level. Uttar Pradesh shares the largest number of registered farmers and traders. Jammu and Kashmir constitute the lowest number of registered traders. Commission agents help to create a link between farmers and traders. There are 77608 commission agents registered in various electronic national agricultural markets across the country. There is no role of commission agents in Jharkhand, Madhya Pradesh, Odisha, and Pondicherry.

Farmers Producers Organizations (FPOs) are meant to make trade possible and profitable for the small and marginal farmers because this category constitutes the largest share among all the farmers in India. In total, 1398 FPOs have registered to participate in e-NAM enabled markets. But it is also not equally distributed across the country. In Madhya Pradesh, 17.17 per cent of total FPOs have registered which is the highest and in Chandigarh, there is not even a single FPOs has registered.

Unified Licenses by States<sup>6</sup> are granted by the apex agricultural marketing authorities in various states. There are 32052 unified licenses permitted by different state governments. Out of the total unified license, about 46.03 per cent are granted by the Rajasthan state only which is highest.

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<sup>6</sup> The traders who have the Unified Licenses by State are permitted to purchase agricultural crops from the regulated markets of the state with a single license.

There is not even a single Unified License granted by the marketing authorities of states like Himachal Pradesh, Jammu & Kashmir, Jharkhand, Kerala, Madhya Pradesh, Punjab, and West Bengal.

### 3.4 Assessment of Performance of electronic National Agricultural Markets in Odisha

Agricultural marketing is a state subject means the state government have the power to formulate rules and regulations related to marketing. The state governments have selected some crops to trade with newly introduced e-NAM enabled markets. Some of the sample farmers from Odisha argued that the policymakers have not included some of the major crops grown under the market jurisdiction in the list of e-NAM to trade. The list of crops selected to trade with e-NAM in various states and UTs have given in Appendix 3.1.

**Table 3.3** List of e-NAM markets and major commodities traded in Odisha

Market	Name of the District	Major Commodities Traded through e-NAM
Kantabanji	Balangir	Onion, cotton, and sunflower seeds
Kendupatana	Cuttack	Moong whole (Green gram)
Paralakhemundi	Gajapati	Cashew nuts and maize
Tikabali	Kandhamal	Turmeric and peas green
Kunduli	Koraput	Ginger, jack fruit, leafy vegetable, potato, and sweet potato
Nabarangapur	Nabarangapur	Maize
Bahadjhola	Nayagarh	Bitter guard, brinjal, cauliflower, cucumber, ladies finger, moong whole, and tomato
Sakhigopal	Puri	Coconut
Rayagada	Rayagada	Cotton
Kuchinda	Sambalpur	Chillies and mahua flower

Source: OSAMB, Bhubaneswar

In March 2017 there were 10 regulated agricultural markets located in different districts of Odisha state integrated with the e-platform and in the year 2020, 31 markets were added to this platform. At present, there are 41 e-NAM enabled markets is working in Odisha. Based on agricultural production within the market regime the Odisha State Agricultural Marketing Board (OSAMB) has selected the list of agricultural commodities to trade with these new markets. But the ground reality is that the policymakers have not included other major crops grown within the market jurisdiction to trade with e-NAM which is an important obstacle on the way of successful implementation of e-NAM.



**Table 3.4** Details of stakeholders registered in various e-NAM markets of Odisha

Market	Farmers	% Share	Traders	% Share	FPOs	% Share
Bahadajhola	5735	10.35	65	8.29	01	9.09
Kantabanji	11966	21.61	96	12.24	07	63.64
Kendupatna	1617	2.93	07	0.89	-	-
Kunduli	3631	6.56	73	9.31	01	9.09
Kuchinda	2907	5.24	112	14.29	-	-
Nabarangpur	9477	17.11	116	14.79	-	-
Paralakhemundi	3223	5.82	133	16.96	02	18.18
Rayagada	3213	5.80	94	11.99	-	-
Sakhigopal	3765	6.80	59	7.53	-	-
Tikabali	9846	17.78	29	3.71	-	-
Total	55380	100	784	100	11	100

Source: OSAMB, Bhubaneswar

Table 3.4 gives information about different stakeholders of e-NAM. It can be seen that there is large inequality exists within various electronic markets in terms of registered farmers, traders, and FPOs in the state. Largely, 21.61 per cent of farmers have registered to sell their agricultural produce through e-NAM, Kantabanji which is a sample market for the study. About 17 per cent of farmers have registered in Nabarangpur and Tikabali markets individually. In Bahadajhola market also there is about 10.35 per cent of farmers have registered to trade through e-NAM. In Kendupatana market there is about 2.93 per cent of total farmers have registered to trade which is lowest as compared to other markets in the state.

In some markets it is the lack of knowledge about e-NAM which is responsible for small number of farmers participation. The policymakers have not included all the major crops grown within the market area to trade with e-NAM and it is another reason for differences farmers participation.

One of the most important reasons behind the introduction of e-NAM is to enhance competition among traders. Table 3.4 shows that there are 16.96 per cent of traders have registered to make the trade through Paralakhemundi market which is the highest in the state. In Kuchinda, Nabarangpur, Rayagada, and Kantabanji market also there are significant numbers of traders have registered. In Kendupatana market there is only 0.89 per cent of traders have registered which is the lowest in the state. The ratio between traders and farmers is 1:231 in Kendupatana e-NAM enabled market which needs to be enhanced.

The cost of agricultural marketing is more for small and marginal farmers. Hence, the policymakers have introduced Farmers Producers Organizations (FPOs) to decrease the

average cost of marketing of small and marginal farmers. But it can be concluded from the table that the performance of the Odisha state is not satisfactory to include more number of FPOs in e-NAM enabled markets.

**Table 3.5** Information about the number of farmers participated in e-NAM of Odisha

Market (1)	Number of registered Farmers (2)	Number of farmers participated (3)	Ratio (3/2)
Bahadajhola	5735	2649	0.461
Kantabanji	11966	2644	0.221
Kendupatna	1617	445	0.275
Kunduli	3631	389	0.107
Kuchinda	2907	509	0.175
Nabarangpur	9477	395	0.041
Paralakhemundi	3223	877	0.272
Rayagada	3213	822	0.255
Sakhigopal	3765	1691	0.449
Tikabali	9846	1442	0.146
Total	55380	11863	0.214

Source: OSAMB, Bhubaneswar

Table 3.5 shows details of the participated farmers in various e-NAM enabled markets of Odisha. It can be seen that the share of participant farmers is very less in most of the e-NAM enabled markets of the state except Bahadajhola, Kantabanji, and Sakhigopal markets. The ratio between the participated farmers and number of registered farmers is highest in Sakhigopal market whereas it is lowest in Nabarangpur market. In overall approximately one-fifth of registered farmers have participated in all e-NAM enabled markets of the state. The ratio between participant farmers and registered farmers for all markets in Odisha is 0.214 which need to be enhanced.

There are only a few farmers in Odisha have registered to trade with the electronic enabled agricultural markets. But it is also surprising to know that there is very less proportion of registered farmers used to participate in the e-NAM facilitated markets. The reasons for less participation of farmers in electronic markets are more computerized work, inefficiency in marketing, and difficulties in the marketing activities. The government should take necessary action so that number of participate farmers will increase which is important for the successful implementation of e-NAM.

**Table 3.6** Details about the number of traders participated in different e-market of Odisha

Market	2017	2018		2019	
	No of traders	No of traders	% change over previous year	No of traders	% change over previous year
Bahadajhola	47	34	-27.66	33	-2.94
Kantabanji	50	32	-36.00	10	-68.75
Kendupatna	02	01	-50.00	-	-
Koraput	10	07	-30.00	05	-28.57
Kuchinda	82	13	-84.15	04	-69.23
Nabarangpur	09	39	333.3	12	-69.23
Paralakhemundi	10	32	220	27	-15.63
Rayagada	02	04	100	01	-75.00
Sakhigopal	-	40	-	31	-22.50
Tikabali	02	04	100	07	-75.00
Total	214	206	-3.74	130	-36.89

Source: OSAMB, Bhubaneswar

Table 3.6 shows the share of traders participation in various electronic markets and it also indicates how the share of participated traders has changed as compared to the previous year. It can be seen that Kuchinda market has a large share in traders' participation in the initial year of e-NAM introduction and it was lowest in Kendupatna, Tikabali, and Rayagada markets. Since it is an ideal model of agricultural marketing system we can expect to enhance the number of participate traders in subsequent years after implementation.

But it can be seen that in 2018 the number of participate traders has declined as against 2017 in five different markets and in overall all the markets also it has declined by 3.74 per cent. It is a surprise to know that in 2019 the share has declined in all electronic enabled markets of Odisha. The reason behind this is that at the initial year of e-NAM implementation, there was much enthusiasm among farmers, traders, and market officials about the new market system which has declined later on. In total if we take into consideration all the markets of Odisha it has declined by 36.89 per cent in 2019.

**Table 3.7** Information about lots arrival and lots traded in different markets of Odisha

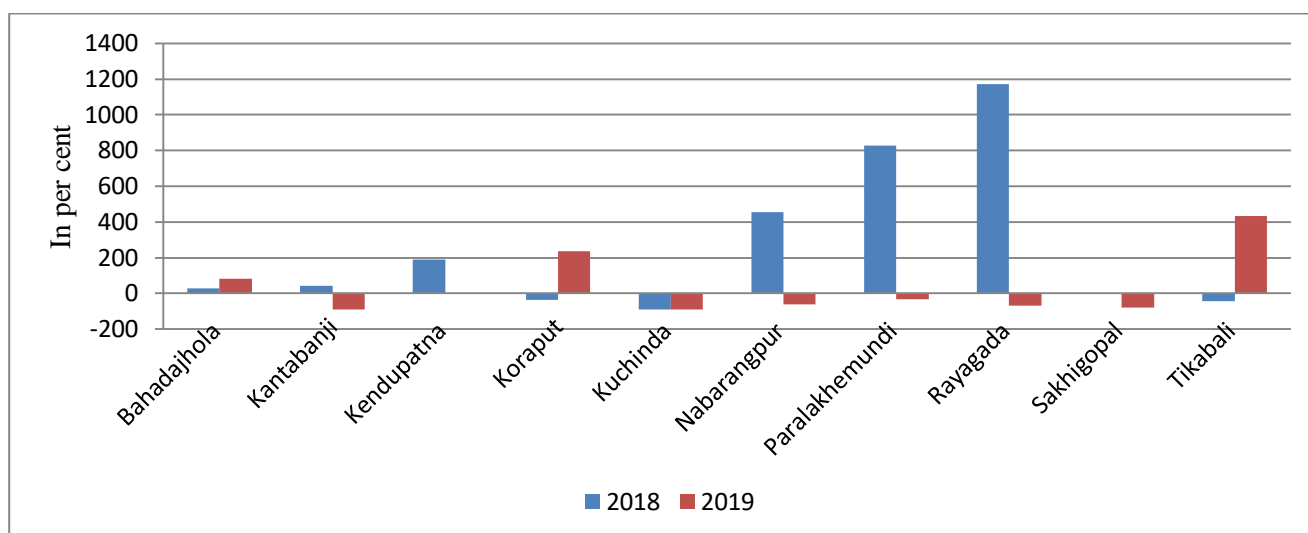
Market	2017			2018			2019		
	Number of lots arrivals	Number of lots traded	Lots traded as a % of lots arrivals	Number of lots arrivals	Number of lots traded	Lots traded as a % of lots arrivals	Number of lots arrivals	Number of lots traded	Lots traded as a % of lots arrivals
Bahadajhola	841	836	99.41	1085	1085	100	1954	1944	99.49
Kantabanji	1533	1314	85.71	2205	2094	94.97	241	137	56.84
Kendupatna	124	123	99.19	358	324	90.50	-	-	-
Koraput	213	194	91.08	132	107	81.07	444	439	98.87
Kuchinda	1166	1138	97.59	107	107	100	10	09	90.00
Nabarangpur	31	27	87.09	495	369	74.54	195	193	98.97
Paralakhemundi	30	29	96.67	664	663	99.85	451	451	100
Rayagada	03	03	100	1003	994	99.10	295	294	99.66
Sakhigopal	-	-	-	7084	3400	47.99	1562	496	31.75
Tikabali	438	430	98.17	242	241	99.59	1291	1290	99.92
Total	4379	4094	93.49	13375	9484	70.91	6443	5253	81.53

Source: OSAMB, Bhubaneswar

Table 3.7 reveals information about lots traded as a proportion of lots of arrivals into various e-NAM enabled markets of Odisha. It can be seen that there was 93.49 per cent of lots traded out of total lots of arrival in 2017 which was declined to 70.91 per cent in 2018. In 2018, there were very small numbers of lots traded in Nabarngpur and Sakhigopal markets. In the initial year, the performance of e-NAM enabled markets was good in all the electronic markets of the state.

But in 2019, there was a slight improvement over the previous year and about 80.53 per cent of lots traded as a proportion of total lots arrival. In 2019 the performance of Sakhigopal and Kantabanji market was not satisfactory in this context.

**Figure 3.2** Information about change of lots arrivals into different markets of Odisha (% change over previous year)



Source: OSAMB, Bhubaneswar

The trend in lot of arrivals into the agricultural markets can be considered as one of the important indicators to assess the performance. It has been three and a half years since the inception of electronic markets in India. Odisha is one of the leading states to proliferate the concept of electronic national agricultural markets among the stakeholders.

But it is clearly understood from Figure 3.2 that in 2018 about six markets have performed well and the lots arrivals into these markets have increased as compared to 2017. The reverse trend of lots of arrivals has not changed in the year 2019. In six markets of Odisha the trend has declined in 2019 as compared to the previous year. It indicates that acceptance of the new agricultural markets is not good among the farmers in the state.

As per the provision of electronic markets, there is no direct contact between farmers and traders. It is the technicians appointed by the government who examine the quality of the products. It is one of the important requirements that the state marketing board should recruit enough well trained efficient technicians to examine the quality of agricultural products. But the ground reality in the sample e-NAM enabled markets to show that there is not enough staff in these markets.

**Table 3.8** Information about the quality assessment by the e-NAM officials

Market	2017		2018		2019	
	Number of lots assessed	Assessed as a % of lots traded	Number of lots assessed	Assessed as a % of lots traded	Number of lots assessed	Assessed as a % of lots traded
Bahadajhola	720	81.34	1084	99.86	1917	98.61
Kantabanji	727	35.35	2066	96.59	117	85.40
Kendupatna	120	97.56	04	1.15	-	-
Koraput	178	91.75	101	97.17	436	99.32
Kuchinda	02	0.81	0	0	01	100
Nabarangpur	20	74.04	369	100	193	100
Paralakhemundi	25	84.56	663	100	451	100
Rayagada	0	0	987	99.55	289	98
Sakhigopal	-	-	2643	77.74	281	56.65
Tikabali	0	0	130	53.94	1232	95.50
Total	1792	43.77	8047	85.29	4917	93.60

Source: OSAMB, Bhubaneswar

It can be seen from Table 3.8 that in 2017 performance of quality assessments was not good in some markets. In Kuchinda market there was only 0.81 per cent of the lot assessed out of total lots traded whereas it was 97.56 per cent in Kendupatna market. Overall there was only 43.77 per cent of lots traded assessed by the market officials in 2017.

But it is a positive indicator that in 2018 and 2019 the overall assessment in all electronic enabled markets has increased to 85.29 and 93.60 per cent of total lots traded. In 2019 the performance of Sakhigopal market was not satisfactory on this ground.

**Table 3.9** Information about volume of trade through e-markets in Odisha

Market	2017		2018			2019		
	Amounts (Rs. lakh)	% Share	Amounts (Rs. lakh)	% Share	% Change over previous year	Amounts (Rs. lakh)	% Share	% Change over previous year
Bahadajhola	140.73	9.80	45.71	0.35	-67.52	279.01	7.03	510.39
Kantabanji	738.62	51.45	2154.37	16.73	191.68	196.40	4.95	-90.88
Kendupatna	29.53	2.06	59.65	0.46	102	-	-	-
Kunduli	189.79	13.22	187.07	1.45	-1.43	693.42	17.48	270.67
Kuchinda	146.04	10.17	6.85	0.05	-95.31	0.88	0.02	-87.15
Nabarangpur	59.03	4.11	690.09	5.35	1069.05	305.76	7.71	-55.69
Paralakhemundi	77.18	5.38	2211.07	17.15	2864.82	1857.3	46.82	-16.00
Rayagada	10.47	0.73	2341	18.17	22259.1	410	10.33	-470.98
Sakhigopal	-	-	5157.06	40.01	-	50.34	1.27	-99.02
Tikabali	44.22	3.08	35.97	0.28	-18.66	174.15	4.39	384.15
Total	1435.61	100	12888.84	100	797.80	3967.26	100	-69.22

Source: OSAMB, Bhubaneswar

Table 3.9 shows the volume of trade by all the e-NAM enabled markets of Odisha in money terms. It is visible from the table that the volume of trade is not identical among all the markets. In 2017 the total volume of trade was 1435.61 lakh which has significantly increased to 12888.84 lakh in 2018. But in 2019 the total volume of trade declined to 3967.26 lakh means it has declined by 69.22 per cent as compared to the previous year.

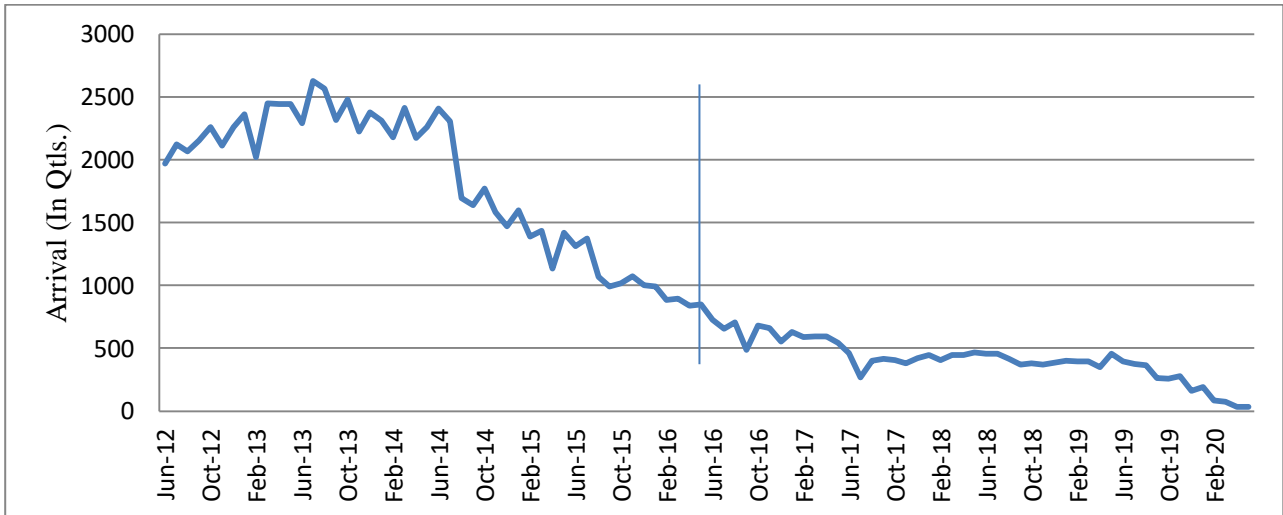
The table reveals that in 2018 there were three markets where the total volume of trade declined as compared to the previous year and the performance of the markets was to some extent better. But it is surprising to know that in 2019 there were six markets whose performance were declined as compared to the previous year. The overall performance of all electronic markets also has declined in 2019 as compared to the previous year.

### 3.5 Arrivals of Crops into Different Markets of Odisha: Pre and Post e-NAM Periods

Secondary data on the arrival of crops have been collected from the AGMARKNET source for selected agricultural markets of Odisha to assess the performance of e-NAM. But due to the unavailability of data for both e-NAM and regulated agricultural markets the analysis has made by comparing the trend of arrival four years monthly arrival before the introduction of e-NAM (Pre-eNAM) with four years monthly arrival after the introduction of e-NAM (Post-eNAM) at e-NAM enabled markets for a meaningful explanation. From June 2012 to April 2016 monthly data has taken as pre-eNAM and May 2016 to May 2020 as post-eNAM. The vertical line in the below graphs has drawn to distinguish between pre-eNAM and post-eNAM time period.

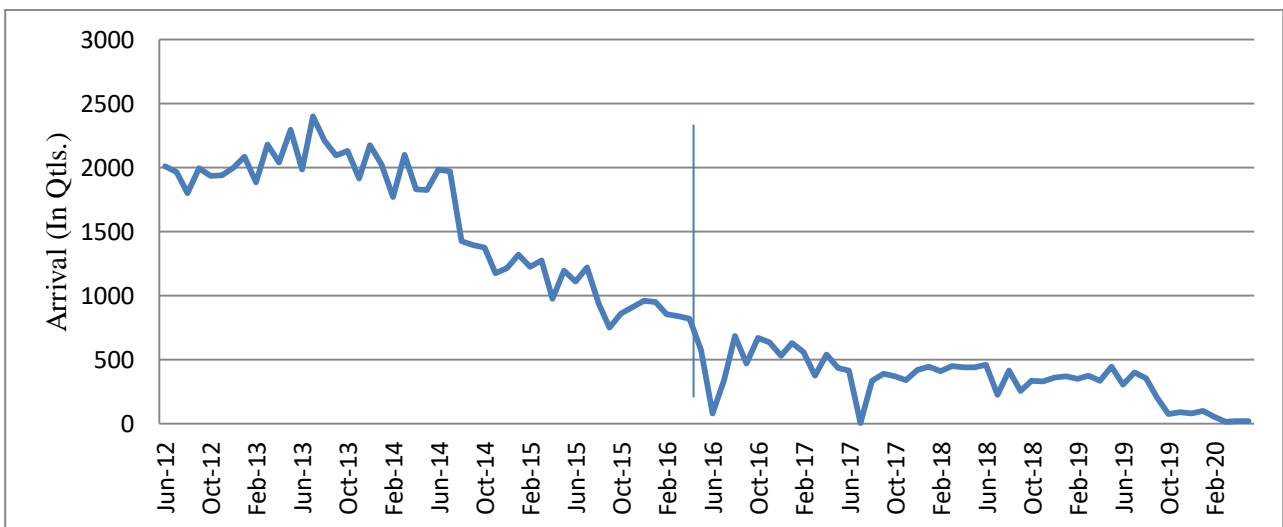
Some of the crops are seasonal by nature due to that the continuous data is not available for all crops.

**Figure 3.3** Brinjal arrivals in Bahadajhola market of Odisha (Quintal)



Source: AGMARKNET

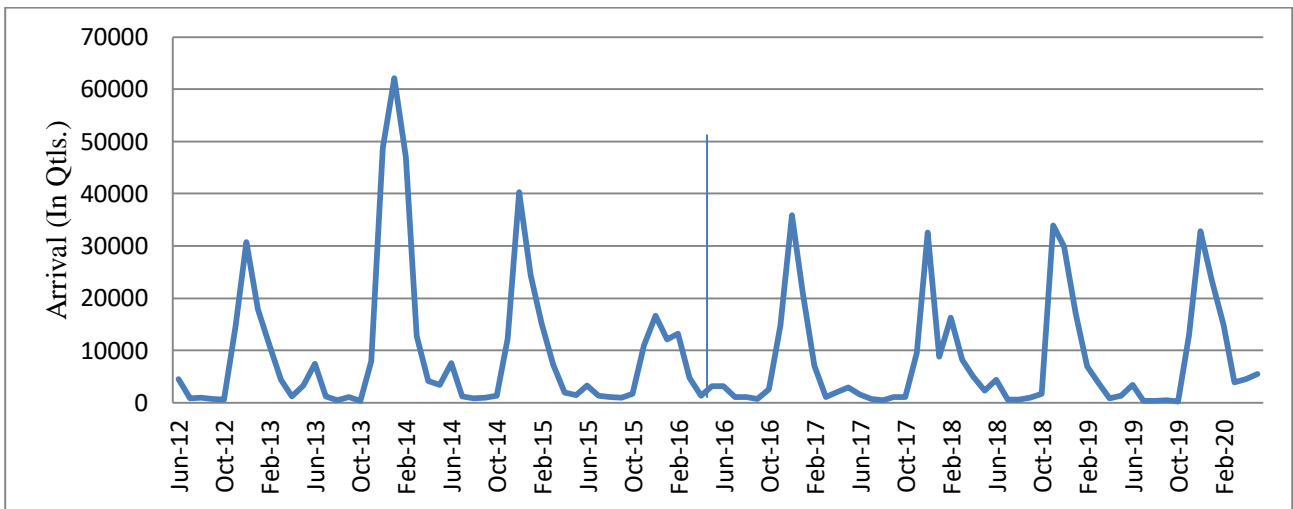
**Figure 3.4** Tomato arrivals in Bahadajhola market of Odisha (Quintal)



Source: AGMARKNET

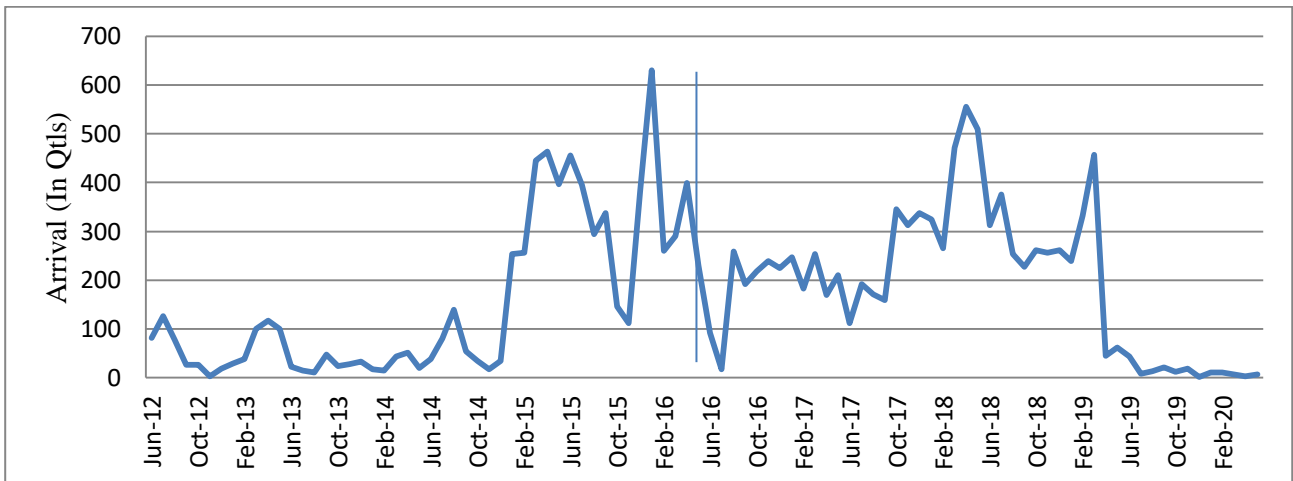


**Figure 3.5** Maize arrivals in Nabarangpur market of Odisha (Quintal)



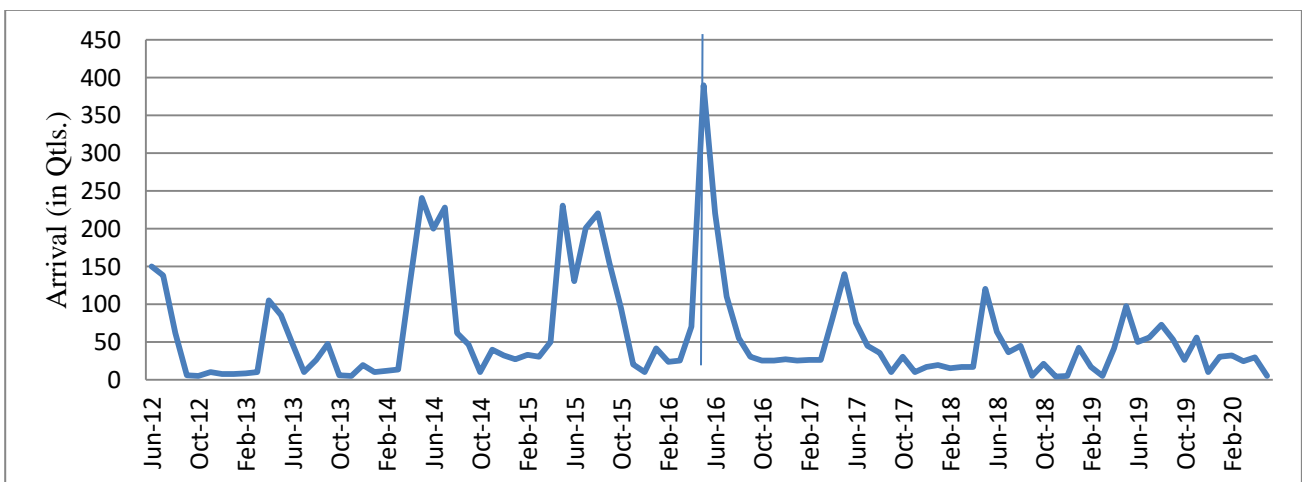
Source: AGMARKNET

**Figure 3.6** Turmeric arrivals in Tikabali market of Odisha (Quintal)



Source: AGMARKNET

**Figure 3.7** Cashew nuts arrivals in Paralakhemundi market of Odisha (Quintal)



**Table 3.10** Descriptive statistics of crops arrivals into various e-NAM enabled markets of Odisha (In Quintals)

	Cotton		Green gram		Cashew nuts		Turmeric		Maize		Brinjal		Tomato	
	Pre-eNAM	Post-eNAM	Pre-eNAM	Post-eNAM	Pre-eNAM	Post-eNAM	Pre-eNAM	Post-eNAM	Pre-eNAM	Post-eNAM	Pre-eNAM	Post-eNAM	Pre-eNAM	Post-eNAM
Mean	570.77	980.66	27.21	18.79	66.65	49.29	148.62	194.38	9980.95	7928.67	1833.47	419.99	1603.15	348.28
Median	166.17	417.17	19.20	10.70	32.71	30	77.50	218	4162.02	3209.01	2065	404	1825	374
Minimum	2.80	40.50	0.43	3.80	5	4	2.50	1.70	274.96	241.23	837	32.62	750	5
Maximum	3207.93	2432.48	116.80	55	240.60	390	630	555	62182.51	35926.26	2625	848	2400	685
Std. Dev.	883.56	887.17	31.56	17.62	72.29	63.79	163.14	147.39	14152.02	10270.22	564.82	175.54	502.92	181.26
Coeff. Var.	154.80	90.47	115.99	93.77	108.46	129.42	109.77	75.83	141.79	129.53	30.81	41.80	31.37	52.04

Note: Details of change in arrivals during Pre and Post e-NAM has given in Appendix 3.2

Source: AGMARKNET

### Brinjal

To assess the performance of e-NAM in Odisha pattern of arrivals of brinjal has taken into consideration for Bahadajhola market. It is visible from figure 3.3 that the trend of arrivals has been continuously decreasing from 2014 to 2020. The study reported that the average arrival of brinjal in the Bahadajhola market has decreased from 1833.47 quintals per month during pre-eNAM to 419.99 quintals per month during post-eNAM (Table 3.10). There has been a decreasing trend in maximum and minimum average arrivals in the market during the time of post-eNAM period. But the result of the standard deviation shows that variability in arrivals has declined after e-NAM.

### Tomato

Tomato arrival data into Bahadajhola market has taken for the analysis of this study. The trend of tomato arrivals into the market is also showing a downward movement (Figure 3.4). The mean arrival of tomato into the Bahadajhola market has decreased from 1603.15 quintals per month during pre-eNAM to 348.28 quintals per month during post-eNAM. The reason for this can be declined in production but there is indeed no improvement of arrivals into the market even after the implementation of e-NAM facilitation.

### Maize

Secondary monthly time series data has been compiled from AGMARKNET about maize arrivals into Nabarangpur market. Figure 3.5 demonstrates that there is no uniform trend in arrivals of Maize into the market. There is a fluctuation in the trend of maize arrivals due to the seasonal nature of the crop. Table 3.10 shows that the mean arrival of Maize into the Nabarangpur market was 9980.95 quintals per month during the time of pre-eNAM and 7928.67 quintals per month during post-eNAM.

### Turmeric

Turmeric is considered a major crop is grown in Tikablali market area of Kandhamal district. It can be seen from figure 3.6 that there is a fluctuation in the trend of turmeric arrivals into the market. But overall there is an increasing trend in arrivals of Turmeric into the market from 2014 to 2019. Table 3.10 indicates that the average arrival of Turmeric has increased from 148.62 quintals per month during pre-eNAM to 194.38 quintals per month during post-eNAM.

It is a positive indicator that there has been an improvement in arrivals of Turmeric into the market after the introduction of the e-NAM.

### Cotton

Rayagada district is a major producer of cotton in Odisha. Secondary data has been collected for cotton to assess the performance of e-NAM, Rayagada. Continuous secondary data is not available for cotton due to seasonal nature of the crop. Table 3.10 shows that average cotton arrivals into the market have increased after the introduction of e-NAM. It can be seen from the table that the average arrival of cotton into the market was 570.77 quintals per month before e-NAM and it was increased to 980.66 quintals per month during the time of post-eNAM.

### Green gram

It can be concluded from Table 3.10 that the mean arrivals of a green gram have decreased after the introduction of e-NAM. The mean arrival of green gram into the market was 27.21 quintals per month during pre-eNAM which has declined to 18.79 quintals per month during post-eNAM. The study reported that variability also declined in arrivals of green gram into the market after the introduction of e-NAM.

### Cashew nuts

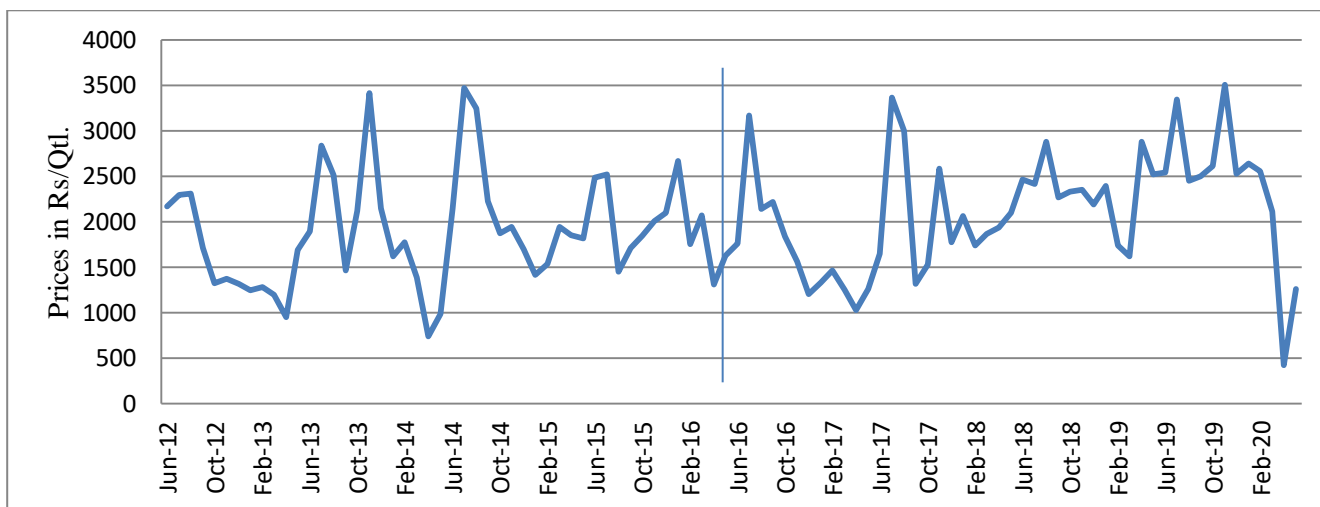
Cashew nut is considered a major commercial crop grown in Paralakhemundi market jurisdiction. Figure 3.7 demonstrates the trend of cashew nuts arrivals into Paralakhemundi market from 2012 to 2020. It can be seen from the figure that there is no definite pattern of growth in arrivals of cashew nuts. But there is indeed no improvement of arrivals of cashew nuts into the market even after the introduction of e-NAM in the market. Table 3.10 indicates that the mean arrival of cashew nuts into the market was 66.65 quintals per month during pre-eNAM which decreased to 49.29 quintals per month during the post-eNAM period.

It can be concluded that there is no improvement of arrivals of crops into the market after the introduction of e-NAM except cotton and turmeric out of the seven crops that have taken into consideration for the study. The market officials should take the initiative to aware more numbers of farmers about the benefits of e-NAM so, that arrivals of different crops into these markets will increase and it will help to make an efficient and strengthen the electronic national agricultural marketing system.

### 3.6 Trend in Price of Crops in Different Markets of Odisha: Pre and Post e-NAM Periods

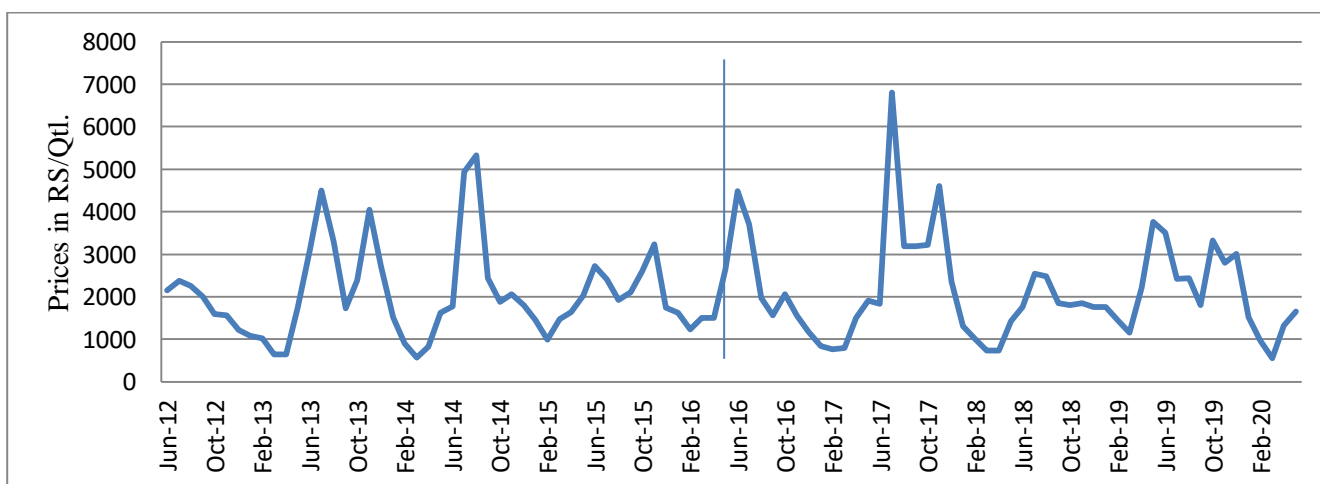
Price is an important component of agricultural markets because it transmits the information to make investment by the farmers. Stable crop price is crucial to protect the interest of both farmers as well as consumers. Hence, to assess the performance of e-NAM secondary data on price has been collected for selected crops. The price trend for cotton and green gram has not given due to the unavailability of continuous monthly price data for e-NAM enabled markets of Odisha.

**Figure 3.8** Trend of brinjal price in Bahadajhola market of Odisha (Rs/Quintal)



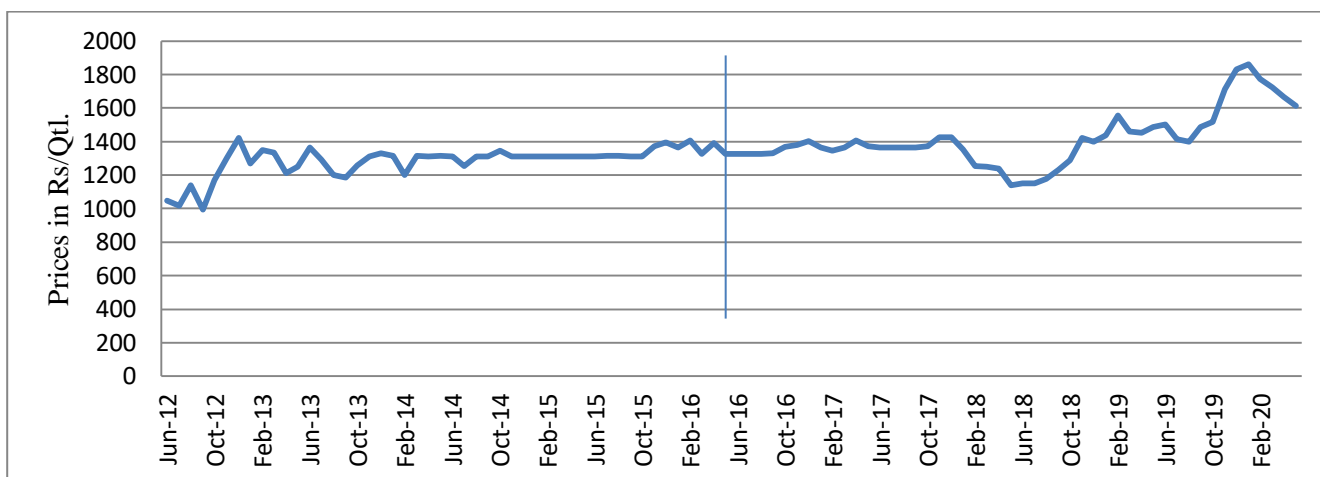
Source: AGMARKNET

**Figure 3.9** Trend of tomato price in Bahadajhola market of Odisha (Rs/Quintal)



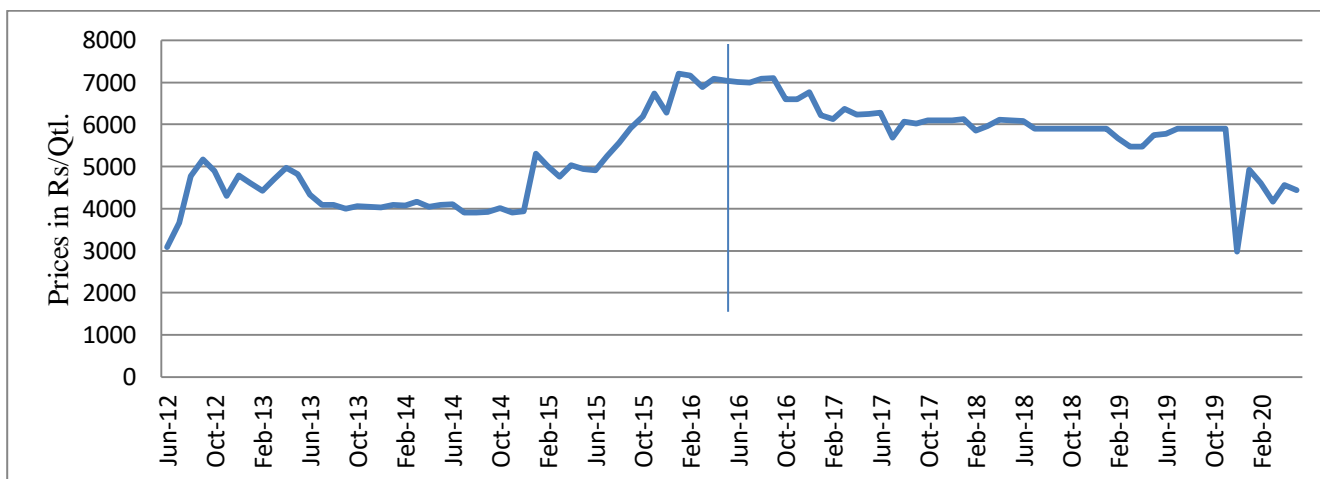
Source: AGMARKNET

**Figure 3.10** Trend of maize price in Nabarangpur market of Odisha (Rs/Quintal)



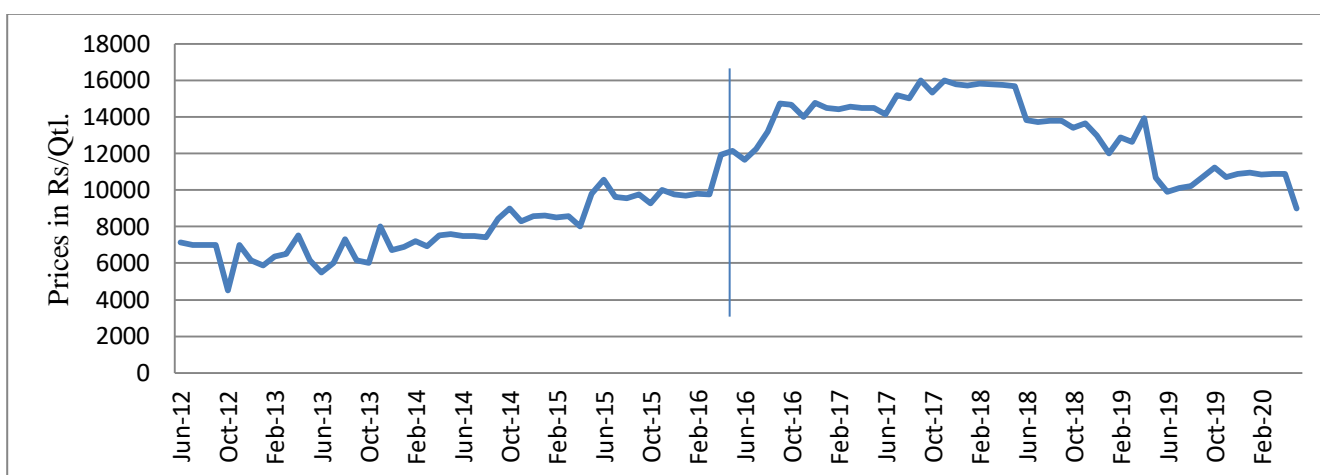
Source: AGMARKNET

**Figure 3.11** Trend of turmeric price in Tikabali market of Odisha (Rs/Quintal)



Source: AGMARKNET

**Figure 3.12** Trend of cashew nuts price in Paralakhemundi market of Odisha (Rs/Quintal)



Source: AGMARKNET

**Table 3.11** Descriptive statistics of various crop prices in different e-NAM enabled markets of Odisha (Rupees per quintal)

	Cotton		Green gram		Cashew nuts		Turmeric		Maize		Brinjal		Tomato	
	Pre-eNAM	Post-eNAM	Pre-eNAM	Post-eNAM	Pre-eNAM	Post-eNAM	Pre-eNAM	Post-eNAM	Pre-eNAM	Post-eNAM	Pre-eNAM	Post-eNAM	Pre-eNAM	Post-eNAM
Mean	4211.44	5033.05	4998.92	5398.01	7870.12	13258.93	4791.76	5910.02	1285.83	1413.81	1890.68	2105.23	2041.17	2143.88
Median	4070.61	5288.67	4873.06	5400	7506.67	13778.20	4609.25	5900	1310	1373.52	1845.82	2137.69	1777.88	1832.43
Minimum	3900	4300	3000	4800	4500	9000	3086.28	2976.92	993.74	1140.23	739.89	420.51	575	559.29
Maximum	4800	5466.17	7204.08	6000	11916.67	16000	7200	7100	1423.04	1860.16	3467.90	3503.27	5325	6800
Std. Dev.	289.15	399.59	1181.44	318.45	1548.95	1979.39	1012.05	763.49	91.53	165.82	605.86	661.64	1056.85	1194.67
Coeff. Var.	6.86	7.94	23.64	5.90	19.68	14.93	21.12	12.92	7.12	11.72	32.04	31.38	51.78	55.72

Note: Details of change in crop price during Pre and Post e-NAM has given in Appendix 3.3

Source: AGMARKNET

### Brinjal

Figure 3.8 demonstrates the trend of Brinjal price in Bahadajhola market of Odisha for both the pre-eNAM and post-eNAM periods. The figure shows that although there is not a definite pattern of trend in Brinjal price it shows an increasing trend throughout the study period with some ups and downs. Table 3.11 shows that the average price of Brinjal was Rs.1890.68 per quintal before the introduction of e-NAM which increased to Rs. 2105.23 per quintal after e-NAM. It is a positive indicator that the price of Brinjal has increased after the introduction of electronic platforms in agricultural markets.

### Tomato

There is no uniform growth in the trend of Tomato price in Bahadajhola market (Figure 3.9). The trend shows that there is not much change in the price of Tomato between before the introduction of e-NAM and after the introduction of e-NAM. It can be seen from Table 3.11 that there has been a slight improvement in Tomato's price after the introduction of e-NAM. Standard deviation is a measure of dispersion which indicates how the data disperse from the mean. It shows that there is much variation in the price of Tomato after the introduction of e-NAM.

### Maize

Maize is considered one of the most important crops grown by farmers in Nabarangpur district. Figure 3.10 demonstrates that the price trend of Maize in Nabarangpur has a uniform growth. It can be understood from the figure that there has been a slight improvement in the price of Maize from mid of 2017 onwards. The mean price of Maize also has increased from Rs. 1285.83 per quintal during pre-eNAM to Rs. 1413.81 per quintal during post-eNAM in the market. There is also an increment of both minimum and maximum monthly prices after the introduction of electronic enabled markets.

### Turmeric

Figure 3.11 demonstrates that there was a sudden increase in the price of Turmeric in Tikabali market in February 2015 and it had continued up to October 2016. After 2016 the trend of Turmeric price becomes flat up to 2020. But the mean price of Turmeric had increased after the introduction of e-NAM. The average price of Turmeric was Rs. 4791.76 per quintal before e-NAM but after of electronic platform, it had increased to Rs. 5910.02 per quintal.



### Cotton

Cotton is a major commercial crop grown by the farmers of southern and western Odisha. The crop is seasonal and it comes to market during a specific time of the year. Hence, continuous price data for cotton is not available on the AGMARKNET website. To make a meaningful assessment of the performance of the electronic market average price of cotton has been taken into consideration. It can be seen from Table 3.11 that the average price of cotton was Rs. 4211.44 per quintal before e-NAM and it has increased to Rs. 5033.05 per quintal after the introduction of e-NAM.

### Green gram

Table 3.11 demonstrates the average changes in green gram price for both pre-eNAM and post-eNAM. Secondary data for green gram has been compiled from AGMARKNET for Kendupatna market of Odisha. The table shows that the mean price of green gram was Rs. 4998.92 per quintal before e-NAM which has increased to Rs. 5398.01 per quintal after the introduction of e-NAM. The value of standard deviation shows that variability in the price of green grams has declined significantly after the implementation of e-NAM in regulated agricultural markets.

### Cashew nuts

Figure 3.12 demonstrates the trend of the price of cashew nuts in Parakhemundi market between 2012 to 2020. It can be seen from the figure that the price of cashew nuts has increased from January 2016 onwards. The average price of cashew nuts was Rs. 7870.12 per quintal before e-NAM which has increased to Rs. 13258.93 per quintal after e-NAM. The price volatility for cashew nuts in the market has declined after the introduction of e-NAM.

To conclude the average price of all the crops that has taken into consideration for the study has increased during the post-eNAM period. But some of the sample farmers argued that the price of most of the crops has increased during the recent period due to a decline in production and it is not because of the introduction of e-NAM. For example in 2017-18 due to a decline in rainfall and severe pest attack food grain production has declined significantly in Odisha. Total foodgrains production has fallen from 116.82 Lakh MT in 2016-17 to 84.82 Lakh MT in 2017-18. Only rice production has decreased by 33 per cent in 2017-18. But pulses were the only crop in which production has significantly increased in 2017-18 (Economic Survey 2018, Government of Odisha).

### 3.7 Issues of Price Volatility during Pre and Post e-NAM Periods

The issue of price volatility or instability is considered a major problem in the Indian agricultural markets. In simple terminology, volatility means variations in economic variables over a period of time. Agricultural price volatility means fluctuations in agricultural prices in both upward and downward directions. Some economists argued that small variations in price are the basic requirement for the smooth functioning of the agricultural markets but when price fluctuation is very high and unpredictable that creates problems to achieve prosperity in the sector (Aye, 2015).

Price volatility in various e-NAM enabled markets for five different crops has calculated based on secondary monthly time series data compiled from AGMARKNET. The change of price volatility has empirically estimated by comparing pre-eNAM and post-eNAM. Secondary data from June 2012 to April 2016 has taken as Pre-eNAM and May 2016 to May 2020 as Post-eNAM.

Price volatility has calculated by using the standard deviation of the log of  $(P_t/P_{t-1})$

Where  $P_t$ = Price of the crop in the current month

$P_{t-1}$ = Price of the crop in the previous month

**Table 3.12** Details of price volatility before and after the introduction of e-NAM in Odisha

Crop	Pre-eNAM	Post-eNAM
Maize	0.0256	0.0177
Turmeric	0.0353	0.0559
Cashew nuts	0.0587	0.0284
Brinjal	0.1341	0.1714
Tomato	0.1736	0.1884

Source: AGMARKNET

Table 3.12 shows the changes in price volatility for different crops before and after the implementation of e-NAM. It can be seen that the price volatility has decreased after e-NAM for maize and cashew nuts. But for the other three crops i.e. turmeric, brinjal, and tomato price volatility has increased after the implementation of e-NAM. Tomato is the most volatile crop during the time of both pre-eNAM and post-eNAM among all the five crops that have chosen to estimate price volatility in selected e-NAM enabled markets of Odisha. Brinjal price is the second most volatile crop after tomato price during the time of both pre-eNAM and post-

eNAM. Price volatility has not been estimated for cotton and green gram due to the unavailability of continuous secondary monthly data in the AGMARKNET.

Seasonal and perishable crops like onion, potato, tomato, and mango witnessed comparatively more price volatility as compared to other crops. Paddy, wheat, mustard, and cotton are the stable crops where there is not much price variation in the context of Haryana state electronic national agricultural markets (Sekhar and Bhat, 2018). So, the conclusion of the present study also substantiates with the result of existing literature that there is more instability in perishable and seasonal crops price in Odisha state in both pre-eNAM and post-eNAM.

### **3.8 Major Findings**

The distribution of e-NAM integrated agricultural markets is not identical across the states and Union Territories of India. Rajasthan, Gujarat, Maharashtra, and Uttar Pradesh constitute 51 per cent out of the total e-NAM enabled markets. There are only 1.66 crore farmers have registered to trade with this new platform of agricultural marketing (SFAC, June 2020) which needs to increase. Unawareness among farmers and inadequate skilled manpower is considered as the major obstacle to achieving success in electronic national agricultural markets (NIAM, 2019 and OSAMB, 2017). More numbers of FPOs are required to participate with e-platform to provide better prices to small and marginal farmers.

Odisha is a leading state to proliferate the benefits of e-NAM among farmers and traders. But OSAMB has not included some of the major crops grown in the state to trade with e-NAM enabled markets. Secondary data has compiled from OSAMB shows that the proportion of participated farmers out of total registered farmers is less in most of the markets except Bahadajhola, Kantabanji, Sakhigopal, and Tikabali market. The study concludes that only one-fifth of registered farmers have participated in e-NAM enabled markets in Odisha state. The participation of traders in the e-NAM facilitates markets have declined in all the markets of Odisha in 2019 as compared to previous years.

Crop arrival is one of the most important indicators to assess the performance of agricultural markets. But the present study empirically proved that the mean arrival has declined for green gram, cashew nuts, maize, brinjal, and tomato and it has increased for only cotton and turmeric. Crop arrivals also have declined in five different markets of Odisha in 2019 as compared to previous years. But it is a positive sign that the average price of all the crops that have taken into consideration for the study has increased during the time of post-eNAM as compared to pre-eNAM. But most of the sample farmers argued that the price of the crops in recent times

has increased due to the decline in total production and not due to the introduction of electronic platforms in agricultural markets.

The study concludes that price volatility has decreased after the introduction of e-NAM for maize and cashew nuts. But price instability has increased for turmeric, brinjal, and tomato after the introduction of e-NAM. The conclusion of the present study about price instability of agricultural products substantiates with the conclusion of an earlier study that volatility is more in the case of seasonal and perishable crops (Sekhar and Bhat, 2018).

## **Chapter-4 SOCIO-ECONOMIC CHARACTERISTICS OF SAMPLE FARMERS AND TRADERS IN BALANGIR AND KORAPUT DISTRICTS OF ODISHA**

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### **4.1 Introduction**

Agriculture is an important source of livelihood for human being since immemorial time. In India, agriculture has been providing employment to a large proportion of the rural population for many decades. But at the time of independence, India was not self-sufficient in food grain production required to feed its population. India had to import food grains from the developed countries for example USA by the agreement of Public Law 480 (PL-480) (Jodhka S., 2020). Foodgrains production has increased significantly from 50.82 million tonnes in 1951-52 to 285.21 million tonnes in 2018-19 (Agricultural Statistics at Glance 2019, Ministry of Agriculture and Farmers Welfare, Directorate of Economics and Statistics, Government of India). But despite that, a major proportion of Indian farmers lives below the poverty line, and about 40 per cent out of total farmers do not like farming because of the emergence of distress in the recent past as per the findings of NSSO 59<sup>th</sup> round.

About two-third of Indian farmers whose family consumption expenditure is more than their net income from cultivation (NSSO 70<sup>th</sup> round). This adversely affects to make huge investment in the sector. Agrarian distress has arisen due to low productivity, unfavorable terms of trade, declining average land holding, indebtedness among farmers, volatile crop price, and inefficient agricultural markets etc. (Bhoi and Dadhich, 2019).

Workers are the essential factors of production in the agriculture sector. Hence, better socio-economic condition of farming class is considered as pre-requisite to achieve prosperity in the sector and for holistic economic development. It also helps to make an egalitarian society, especially in rural areas. Improvement in agricultural growth, agricultural wages, non-farm employment, and terms of trade have immensely contributed to strengthening the rural economy of India (Bathla, 2017).

In the agriculture sector of most of the developing countries of the world, there is yield and marketing risks due to climate change, seasonal nature of crops, the difference in land fertility, geographical variation, natural disaster, the existence of imperfect markets, absence of required efficient of financial services, lack of information, and bargaining power (Ullah, 2016).

There are many plans and policies formulated by the Government of India to address these problems. The initiatives, among others, include the Minimum Wage Act (1948), Abolition of Bonded Labour (1976), Rural Landless Employment Guarantee Programme (1983), Swarna

Jayanti Grama Swarojgar Yojana (1999), Mahatma Gandhi National Rural Employment Guarantee Act (2005), National Food Security Mission (2007), and Rashtriya Krishi Vikas Yojana (2007) to enhance the socio-economic conditions of rural inhabitants. But still, there is wage discrimination exists in the agriculture sector based on religion, caste, sex, region, and nature of the work (Bhalla, 2007). Wages paid to laborers in the non-farm sector are significantly higher than the farm sector because of differences in productivity. In agriculturally developed states like Punjab, Kerala, Haryana, and Tamil Nadu wages in both farm and the non-farm sector is more as compared to agricultural underdeveloped states (ibid).

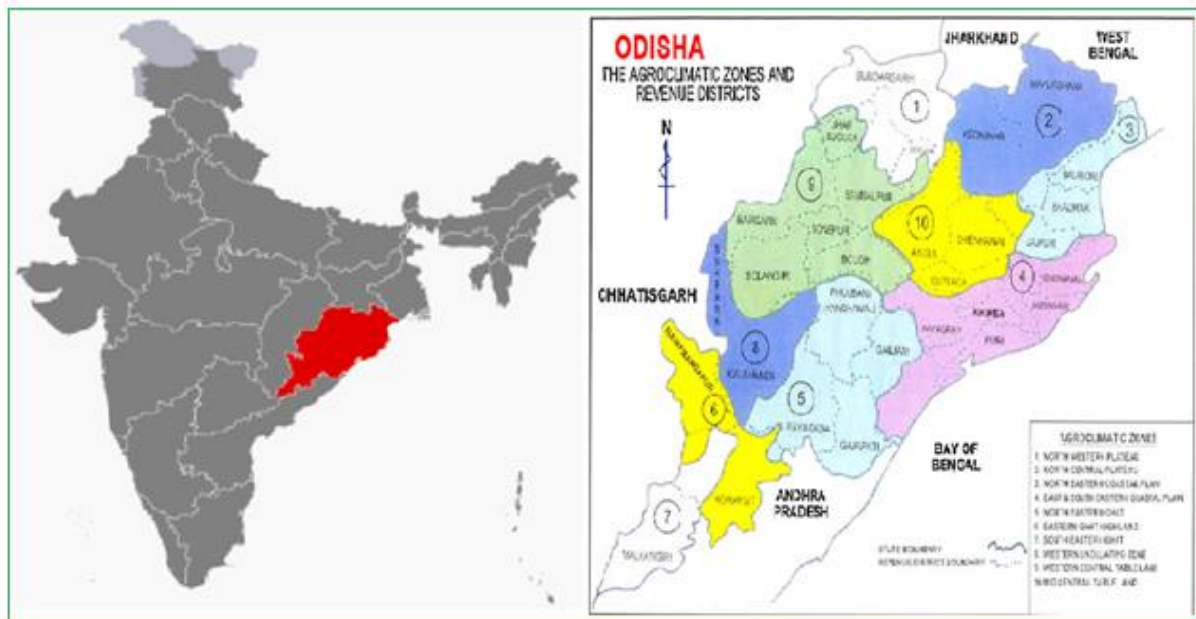
Odisha is considered as one of the backward states of India in terms of various economic indicators but rich in natural resources. The state is primarily based on agriculture for its development. In Odisha, the average monthly income of agricultural households has increased from Rs. 4,976 in 2012-13 to Rs. 7,731 in 2016-17 (Economic Survey 2018, Government of Odisha). But a survey conducted by NABARD revealed that 54 per cent of agricultural households in the state are indebted as against 47 per cent at the national level (NABARD, 2017).

This chapter provides the socio-economic characteristics of the sample districts. Socio-economic characteristics of sample households are also assessed through their cropping patterns, demographic profile, level of education, income sources, landholding, ownership of farm machinery, ownership of livestock, and borrowing from institutional and non-institutional sources.

## **4.2 Odisha State and its Agro-climatic Zones**

Figure 4.1 shows the location of Odisha state in India map and the agro-climatic zones of the state. Odisha state is located in the south-eastern part of the country. It is the 8<sup>th</sup> largest state by area and 11<sup>th</sup> largest area by population (Population Census, 2011). The state is geographically subdivided into thirty districts, ten different agro-climatic zones, and three revenue divisions. The sample districts (Balangir and Koraput) are located in two different agro-climatic zones of the state.

**Figure 4.1** The agro-climatic zones of Odisha state



Source: Department of Forest and Environment, Government of Odisha<sup>7</sup>

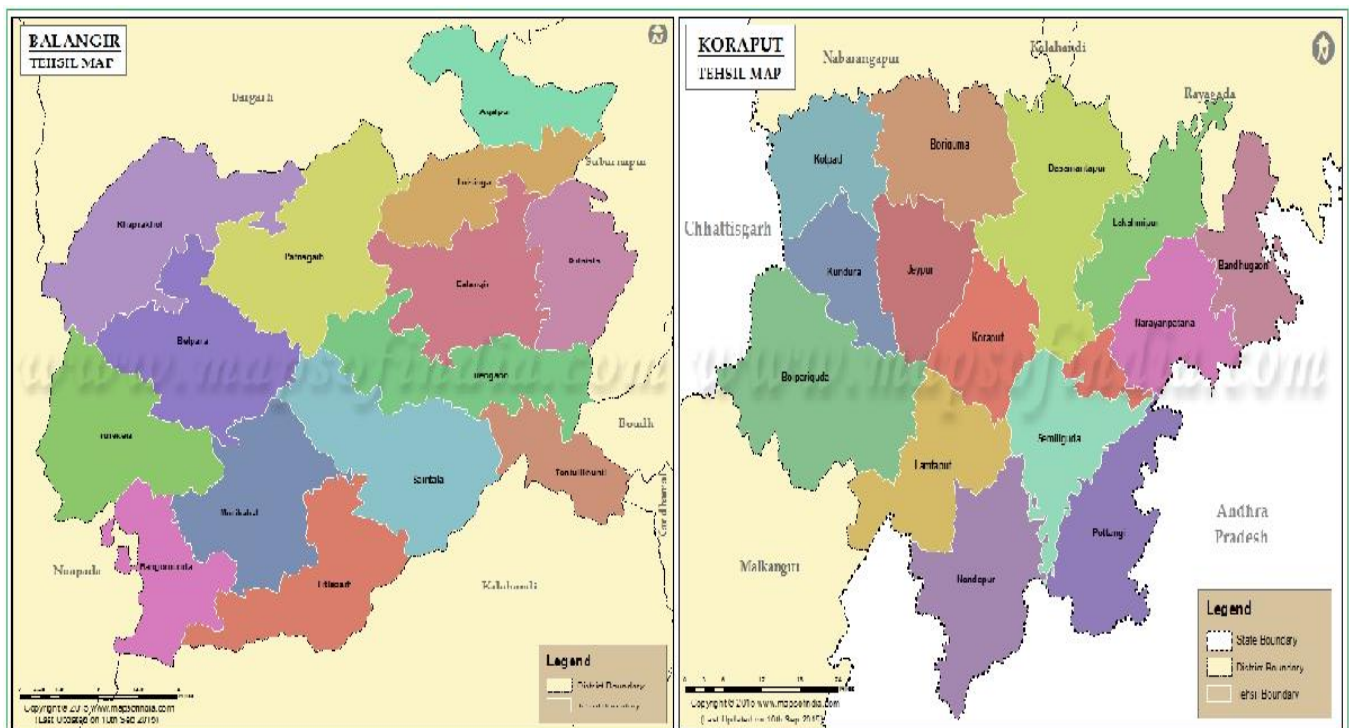
Odisha Economy primarily depends upon agriculture for its development. As per the 2011 Population Census, about 83.31 per cent of the state population lives in rural areas whose primary source of livelihood is agriculture. Odisha has transformed from a food deficit state to a food surplus state. Paddy, pulses, oilseeds, and vegetable production have increased threefold during the last four decades in the state. But the socio-economic conditions of farmers have not improved as it could have due to agricultural crop price volatility, long marketing channel, and the existing disparities in agricultural production and productivity in different parts of the state (Patra, 2015).

<sup>7</sup> Characteristics of Agro Climatic Zones of Odisha  
<https://odishaahvs.nic.in/upload/files/Agro-climatic-zones.pdf>

### 4.3 Socio-Economic Characteristics of Balangir and Koraput Districts

Odisha state has 30 districts and 10 agro-climatic zones delineated based on soil types, topography, rainfall, and cropping pattern. Balangir and Koraput districts are located in the western and southern parts of the state, respectively. These two districts have been chosen for primary survey because both of the districts located in two different agro-climatic zones and the volume of agricultural crop transactions by e-NAM enabled markets of these districts are more as compared to other e-NAM enabled markets in the state.

**Figure 4.2** Balangir and Koraput district map



Source: <https://www.mapsofindia.com/maps/odisha/tehsil/balangir.html>

<https://www.mapsofindia.com/maps/odisha/tehsil/koraput.html>

These districts come under the KBK region (Kalahandi, Balangir, and Koraput). This region has been defined as the most backward region of the state based on different socio-economic criteria by the planning commission in 1992-93<sup>8</sup>. A large proportion of the rural population of this region lives below the poverty line and suffers from food insecurity. Most of the inhabitants of this area heavily depend upon agriculture and forest for their livelihood.

<sup>8</sup>Koraput, Balangir and Kalahandi (KBK) districts have been sub-divided into eight different districts: Koraput, Malkangiri, Nabarangpur, Rayagada, Balangir, Subarnapur, Kalahandi, and Nuapada in 1992-93 for better administration.



Balangir district is geographically spread with 6,575 square km which constitutes 4.22 per cent of the state territory. A total of 16.49 lakhs people live in the district out of which 11.97 per cent lives in the urban areas and the rest 88.03 per cent lives in the rural areas. The density of the population in the district is 251 per square km and 64.72 per cent out of the total population in the district are literate against 72.87 per cent in the state. Out of the total population of the district, 17.88 per cent belong to Scheduled Caste (SC) and 21.05 per cent of people belong to Scheduled Tribe (ST) categories (Population Census, 2011). Balangir district constitutes 12.11 per cent of the total net sown area of the state in 2014-15 (District Statistical Hand Book Balangir 2015, Directorate of Economics and Statistics, Government of Odisha).

Koraput district is geographically spread with 8,807 square km which accounts for 5.66 per cent of the state territory. The district share 3.29 per cent of the state population. Out of the total population of the district, 16.39 per cent lives in urban areas and 83.61 per cent lives in rural areas. The density of the population in the district is 157 per square km and only 49.21 per cent of the population in the district are literate. Koraput is the third-lowest district based on literacy rate in the state. Out of the total population of the district, about 14.2 per cent belong to SC and 50 per cent belong to ST categories (Population Census, 2011). Koraput district is famous for its traditional cultivation system<sup>9</sup>.

In Balangir district, Kantabanji e-NAM and Balangir RMC and in Koraput district Kunduli e-NAM, and Jeypore RMC were selected as sample markets to collect primary data and to make a comparative assessment of performance between e-NAM and RMC.

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<sup>9</sup> The Traditional Agricultural System of Koraput district declared as a Globally Important Agricultural Heritage System (GIAHS) site by 99<sup>th</sup> Indian Science Congress held in 2012 at KIIT University, Bhubaneswar.

**Table 4.1** Pattern of land utilization in sample districts (2018-19)

Particulars	Balangir		Koraput	
	Area (000 Ha)	% share in Odisha	Area (000 Ha)	% share in Odisha
Geographical area	679	4.36	881	5.66
Net sown area	314	5.89	253	4.74
Forest area	154	2.65	188	3.23
Misc. trees and Grooves	4	1.20	17	4.97
Permanent and pasture	46	9.31	45	9.11
Cultivable waste	18	4.80	44	11.73
Land put in non-agri. use	53	4.08	54	4.16
Barren and uncultivable	23	2.74	210	25.00
Current fallow	32	3.77	51	6.01
Other fallow	13	5.68	19	8.30

Source: DAFP, Odisha

Table 4.1 demonstrates that geographically Koraput district is much larger than Balangir district. But Koraput district has 61 thousand hectares less Net Sown Area (NSA) as compared to Balangir district because of the presence of hilly and mountain area, cultivable wasteland, and more barren and uncultivable land. The table shows that NSA in Balangir district is 314 thousand hectares which constitute 5.89 per cent out of the total NSA of the state. Koraput district has 253 thousand hectares NSA which is 4.74 per cent out of the total NSA in the state.

Forest is a major source of livelihood for a large proportion of the population in Koraput district and the district has 154 thousand hectares of forest land which constitutes 5.89 per cent out of the forest area in Odisha. In Balangir, it is 188 thousand hectares which share 3.23 per cent of the state. There is not much difference between these sample districts based on permanent pasture and land put in non-agricultural use. But, Balangir district has 26 thousand hectares less than Koraput district in terms of the cultivable wasteland.

Koraput district share a large proportion of barren and uncultivable land of the state. The district has 210 thousand hectares of barren and uncultivable land which is about 25 per cent of the state. But, it is only 23 thousand hectares in Balangir district. In terms of current fallow, Koraput district has 19 thousand hectares more area than Balangir district.

Therefore, it can be concluded from Table 4.1 that Balangir district has better and optimum use of land resources than Koraput district except for forest area and land put in non-agricultural use proportionately.

**Table 4.2** Classification of farmers by landholding in sample districts

Classification of farmers	Balangir District				Koraput District			
	Operational Holding	% Share	Operated Area (Ha)	% Share	Operational Holding	% Share	Operated Area (Ha)	% Share
Marginal Farmers	158356	69.35	96662.18	38.54	88869	55.92	55579.12	25.64
Small Farmers	48567	21.27	80415.93	32.07	42540	26.76	66876.93	30.85
Semi-medium Farmers	17449	7.64	48541.26	19.35	23532	14.81	65156.17	30.06
Medium Farmers	3730	1.63	21117.44	8.43	3648	2.30	19856.31	9.17
Large Farmers	247	0.11	4024.83	1.61	337	0.21	9279.38	4.28
Total	228349	100	250761.65	100	158926	100	216747.91	100

Source: Agricultural Census<sup>10</sup> 2015-16

There is 86.20 per cent of farmers who fall in the category of small and marginal in India (Agricultural Census, 2015-16). Their role is more pivotal for increasing agricultural growth through production and productivity, and thereby achieving food security, and reducing the incidence of rural poverty. The literature demonstrates that less chance to access institutional credit, presence of imperfect markets for input and output, poor access to irrigation and electricity, lack of education among the farmers, and skill are the major issues and challenges faced by small and marginal farmers in India (NCEUS, 2008)<sup>11</sup>. But despite that, some researchers have found that there is an inverse relationship between farm size and productivity in India. The argument behind this statement is that in small size of landholding farm labour can be optimally used and the land can be intensively cultivated (Rudra and Sen, 1980).

It can be observed from Table 4.2 that in both the sample districts, small and marginal farmers constitute a large bulk in terms of both operational holding and operated area. In Balangir district, 90.62 per cent and in Koraput district, 82.68 per cent of total farmers classified as small and marginal based on operational holding against 92.98 per cent in Odisha. But, in terms of the operated area, Balangir district constitutes 70.61 per cent whereas, in Koraput district, it is 56.46 per cent against 74.93 per cent in the state. So, it can be concluded that there is more number of small and marginal farmers in Balangir district than Koraput district in terms of both operational holding and operated area (Agricultural Census, 2015-16).

The presence of semi-medium farmers in Koraput district is twice that of Balangir district based on operational holding. As per the operated area 19.35 per cent of farmers regarded as

<sup>10</sup> Marginal farmers (< 1 Ha), Small farmers (1-2 Ha), Semi-Medium farmers (2-4 Ha), Medium farmers (4-10 Ha) and Large farmers (> 10 Ha).

<sup>11</sup> National Commission for Enterprise in the Un-organized Sector (NCEUS) created by the government of India in 2004 to deal with the issues and challenges in the unorganized sector.

semi-medium in Balangir district and Koraput district it is 30.06 per cent. There are not many differences existing between both the sample districts based on the share of medium farmers in terms of both operated area and operational holding.

The percentage share of large farmers in both the districts is approximately same based on operational holding but some differences exist based on the operated area. The average size of operational holding in the state had reduced to 0.95 Ha in 2015-16 as compared to 1.04 Ha in 2010-11 (Agricultural Census, 2015-16).

**Table 4.3** Details of production of major crops in Balangir and Koraput districts (2018-19)

Crop	Balangir		Koraput	
	Production (000 MT)	% share in Odisha	Production (000 MT)	% share in Odisha
Paddy	415.51	3.55	527.03	4.50
Wheat	0.02	0.56	0.07	1.94
Maize	17.38	2.31	71.53	9.50
Finger millet	0.35	0.33	53.11	50.62
Green gram	35.25	8.58	1.62	0.39
Black gram	7.34	3.09	2.27	0.95
Red gram	8.92	9.70	0.93	1.01
Ground nut	14.48	4.20	4.59	1.33
Potato	6.01	2.07	23.40	8.07
Sugarcane	11.84	0.65	532.75	29.38

Source: Directorate of Agriculture and Food Production, Odisha

Table 4.3 shows that paddy is a major crop grown in both the sample districts. Balangir district had produced 415.51 thousand MT and in Koraput district, it was 527.03 thousand MT of paddy which constitutes 3.55 per cent and 4.50 per cent of total paddy production of the state in 2018-19, respectively. It can be observed that wheat is not a major crop in these districts. Balangir and Koraput districts had produced 2.31 per cent and 9.5 per cent of total maize production of the state respectively in 2018-19.

Koraput district is considered the largest producer of finger millet and sugarcane in the state. Out of total finger millet and sugarcane production in the state, the district had contributed 50.62 per cent and 29.38 per cent respectively in the year 2018-19. But the Odisha State Agricultural Marketing Board (OSAMB) has not included finger millet and sugarcane to trade through the e-NAM enabled market in Koraput district. The district is a major producer of potato which constitutes 8.07 per cent out of total potato production in the state.

Balangir district has a significant share in total pulses production of the state. But, Koraput district does not contribute much to pulses production. Balangir district had produced 35.25 thousand MT of green grams and 8.92 thousand MT of red grams which constitutes 8.58 per cent and 9.70 per cent respectively of total production in the state in 2018-19. Balangir district is also regarded as a major producer of groundnut and black grams. But it is surprising to know that the OSAMB has not included pulses, groundnut, and black gram to trade through e-NAM in Balangir district.

India is the second-largest producer of rice after China in the world and rice is considered the main food for more than 70 per cent of India's population. Rice is the most important crop which shares half of the Gross Cropped Area (GCA) of Odisha state and pulses is the second largest crop by the share in GCA. At present Odisha secured 8<sup>th</sup> position among all states of India in terms of rice production. But unfortunately, the policymakers have not included rice in any of the e-NAM enabled markets of the state to trade (Economic Survey 2018-19, Government of Odisha).

**Table 4.4** Information on regulated marketing committees in sample districts

Name of the district	Number of RMC	Number of market yards
Balangir	03	14
Koraput	02	49
Odisha	65	438

Note: List of regulated agricultural markets of all districts given in the Appendix 4.1.

Source: OSAMB, Bhubaneswar

Odisha state government enacted Odisha Agricultural Market Produce Act (OAMPA) in 1956 and it came into existence on 2<sup>nd</sup> August 1957. The first regulated agricultural market was established in Jatnai on 2<sup>nd</sup> April 1958. At present, there are 68 regulated agricultural markets and 428 market yards in the state under the OSAMB. The state government also started 43 Biju Krushak Bazar to enhance the accessibility of agricultural markets by the farmers. But secondary data compiled from OSAMB shows that the distribution of regulated markets, market yards, and infrastructure are not equitable across all the districts of Odisha state.

Table 4.4 exhibits that Balangir district has 3 regulated agricultural markets and 14 market yards which constitute 4.61 per cent and 3.19 per cent of total regulated and market yards in the state respectively. Koraput district has only 2 regulated markets and 49 market yards which

constitute 3.07 per cent and 11.19 per cent of total regulated markets and market yards in the state, respectively.

#### 4.4 Socio-Economic Characteristics of Sample Farmers

Farmers play a crucial role in agricultural production, prosperity, and overall economic development of the nation. Hence, their socio-economic conditions need to be improved to achieve stable economic growth. Socio-economic characteristics reflect the social and economic position of farmers in society. Betterment of farmers helps to access various modern techniques in cultivation which ultimately help to improve their farm income and livelihood. The present study has included selected variables to understand the socio-economic status of farmers in sample agricultural markets. The following two subsequent sections deal with the socio-economic characteristics of farmers and traders in the sample agricultural markets.

**Table 4.5** Distribution of sample farmers based on religion and social group (%)

Market	Social Group				Religion			
	SC	ST	OBC	Total	Hindu	Muslim	Christian	Total
Regulated Market								
Balangir	2.86	40.00	57.14	100	100	0	0	100
Jeypore	34.29	57.14	8.57	100	77.14	0	22.86	100
Overall	18.57	48.57	32.86	100	88.57	0	11.43	100
electronic National Agricultural Market								
Kantabanji	22.86	34.29	42.85	100	97.14	2.86	0	100
Kunduli	22.86	54.29	22.85	100	100	0	0	100
Overall	22.86	44.29	32.85	100	98.57	1.43	0	100

Source: Field Survey

Table 4.5 demonstrates that in all the sample agricultural markets, a large proportion of farmers were from the Hindu religion. In both, the sample regulated agricultural markets out of the total farmers 88.57 per cent were from the Hindu religion and the rest 11.43 per cent from the Christian religion. In Balangir market, all sample farmers and in Jeypore market, 77.14 per cent were from the Hindu religion only.

But, in sample e-NAM enabled markets all sample farmers were from the Hindu and Muslim religion. In Kunduli market, all the sample farmers were from the Hindu religion only whereas in Kantabanji market it was 97.14 per cent, and the rest 2.86 per cent were from the Muslim religion. In overall e-NAM enabled markets 98.57 per cent of sample farmers were from the Hindu religion and the rest 1.43 per cent were from the Muslim religion.

The share of Other Backward Class (OBC) farmers in both sample regulated agricultural markets and e-NAM enabled markets are approximately the same. About 48.57 per cent of sample farmers in regulated markets and 44.29 per cent in e-NAM enabled markets were from ST categories. Regulated markets have 4.29 per cent less SC population than electronic markets.

**Table 4.6** Average household size of sample farmers

Market	SC	ST	OBC	Total
Regulated Market				
Balangir	4.00	4.86	5.30	5.09
Jeypore	6.00	5.40	5.67	5.63
Overall	5.85	5.18	5.35	5.36
Electronic National Agricultural Market				
Kantabanji	4.25	5.50	5.14	5.06
Kunduli	5.75	5.47	5.13	5.46
Overall	5.00	5.43	5.14	5.26

Note: No single sample farmer belonged to the general category.

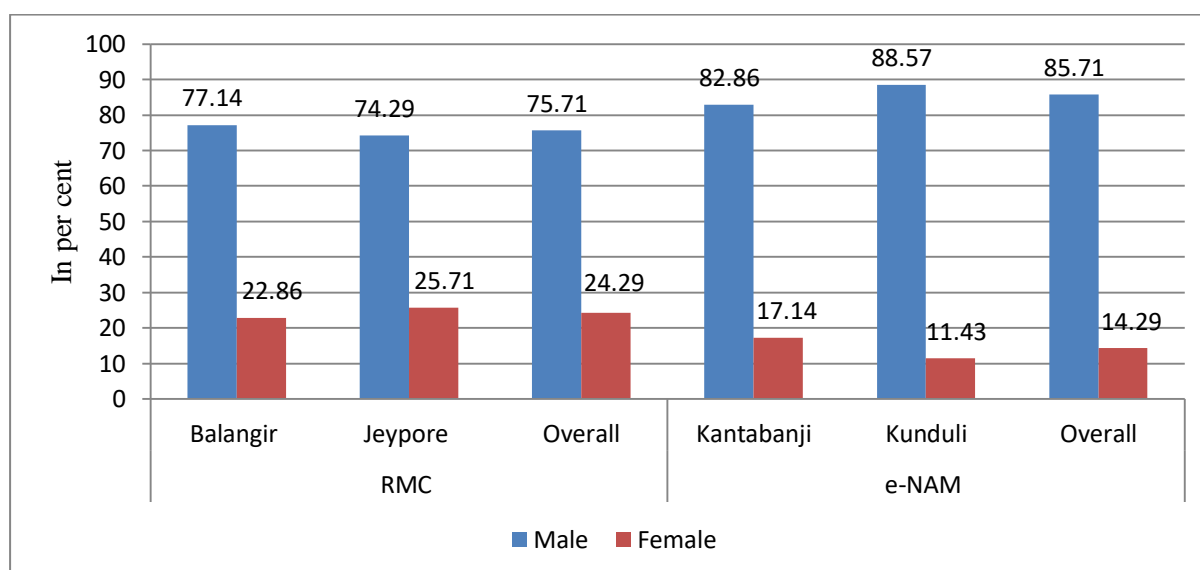
Source: Field Survey

Primary information related to the average household size of the sample farmers has given in Table 4.6. The table shows that there was not much divergence in mean household size for all three social categories in between individual regulated agricultural markets and e-NAM enabled markets.

The mean household size of sample farmers in overall regulated markets was 5.36 and for farmers participated in electronic national agricultural markets, it was 5.26. Within the regulated markets some differences exist in mean household size for SC and ST social groups. But there were very few differences between mean household sizes for OBC categories farmers.

Table 4.6 explains that in case of individual electronic national agricultural markets also there were not many differences in terms of mean household size based on ST and OBC categories. But mean household size for SC categories sample farmers in Kantabanji market was slightly lower than Kunduli market. So, broadly it can be concluded that there is not much divergence between sample farmers in various markets in terms of mean household size across all the social categories.

**Figure 4.3** Sex composition of sample farmers in different markets



Source: Field Survey

It can be seen from Figure 4.3 that the participation of male and female farmers is not equal in any of the agricultural markets. The proportion of male farmer's participation was more than female farmers in all sample markets. Among the individual regulated markets, Jeypore market had slightly higher female participation as compared to Balangir market. In overall sample regulated markets, the composition of male and female farmers was 75.71 and 24.29 per cent participation, respectively.

Between the electronic national agricultural markets also Kantabanji market had 5.71 more female farmer's participation as compared to Kunduli market. Kunduli market had 88.57 per cent share of male farmers' participation and in Kantabanji market it was 82.86 per cent.

But interestingly it can be concluded from Fig. 4.3 that in the overall regulated agricultural markets the female farmers have 10 per cent more participation than the electronic national agricultural markets. The huge differences in female farmer's participation can be attributed to more computerized work in the electronic platform because it is also true that the level of formal education among female farmers is significantly less as compared to their male counterparts.



**Table 4.7** Average number of family labour engaged in agriculture

Market	SC	ST	OBC	Total
Regulated market	3.38	2.88	2.83	2.96
e-NAM	2.56	3.06	2.65	2.81
Overall	2.93	2.97	2.74	2.89

Source: Field Survey

In most of the developing countries of the world, family contributes a large part to factors of production for agricultural activities in the form of labour because a large proportion of cultivators are small and marginal landholders whose financial strength is not enough to use wage labour. It helps to reduce the cost of cultivation for many farmers and simultaneously it helps to make intensive cultivation to enhance agricultural productivity.

It can be observed from Table 4.7 that there was not much difference in both types of markets in terms of the average number of family members engaged in cultivation from OBC categories. In the case of the electronic market, the average number of family members was highest from the ST category, and from the SC category, it was lowest.

It can be observed that the average number of family members engaged in agriculture for all the social groups taken together for overall regulated markets was 2.96 and in the electronic enabled markets it was 2.81. Hence, it can be concluded from the table that there is not much difference across all the social groups in terms of the average number of family labour engaged in agriculture in both types of markets.

**Table 4.8** Information on experience in cultivation (In years of cultivation)

Market	Mean	Standard deviation	Minimum	Maximum
Regulated Market				
Balangir	23.29	9.42	8	45
Jeypore	18.97	10.07	2	40
Overall	21.13	9.93	2	45
Electronic National Agricultural Market				
Kantabanji	21.60	12.11	3	52
Kunduli	15.34	10.34	3	45
Overall	18.47	11.61	3	52

Source: Field Survey

Some of the existing literature based on e-NAM enabled markets have empirically proved that experience in agricultural activities is considered as one of the important determinants which positively influence farmers to participate in the electronic agricultural markets.

Table 4.8 gives information about the experience of sample farmers in agricultural activities. Mean years of cultivation by sample farmers in both regulated and electronic markets were 21.13 and 18.47, respectively. It can be observed from the value of the standard deviation that there was much variation in the electronic markets as compared to the regulated markets. Minimum years of experience in cultivation by sample farmers in the regulated market and electronic agricultural markets were 2 and 3 years, and a maximum 45 and 52 years, respectively.

So, it can be concluded that as per the primary data analysis of market participants in both the markets the minimum and maximum years of experience in cultivation is lowest among the participants in the regulated markets and highest in electronic enabled agricultural markets.

**Table 4.9** Education profile of sample farmers (%)

Level of education	Regulated market			e-NAM market			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Illiterate	15.09	35.29	20.00	15.00	20.00	15.71	15.04	29.63	17.86
Pre-primary	24.53	29.41	25.71	26.67	10.00	24.29	25.66	22.22	25.00
Upper primary	15.09	17.65	15.71	20.00	20.00	20.00	17.71	18.52	17.85
Secondary	37.74	17.65	32.86	30.00	40.00	31.42	33.63	25.93	32.14
Higher secondary	5.66	0	4.29	3.33	10.00	4.29	4.42	3.70	4.29
Graduation and above	1.89	0	1.43	5.00	0	4.29	3.54	0	2.86
Total	100	100	100	100	100	100	100	100	100

Source: Field Survey

Note: Data has been collected related to education about the respondent farmers' only<sup>12</sup>.

Some researchers have empirically proved by analyzing primary data based on the context of other states that education and computer knowledge are regarded as the two important determinants that positively influence farmers to participate in the e-NAM enabled markets (Chengappa et al., 2012).

Table 4.9 demonstrates that 20 per cent of the sample farmers in the regulated markets were illiterate as against 15.71 per cent in the electronic enabled markets and it was 17.86 per cent if both types of markets are taken as together. The percentage of sample male farmers having no formal education was approximately equal in both types of agricultural markets. There was more illiteracy among the sample female farmers as compared to male farmers in both types of

<sup>12</sup> Illiterate (No formal education), Pre-primary ( 1<sup>st</sup> to 5<sup>th</sup> class), Upper primary (6<sup>th</sup> and 7<sup>th</sup> class), Secondary (8<sup>th</sup> to 10<sup>th</sup> class), Higher secondary (11<sup>th</sup> and 12<sup>th</sup> class) and Graduation and above (13<sup>th</sup> and above)

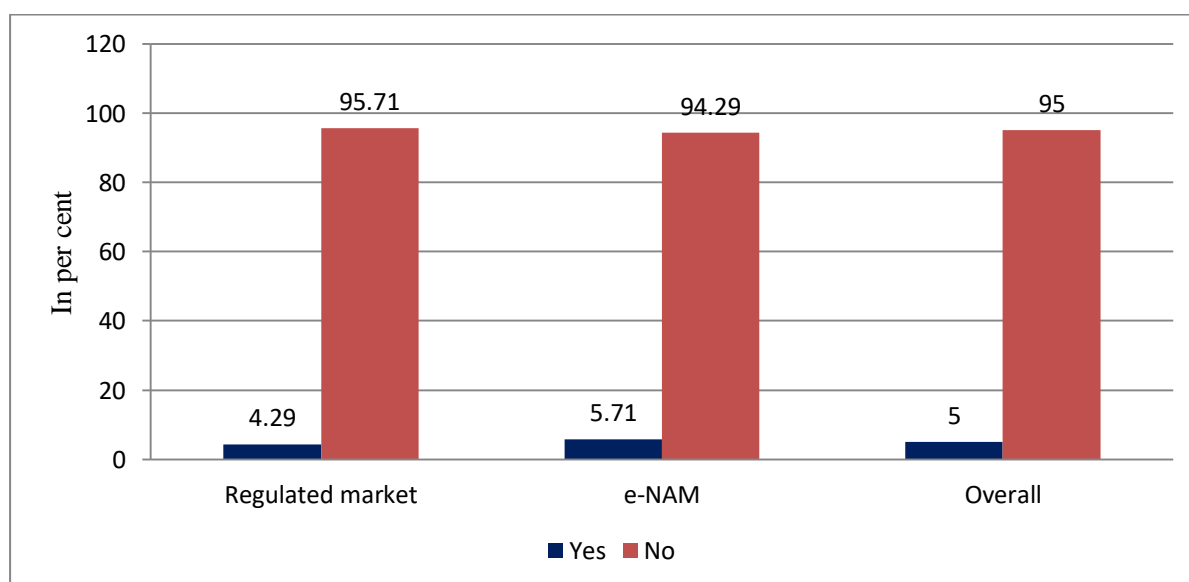
markets. A farmer can effectively trade at the e-NAM enabled markets if adequately well-trained staff employed by the government in these markets.

A large proportion of sample farmers in both types of markets have formal education which includes pre-primary, upper primary, and secondary. About 25 per cent of sample farmers had studied up to pre-primary in both regulated and electronic markets.

There were 15.71 per cent and 20 per cent of sample farmers reported having education up to upper primary in regulated and e-NAM enabled markets, respectively. There was also not much difference existing among sample farmers in the regulated and electronic markets having secondary education.

The analysis shows that there were very few farmers who have formal education up to higher secondary, graduation, and above. Both regulated and electronic markets have approximately the same proportion of farmers studied up to secondary education. But there was only 1.43 per cent of sample farmers in the regulated markets studied up to graduation whereas in the electronic markets it was 4.29. So, broadly it can be concluded that the participation of educated farmers in the electronic markets is to some extent higher than the regulated markets.

**Figure 4.4** Awareness about computer knowledge of sample farmers in different markets



Source: Field Survey

The major part of marketing work like price checking, quality assessment information, number of traders interested to purchase crop, and payment in e-NAM managed with the help of information technology. So, this new platform of agricultural marketing system requires some basic computer education for both farmers and traders to manage their trade rationally. Due to

the small volume of agricultural production and trade, all stakeholders of the markets cannot employ personal technicians to manage their trade. Well-trained market officials are deployed by the government in all markets to help stakeholders but this is not enough and there is a need to enhance this number.

The ground reality of farmers' computer literacy level shown in Figure 4.4 gives a different picture. This figure provides information about awareness of computer knowledge among the sample farmers in both types of markets. It can be clearly understood from the figure that only 4.29 per cent and 5.71 per cent of sample farmers were aware of basic computer knowledge in regulated and electronic markets, respectively. Overall only 5 per cent of the sample farmers were aware of computer knowledge and the rest of the farmers do not have even basic computer knowledge.

So, the study concludes that it is very difficult to get success in electronic national agricultural markets due to a lack of computer knowledge among the large bulk of farmers unless there is enough staff deployed to manage the trade.

**Table 4.10** Classification of sample farmers by operational landholding (%)

Market	Marginal	Small	Semi-medium	Medium	Large	Total
Regulated Market						
Balangir	20.00	42.86	20.00	14.28	2.86	100
Jeypore	42.86	42.86	14.28	0	0	100
Overall	31.43	42.86	17.14	7.14	1.43	100
Electronic National Agricultural Market						
Kantabanji	14.28	60.00	20.00	2.86	2.86	100
Kunduli	54.29	34.28	5.71	2.86	2.86	100
Overall	34.28	47.14	12.86	2.86	2.86	100

Source: Field Survey

Table 4.10 shows that 62.86 per cent and 85.72 per cent of sample farmers in Balangir and Jeypore regulated agricultural markets categorized as small and marginal, respectively. It was 74.29 per cent in overall sample regulated markets. There was 74.28 per cent and 88.57 per cent of total sample farmers' fall under the same classification in Kantabanji and Kunduli markets, respectively. The table demonstrates that 17.14 per cent of the total sample farmers participated in the regulated market were semi-medium and it was 12.86 per cent in the electronic enabled agricultural markets.

It can be seen from Table 4.10 that the percentage of semi-medium and medium sample farmers in the regulated markets was to some extent higher than e-NAM enabled markets. The

percentage share of large farmers in both types of markets was less as compared to other categories farmers. In overall regulated markets the share of large farmers was 1.43 per cent whereas in the electronic national agricultural markets it was 2.86 per cent.

**Table 4.11** Details of sample farmers average landholding in different market (Area in acre)

Market	Average owned land	Average Leased-in land	Average operational land	Average irrigated operational land
Regulated Market				
Balangir	7.21	1.23	8.09	4.70
Jeypore	4.42	1.00	4.63	2.71
Overall	11.64	2.22	12.72	7.41
Electronic National Agricultural Market				
Kantabanji	5.85	0.82	5.87	2.48
Kunduli	5.42	0.54	5.35	3.14
Overall	11.27	1.36	11.22	5.62

Source: Field Survey

Table 4.11 demonstrates the average landholding profile of sample farmers in different sample agricultural markets. It can be observed that there is not much difference between regulated and e-NAM enabled markets in terms of both average owned land and average operational land. But individually, some differences exist between individual regulated markets and the e-NAM enabled markets. The sample farmers associated with Balangir regulated agricultural market have more average owned and average operational land as compared to farmers of other sample markets. So, it can be concluded that there was not much divergence between regulated and e-NAM enabled markets farmers based on average owned landholding and operational landholding farmers. The table shows that average leased-in land and average irrigated operational land in the regulated markets were higher than the e-NAM enabled markets.

**Table 4.12** Cropping pattern in Balangir district (2018-19) (Area in acre)

Crop	Kharif		Rabi		Total	
	Area (%)	Area (%)	Area (%)	Area irrigated (%)	Area (%)	Area irrigated (%)
Paddy	65.59	69.43	9.66	13.06	52.79	51.39
Wheat	-	-	19.14	25.87	4.38	8.28
Maize	3.97	3.34	8.74	4.66	5.05	3.76
Cotton	10.92	9.33	-	-	8.42	6.35
Onion	-	-	16.15	21.83	3.70	6.98
Groundnut	-	-	8.19	4.98	1.87	1.59
Pulses	-	-	10.43	4.35	2.39	1.39
Vegetables	8.04	8.19	13.34	12.25	9.26	9.49
Others	11.48	9.71	14.35	13.00	12.14	10.77
Total	100	100	100	100	100	100

Note: Other crops include wheat, onion, banana, groundnut, sugarcane, coriander, sunflower, and watermelon.

Source: Field Survey

Table 4.12 explains how farmers had distributed agricultural land to different crop production in Balangir district for both Kharif and Rabi season in 2018-19 agricultural year. The table shows that in 2018-19 farmers had devoted 65.59 per cent to the cultivation of paddy out of total Kharif agricultural land in the district which is highest as compared to other crops. Cotton and vegetables also share a major part of the total kharif crop area. Farmers had devoted 69.49 per cent, 9.33 per cent, and 8.19 per cent out of the total irrigated area to the production of paddy, cotton, and vegetables, respectively.

Paddy, cotton, vegetables wheat, onion, and pulses are the major crop grown by the farmers of Balangir district. Farmers had distributed 25.87 per cent, 21.83 per cent, 12.25 per cent, and 13.06 per cent of irrigated agricultural land towards the production of wheat, onion, vegetables, and paddy respectively in the rabi season.

It can be observed that paddy was considered as the most important crop for which farmers had distributed 52.79 per cent and 51.39 per cent of cropping area and irrigated area respectively both seasons taken together in 2018-19. Wheat, cotton, onion, and vegetables are also considered as major crops grown in the district. But unfortunately, the market officials of the state have included only cotton, onion, and sunflower seeds to make the trade through the electronic national agricultural market in Balangir district.

**Table 4.13** Cropping pattern in Koraput district (2018-19) (Area in acre)

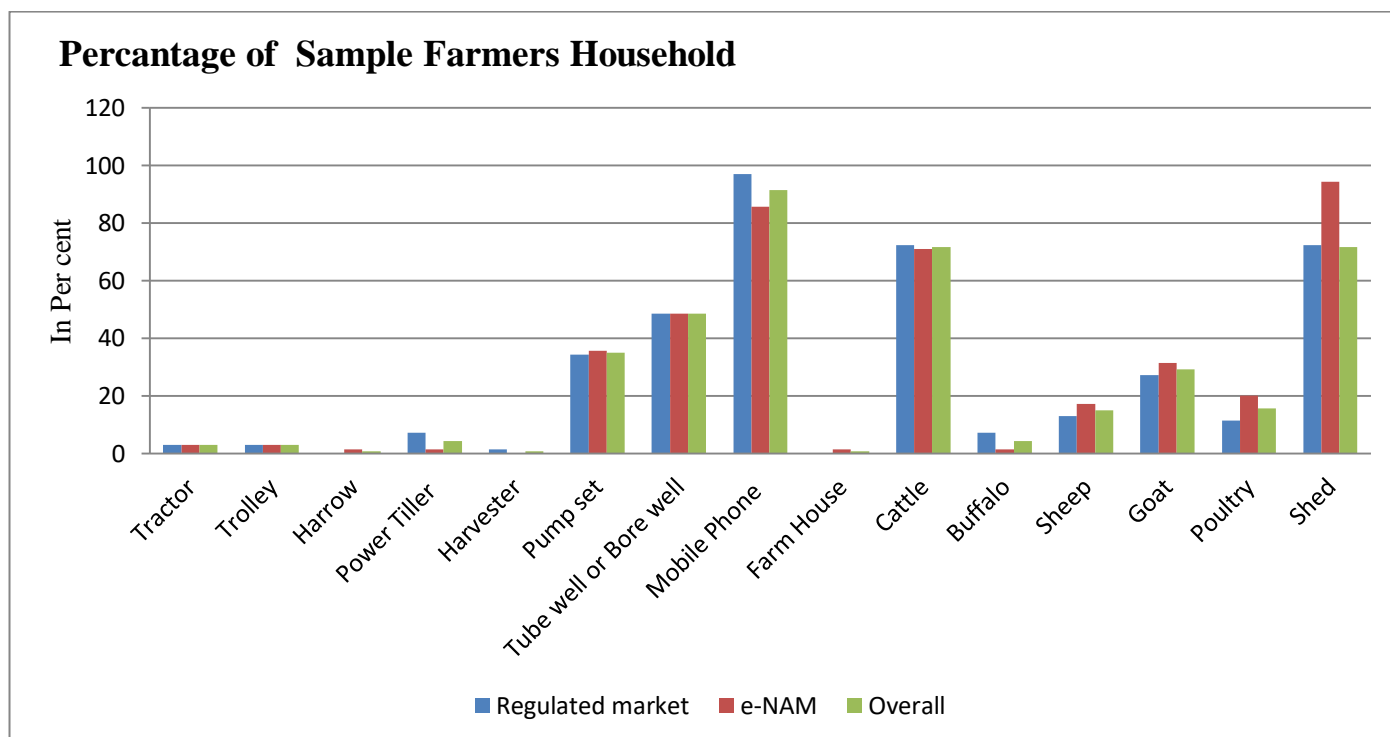
Crop	Kharif		Rabi		Total	
	Area (%)	Area irrigated (%)	Area (%)	Area irrigated (%)	Area (%)	Area irrigated (%)
Paddy	56.36	60.78	31.67	44.01	50.14	55.83
Niger	5.26	3.98	-	-	3.93	2.81
Suan	4.88	4.40	-	-	3.65	3.11
Finger millet	6.31	4.64	-	-	4.72	3.28
Ginger	7.42	8.28	-	-	5.55	5.84
Sweet potato	3.41	1.77	4.54	6.31	3.69	3.11
Pulses	-	-	14.93	8.32	3.77	2.45
Vegetables	9.41	8.87	33.87	27.49	15.57	14.35
Others	6.95	7.28	14.99	13.87	8.98	9.21
Total	100	100	100	100	100	100

Source: Field Survey

Table 4.13 explains about cropping pattern in Koraput district of both kharif and rabi season for the 2018-19 agricultural year. In Odisha major proportion of Gross Cropped Area (GCA) is devoted toward the cultivation of paddy. As per the sample study, about 56.36 per cent and 60.78 per cent of the kharif cropping area and kharif irrigated area respectively were devoted towards paddy cultivation in the Koraput district.

A considerable part of cropping and irrigated areas are distributed toward the cultivation of paddy, vegetables, ginger, finger millet, little millet, and pulses in Koraput district. Kunduli market where the e-NAM enabled market of the Koraput district is located known as the largest vegetable market of Southern Odisha. But the OSAMB has made provision to trade only ginger and sweet potato through e-NAM of Koraput district.

**Figure 4.5** Ownership of farm machinery and livestock by sample farmers (%)



Source: Field Survey

Figure 4.5 demonstrates that among all the assets owned by sample farmers mobile phone has occupied top of the list. Out of total sample farmers, 97.14 per cent and 85.71 per cent of farmers operated in regulated and e-NAM enabled markets, respectively owned mobile phone. The share of sample farmers owned mobile phone in regulated agricultural markets is more than electronic national agricultural markets. In overall markets, 91.48 per cent of sample farmer households have mobile phones. Owning mobile phone is important to operate in the e-NAM enabled markets. So, it's a positive indicator that most of the farmers have mobile phone.

Cattle and shed are considered as the next important assets captured by sample farmers. In overall markets, 48.57 per cent of sample farmers have tube well or bore well. Approximately 35 per cent of sample farmers in both sample markets have owned pump sets. In major part of Odisha state, cultivation is taking place by traditional method. The livestock and allied activities one of the important contributors to farmer's income in Odisha. Hence, sheep, goat, and poultry are also regarded as major assets captured by sample farmers. The study shows that there were very few sample farmers who have assets like the tractor, trolley, harrow, power tiller, harvester, and farmhouse.



**Table 4.14** Information on the income of sample farmers in different markets (Rupees/household)

Market	Income from crop farming				Income from livestock and allied activities				Income from other sources				Total income			
	Mean	CV	Min.	Max.	Mean	CV	Min.	Max.	Mean	CV	Min.	Max.	Mean	CV	Min.	Max.
Regulated Market																
Balangir	85514	119.99	9000	500000	14271	110.96	0	60000	15857	130.63	0	70000	115642	87.68	11500	539000
Jeypore	35085	52.74	8000	78000	5214	110.20	0	25000	28514	84.11	0	100000	68814	37.39	27000	135000
Overall	60300	128.48	8000	500000	9742	130.09	0	60000	22185	104.30	0	100000	92228	83.63	11500	539000
Electronic National Agricultural Market																
Kantabanji	52257	57.07	15000	150000	13528	154	0	90000	18042	107.07	0	60000	83828	65.03	23000	300000
Kunduli	47400	101.42	10000	250000	12414	101.79	0	55000	16600	100.04	0	50000	76414	64.12	15000	280000
Overall	49828	79.85	10000	250000	12971	131.94	0	90000	17321	103.32	0	60000	80121	64.38	15000	300000

Note: Income from other sources includes from MGNREGA work, wage labour, and earning from kendu leaf.

Source: Field Survey

Table 4.14 gives detailed information about the income of sample farmers from crop farming, livestock and allied activities, and other sources for the 2018-19 agricultural year.

Mean income from crop farming for overall sample farmers was Rs. 60,300 whereas it was Rs. 49,828 for those farmers participated in the electronic markets. It is surprising to know that e-NAM farmers had earned Rs. 10,472 less average annual income from crop farming than farmers associated with the regulated markets. The coefficient of variation of income from crop farming in the regulated market was Rs. 128.48 whereas it was Rs. 111.85 in electronic markets. So, there is more income variation in the RMC farmers than the e-NAM farmers. Reported minimum income from crop farming was Rs. 8000 by RMC farmers whereas it was Rs. 10000 by e-NAM farmers. But maximum income earned by regulated market farmers was twice that of electronic market farmers.

Livestock and allied activities are important sources of income for the farming community. Farmers associated with the electronic market had earned Rs. 3229 more average income as compared to regulated market farmers from livestock and allied activities. The value of the coefficient of variation of farmers income from livestock and allied activities shows that there was not much variability between both types of markets. The minimum income from livestock and allied activities was zero for both types of the markets. But there was some differences exist in maximum income earned by the farmers associated with e-NAM which was 50 per cent more than the regulated market farmers.

Due to the uneven distribution of irrigation facilities across different districts of Odisha, it is not possible to work throughout the year in agricultural activities. So, during peak season farmers used to work in the MGNREGA program, employ as wage labour, and collection of kendu leaf. The mean income earned by sample farmers in the overall regulated markets from non-farm activities was Rs. 22,185 as against Rs. 17,321 in the electronic markets. So, there is huge differences exist on average income earned by sample farmers from non-farm activities between both types of markets.

In total income also regulated market farmers had earned Rs. 12,107 more average income as compared to farmers associated with e-NAM. But the value of the coefficient of variation for total income shows that there was more variation among farmers in the regulated markets as against the farmers associated with electronic markets. The maximum total income for sample regulated markets farmers was Rs. 2, 39,000 more than farmers affiliated with the electronic markets.

**Table 4.15** Information on loan borrowed by sample farmers (%) (In 2018-19)

Market	% of farmers taken Loan	Sources of the loan (%)	
		Formal	Informal
Regulated market	52.86	86.49	13.51
e-NAM	40.00	71.43	28.57
Overall	46.43	80.00	20.00

Source: Field Survey<sup>13</sup>

Table 4.15 shows that in the sample regulated markets there were 52.86 per cent of farmers borrowed loans as against 40 per cent in e-NAM enabled markets. In overall markets, 46.43 per cent of sample farmers were in the trap of debt. There were 86.49 per cent of farmers in regulated markets and 71.43 per cent of farmers in electronic markets borrowed loans from the formal source. In total there was 80 per cent out of total debt farmers have borrowed from the institutional source in 2018-19 which is a positive indicator for agricultural prosperity.

**Table 4.16** Amount of loan borrowed by sample farmers in different markets

Market	Numbers of Farmers	Mean Loan (Rs.)	CV (Rs.)	Minimum (Rs.)	Maximum (Rs.)
Regulated Market					
Balangir	21	41333	54.88	10000	80000
Jeypore	16	26812	49.78	10000	70000
Overall	37	35054	57.99	10000	80000
Electronic National Agricultural Market					
Kantabanji	15	68866	148.07	6000	400000
Kunduli	13	36384	106.11	10000	150000
Overall	28	53785	147.87	6000	400000

Source: Field Survey

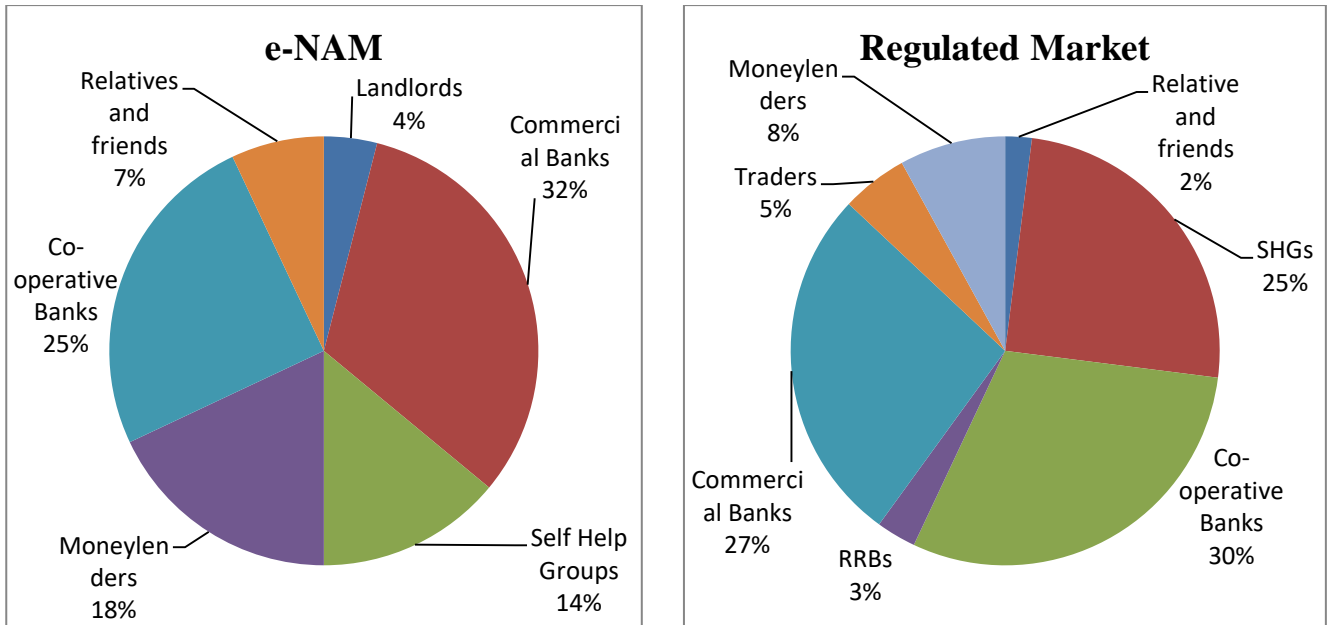
Table 4.16 exhibits the debt profile of farmers in sample agricultural markets. The table demonstrates that more RMC farmers were in debt as compared to e-NAM farmers. In Balangir district, number of farmers were in the debt trap and average loan amount was also relatively high as compared to Koraput district and the reason for this can be attributed to the commercialization of agriculture in the district. It can be understood from Table 4.16 that there is much divergence exist among two type of markets based on the average loan.

Table 4.16 shows that farmers of e-NAM enabled markets had borrowed 53.43 per cent higher average loan than the farmers of regulated markets. It can be observed that there was more variation in debt among the sample e-NAM farmers as compared to RMC farmers. The minimum loan reported from farmers in the electronic national agricultural markets was Rs.

<sup>13</sup> Debt from formal source includes Commercial Banks, RRBs, Co-operative Banks, SHGs and informal sources includes loan from moneylenders, landlords, traders, and relative and friends.

4000 lower than the regulated markets. But there is a huge gap that exists between the regulated markets and e-NAM enabled markets in terms of maximum income. Farmers associated with e-NAM had earned more Rs. 3,20,000 maximum income than farmers associated with RMC.

**Figure 4.6** Sources of the loan of sample farmers in different markets (%)



Source: Field Survey

The role of credit in agricultural activities is more important for the betterment of the sector. Farmers have options to borrow loans from both institutional and non-institutional sources. But the chance of access to credit from institutional sources is not identical for all farmers because of lack of education, lack of collateral, more paperwork, and lack of access to banking institutions in India.

Figure 4.6 demonstrates the share of the institutional and non-institutional sources in total loans borrowed by the sample farmers. It can be observed that farmers associated with the e-NAM enabled markets had received a large part of their loan from the non-institutional source than farmers associated with the regulated markets in the year 2018-19 (Figure 4.6). Co-operative banks, commercial banks, and Self Help Groups (SHGs) have a significant share in the advancement of loan from the institutional source.

#### 4.5 Socio-Economic Characteristics of Sample Traders

The role of traders in marketing activities is essential because they create a linkage between farmers and consumers. Their socio-economic conditions need to be sound for the smooth functioning of agricultural markets.

**Table 4.17** Distribution of sample traders based on religion and social group (%)

Market	Religion	Social Group				Total
		SC	ST	OBC	General	
Regulated Market						
Balangir	100	50.00	10.00	30.00	10.00	100
Jeypore	100	20.00	20.00	40.00	20.00	100
Overall	100	35.00	15.00	35.00	15.00	100
Electronic National Agricultural Market						
Kantabanji	100	10.00	20.00	50.00	20.00	100
Kunduli	100	30.00	10.00	60.00	0	100
Overall	100	20.00	15.00	55.00	10.00	100

Source: Field Survey

Table 4.17 shows the distribution of sample traders in different markets based on religion and social groups. It is visible from the table that all the sample traders were from the Hindu religion only in all the sample markets. But traders were from all the social categories. About 15 per cent and 10 per cent of sample traders were from the General category in sample regulated markets and electronic enabled markets, respectively. The sample regulated market was constituting 20 per cent less OBC category traders than electronic markets. There was 15 per cent of the sample traders in both types of markets constitutes from ST categories. Regulated markets share 15 per cent more SC traders than electronic enabled markets.

**Table 4.18** Mean household size of sample traders in different markets

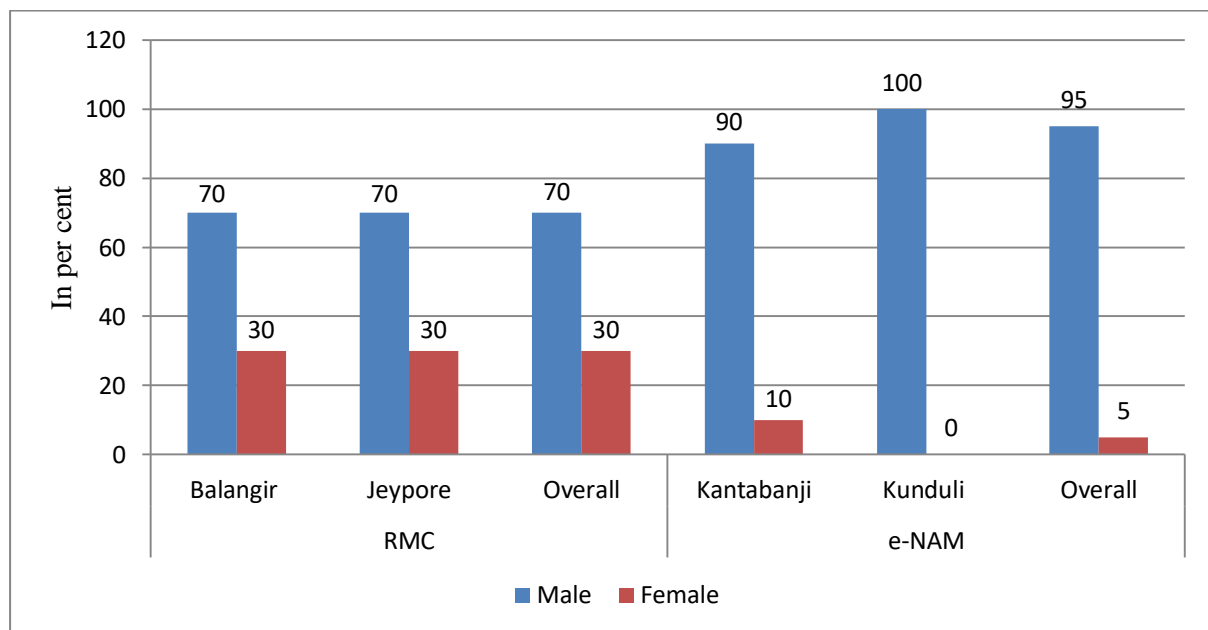
Market	SC	ST	OBC	General	Total
Regulated Market					
Balangir	4.60	3.00	5.33	5.00	4.70
Jeypore	6.00	4.50	4.50	6.00	5.10
Overall	5.00	4.00	4.86	5.67	4.90
Electronic National Agricultural Market					
Kantabanji	3.00	4.50	4.80	7.50	5.50
Kunduli	7.33	5.00	6.67	-	6.70
Overall	6.25	4.67	5.82	7.50	6.10

Source: Field Survey

Table 4.18 demonstrates that in overall regulated markets mean household size of sample traders for the SC category was 5 and it was 6.25 for e-NAM enabled markets. There were not

many differences existing between the regulated and e-NAM enabled markets in terms of mean household size for ST categories. The mean household size for RMC traders belonging to the OBC category was 4.86 and it was 5.82 for e-NAM farmers. There was little difference persisting between the regulated and e-NAM enabled markets in average household size for traders from the general category. In total if all the social categories taken together the mean household size for the overall regulated markets was 4.90 as against 6.10 in electronic markets.

**Figure 4.7** Sex compositions of sample traders in different markets



Source: Field Survey

Figure 4.7 demonstrates the sex composition of traders in sample markets. It can be seen from the figure that in the overall regulated markets there were about 70 per cent male traders and the rest 30 per cent were female traders. It was also equal to sample regulated markets individually. But in overall e-NAM enabled markets there were about 95 per cent of male traders and the rest 5 per cent were female traders. In Kantabanji e-NAM market, there were 90 per cent of sample male traders, and the rest 5 per cent were female traders. But in Kunduli e-NAM market all the sample traders were male and not even a single female trader.

So, it can be concluded that in the regulated markets there is more participation of female traders as compared to electronic national agricultural markets in Odisha state. The reason for this can be attributed to more computerized work in the electronic markets because most of the female traders do not have even basic computer knowledge and formal education which are necessary to manage trade through e-NAM.

**Table 4.19** Average number of a family member of traders engaged in trade activities

Market	SC	ST	OBC	General	Total
Regulated market	1.29	1.33	1.14	1.00	1.20
e-NAM	1.00	1.33	1.18	4.50	1.50
Overall	1.18	1.33	1.17	2.4	1.35

Source: Field Survey

Table 4.19 shows that traders were from all social categories. It can be seen that the average number of family members engaged in trade activities from SC category traders in the regulated markets were more than the electronic markets. There was an equal average number of family members from ST categories involved in trade activities in both types of agricultural markets. For OBC categories also the data does not differ much from one type of market to another. But the average number of family members in trade activities from General categories in regulated markets was 1.00 whereas for electronic markets it was 4.50.

If all the social categories taken together for the regulated markets the average number of family member engaged in trade activities was 1.20 in the case of a regulated markets and it was 1.50 for the electronic markets. So, if both the agricultural markets taken together also the figure of the average number of family members participating in trade activities does not differ much among these two types of markets.

**Table 4.20** Details about the experience in trade (years of participation in trade)

Market	Mean	Standard deviation	Minimum	Maximum
Regulated Market				
Balangir	18	7.72	8	35
Jeypore	13.7	6.86	4	28
Overall	15.85	7.74	4	35
Electronic National Agricultural Market				
Kantabanji	21.7	12.01	10	50
Kunduli	14.4	12.93	2	45
Overall	17.05	13.05	2	50

Source: Field Survey

Existing literature based on the topic demonstrates that experience in trade is considered as one of the major determinants which influence traders to participate in e-NAM enabled markets. Table 4.20 shows that the mean year of a trade-in overall regulated markets was 15.85 years and for the traders of electronic national agricultural markets it was 17.05 years. The minimum year of participation by traders in trade activities was 4 in the regulated markets as against 2 in

e-NAM enabled markets and the maximum year of participation for the overall regulated markets was 35 and for e-NAM enabled markets it was 50.

**Table 4.21** Education profile of sample traders (%)

Level of education	Regulated market			e-NAM market			Overall		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Illiterate	0	16.67	5.00	15.79	0	15.00	9.09	14.29	10.00
Pre primary	7.14	66.66	25.00	10.53	0	15.00	9.09	71.42	20.00
Upper primary	14.29	16.67	15.00	0	100	0	6.06	14.29	7.50
Secondary	71.43	0	50.00	47.37	0	45.00	57.58	0	47.50
Higher secondary	7.14	0	5.00	15.79	0	15.00	12.12	0	10.00
Graduation and above	0	0	0	10.53	0	10.00	6.06	0	5.00
Total	100	100	100	100	100	100	100	100	100

Source: Field Survey

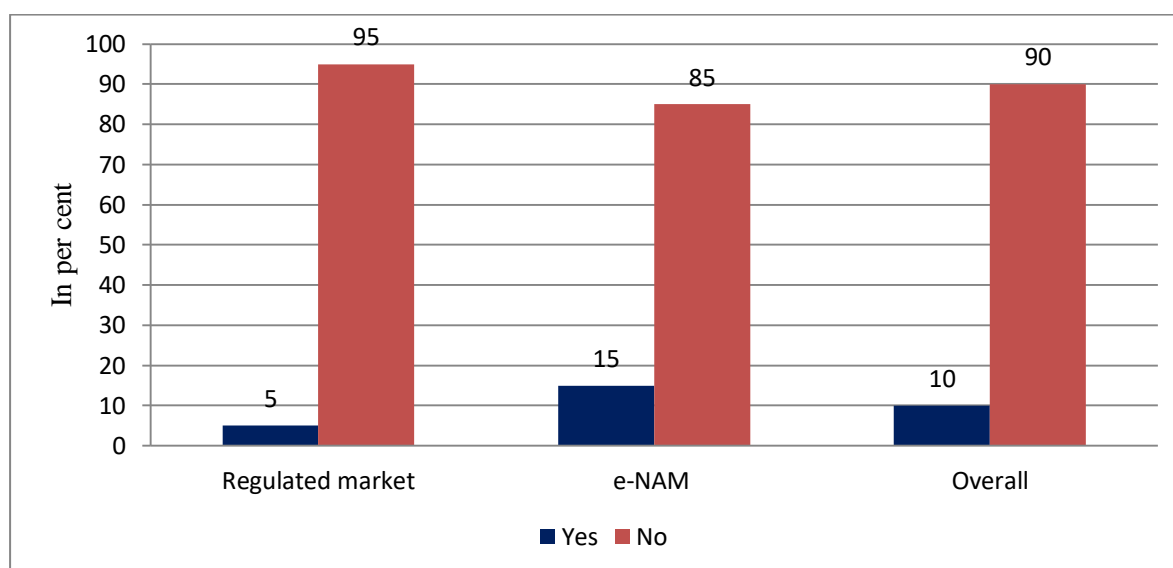
Table 4.21 shows the education profile of sample traders. It can be seen from the table that about 5 per cent out of the total sample traders in the sample regulated markets were illiterate those who do not have any formal education and all these traders were female. In electronic enabled markets there was 15 per cent of illiterate traders. In overall sample markets, there were 10 per cent illiterate traders.

A significant proportion of sample traders in both RMC and e-NAM enabled markets studied up to pre-primary and upper primary level. The table indicates that 40 per cent out of total sample traders in the regulated markets had pre-primary and upper primary education as against 15 per cent in e-NAM enabled markets. The highest per centage of sample traders in both regulated and e-NAM markets have education up to secondary school. Data collected from sample regulated markets shows that there was 50 per cent out of the total sample traders have formal education up to secondary school and it is about 45 per cent for e-NAM enabled markets.

It can be understood from Table 4.21 that very few proportions of sample traders have formal education up to higher secondary, graduation, and above. Only 5 per cent out of the total sample traders from the regulated markets have education up to higher secondary school as against 12.12 per cent in the electronic markets. In sample regulated markets, not even single traders have formal education up to graduation and above. But 10 per cent out of the total sample traders in the electronic markets had formal education who studied up to graduation and above. Overall only 5 per cent of traders had education up to graduation and above in the sample agriculture markets.



**Figure 4.8** Awareness about computer knowledge of sample traders in different markets



Source: Field Survey

The major part of trade activities in electronic national agricultural markets takes place through computers and internet. It is a pre-requisite to have some basic computer knowledge among stakeholders to trade through e-NAM.

But the ground reality speaks some different picture. Figure 4.8 demonstrates that only 5 per cent out of the sample traders have some basic idea to operate computer and internet network in regulated agricultural markets. Only 15 per cent out of total sample traders affiliated with e-NAM had basic computer knowledge. In overall sample markets, only 10 per cent out of the total sample traders have computer knowledge and the rest 90 per cent of traders do not have any idea about basic computer knowledge.

**Table 4.22** Classification of sample traders in different market (%)

Market	Marginal	Small	Semi-medium	Medium	Large	Total
Regulated Market						
Balangir	90.00	10.00	0	0	0	100
Jeypore	80.00	20.00	0	0	0	100
Overall	85.00	15.00	0	0	0	100
Electronic National Agricultural Market						
Kantabanji	50.00	50.00	0	0	0	100
Kunduli	60.00	20.00	10.00	10.00	0	100
Overall	55.00	35.00	5.00	5.00	0	100

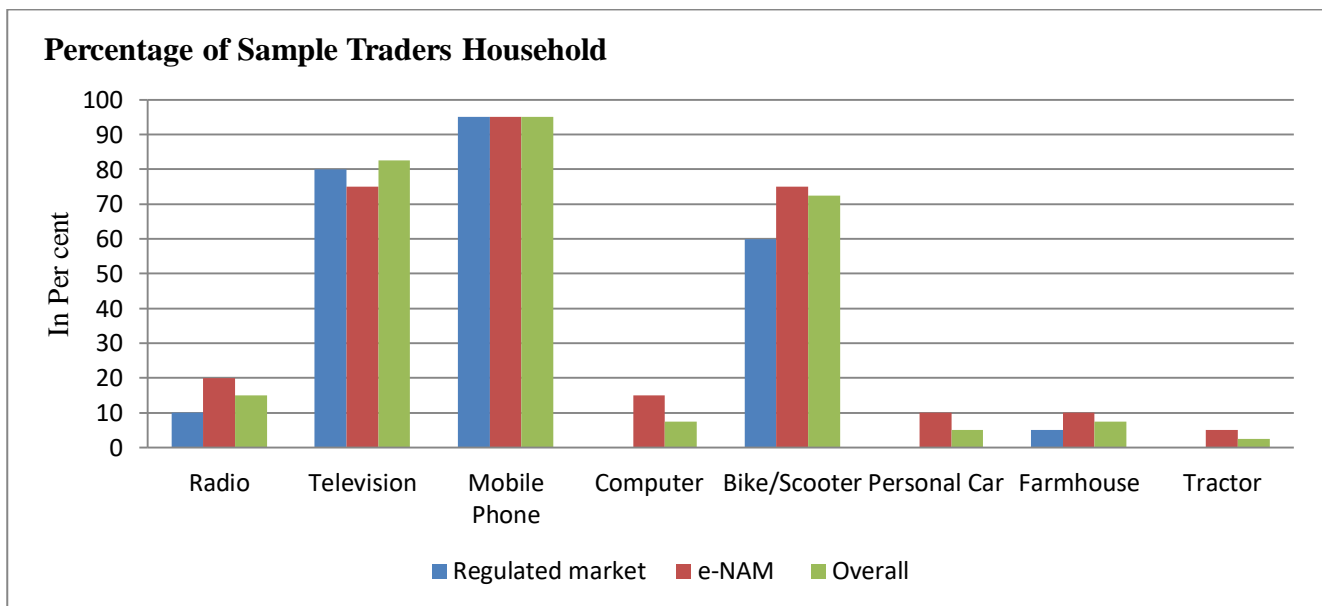
Source: Field Survey

Table 4.22 shows the landholding details of sample traders. It can be seen from the table that a large part of sample traders were small and marginal landholders. All the sample traders in the

overall regulated markets were small and marginal landholders. In Balangir regulated market, there was 90 per cent of sample traders are marginal and in Jeypore regulated market it was 80 per cent.

The table exhibits that about 90 per cent of sample traders in the overall electronic national agricultural markets fell in the category of small and marginal landholders and the rest 10 per cent traders were semi-medium and medium as per landholding categorization. There was not even a single trader who holds land up to 10 hectares and above.

**Figure 4.9** Information about assets holding by sample traders in different markets (%)



Source: Field Survey

It can be understood from Figure 4.9 that among all the assets owned by sample traders' mobile phones had occupied the top position. About 95 per cent of sample traders in both types of markets have owned mobile phone. It is a positive indicator that most of the trader's households have a mobile phone which will help to manage trade through the e-NAM enabled markets.

After mobile phone television was the second most items owned by the sample traders. About 80 per cent out of total sample traders in the regulated markets had television as against 75 per cent in e-NAM affiliated traders. In total there was about 82.50 per cent out of the total sample traders had owned television. Bike/Scooter is also considered as an important asset captured by sample traders. About 60 per cent of sample traders in the regulated markets had bike/scooter as against 75 per cent in e-NAM enabled markets. Only 10 and 20 per cent of sample traders had radio in the regulated and e-NAM market, respectively.

The computer is also an essential requirement to acquire complete information about trade-in various electronic markets across the country. But there was only 15 per cent of the sample traders in e-NAM enabled markets had computers and not even single traders in the sample regulated market have owned computers. Figure 4.9 shows that only a few sample traders' have a personal car and tractor. But it can be seen from the above figure that about 5 and 10 per cent of traders have owned a farmhouse in the regulated and e-NAM enabled markets, respectively.

**Table 4.23** Information on the income of sample traders in different markets (2018-19) (Rupees/household)

Market	Income from trade activities				Income from other sources				Total Income			
	Mean Income	CV	Minimum	Maximum	Mean Income	CV	Minimum	Maximum	Mean income	CV	Minimum	Maximum
Regulated Market												
Balangir	79000	49.28	30000	160000	21000	224.98	0	150000	100000	78.99	30000	310000
Jeypore	111800	91.38	60000	400000	29000	88.21	0	80000	140800	80.62	68000	450000
Overall	95400	77102.39	30000	400000	25000	148.82	0	150000	120400	80.94	30000	450000
Electronic National Agricultural Market												
Kantabanji	140500	126.71	50000	600000	25000	84.56	0	50000	166000	100.48	65000	600000
Kunduli	148000	134.34	50000	700000	71000	263.03	0	600000	219000	174.76	50000	1300000
Overall	144250	127.36	50000	700000	48250	272.42	0	600000	192500	149.93	50000	1300000

Note: Income from other sources includes crop farming, livestock and allied activities, and MGNREGA work.

Source: Field Survey

Table 4.23 demonstrates that the mean income of sample traders in the regulated markets from trade activities was Rs. 95,400 and it was Rs. 1,19,825 for the electronic markets traders. But the value of the coefficient of variation for both types of the market shows that there was more variation in income of sample traders affiliated with the regulated markets as compared to the electronic markets. The minimum income earned by sample traders in the regulated markets was Rs. 3,00,000 and it was Rs. 5,00,000 for electronic markets traders. But there were huge differences between both types of the markets based on maximum income earned by sample traders. Sample traders affiliated with the electronic markets had earned Rs. 3,00,000 more maximum income than traders associated with regulated markets.

It can be seen from Table 4.23 that traders affiliated with the e-NAM markets had earned 93 per cent more average income than traders of regulated markets from other sources which generally include income from crop farming, and livestock and allied activities. But there was more variation in income earned by the sample e-NAM traders from other activities as compared to the income of traders affiliated with regulated markets. Minimum income earned by sample traders is zero from other activities by all traders and it also applies to all sample agricultural markets.

Table 4.23 shows that the mean income earned by sample traders of the regulated markets from trade activities was Rs. 1,20,400 and it was Rs. 1,56,450 for e-NAM enabled markets. The coefficient of variation data shows that there was more variation in the electronic markets as compared to the regulated markets in terms of income from trade activities earned by the sample traders. The minimum income earned by sample traders in the regulated markets was Rs. 30,000 and it was Rs. 50,000 for the traders associated with electronic national agricultural markets. The maximum total income earned by sample traders of the regulated markets was Rs. 4,50,000 and it was Rs. 13,00,000 for the electronic markets traders. It can be concluded that the average income earned by sample traders in the e-NAM facilitate markets was more in all aspects than traders affiliated with the regulated markets.

**Table 4.24** Information on loan borrowed by sample traders in different market (%)

Market	Sample traders taken the loan	Sources of the loan
		Informal
Regulated market	15.00	100
e-NAM	20.00	100
Overall	17.50	100

Source: Field Survey

Table 4.24 shows information related to loans borrowed by sample traders in regulated and e-NAM facilitate markets. It can be seen that more than 5 per cent of sample traders affiliated with electronic national agricultural markets were in the trap of debt as compared to traders of regulated markets. In overall sample markets, there was 17.50 per cent of sample traders in the debt trap. But it is surprising to know that all the traders have borrowed loans from informal sources and not even single traders have borrowed loans from formal sources.

#### **4.6 Major Findings**

Both Balangir and Koraput districts comes under the KBK region of the state but various socio-economic indicators show that Balangir district is some extent more developed as compared to Koraput district. Balangir district has more net sown areas than Koraput district which is a positive indicator to enhance agricultural production and to achieve prosperity. The share of small and marginal farmers in Koraput district is 82.68 per cent whereas in Balangir district it is 90.62 per cent (Agricultural Census, 2015-16). Data shows that the presence of regulated agricultural markets in different districts of the state is not equally distributed (OSAMB, Bhubaneswar).

Koraput district is known for its traditional cultivation system and the district is a major producer of paddy, maize, finger millet, and vegetables. Balangir district is a major producer of paddy, groundnut, green gram, black gram, and red gram. But it is surprising to know that the state government of Odisha has not included these crops in the list to make the trade through e-NAM enabled markets.

Most of the sample farmers were from the Hindu religion in both types of agricultural markets and they were from SC, ST, and OBC categories. None of the sample farmers were from the general category. All the sample traders were from the Hindu religion only in all the sample agricultural markets. But the study empirically proved that a large proportion of sample traders were from OBC categories. The male farmers dominate marketing activities as compared to female farmers in both types of markets. But the participation of female farmers is more in regulated agricultural markets as compared to e-NAM enabled markets and the reason for this is the more use of the computer, internet, and banking service in these markets.

The proportion of small and marginal farmers is more in both types of agricultural markets. The study reveals that there were about 74.29 per cent and 81.42 per cent of sample farmers categorized as small and marginal based on landholdings. Secondary data also demonstrates that there are 86 per cent of farmers in India are small and marginal whose landholding is less

than one hectare. So, the policymakers should formulate agricultural market policies that will be more favorable to small and marginal farmers.

The study concludes that there is not much divergence among farmers' household-based on mean household size in all the sample agricultural markets. But some differences exist based on mean household size across the social groups. In overall regulated markets it is highest from the OBC categories whereas in overall e-NAM enabled markets it is highest from ST category sample farmers.

Education and computer knowledge of farmers and traders influence positively to participate in sample e-NAM enabled markets (Chengappa et. al., 2012). But the study shows that 20 per cent of sample farmers in regulated markets were illiterate as against 15.71 per cent in e-NAM enabled markets. Approximately 5 per cent of sample traders in the regulated markets was illiterate as against 15 per cent in electronic markets. Very few per centages of sample farmers and traders have education up to graduation and above. Basic computer knowledge is necessary to get all information about trade managed through electronic national agricultural markets. But the ground reality shows a different picture that only 5 per cent of sample farmers and 10 per cent of traders have basic computer knowledge in overall markets. It is one of the most important disadvantages among the stakeholders on the way of successful implementation of e-NAM in Odisha and India.

Mobile phone, cattle, shed, tube well, bore well, and pump sets are the major assets owned by sample farmers. Mobile phones, bikes, scooters, computers, and radio are the major assets captured by sample traders. Approximately 91.43 per cent and 95 per cent of the total sample farmers and traders respectively have a mobile phone which is used as an essential requirement to make the trade through e-NAM. So, it is a positive indicator that stakeholders can get all information about their products in the markets during the time of the trade.

The mean income of farmers is a better measure to assess the efficiency of agricultural markets despite having some deficiencies in the method of calculation like it is affected by extreme values. The study reveals that farmers associated with e-NAM facilitate markets had earned Rs. 12,107 less annual average income than farmers of regulated agricultural markets. But there is indeed more variability in the income of regulated market farmers than the farmers associated with e-NAM enabled markets. The traders of e-NAM facilitate markets used to earn more annual average income than traders associated with regulated markets.

The study demonstrates that 52.86 per cent of sample farmers households affiliated with regulated agricultural markets had borrowed loan as against 40 per cent in e-NAM enabled markets in the 2018-19 agricultural year. But it is a positive indicator that 86.49 and 71.43 per cent of farmer's households is regulated and e-NAM facilitate the market respectively have borrowed loan from the institutional sources. It concludes that the mean loan of sample farmers households in overall e-NAM facilitate markets was Rs 53,785 whereas in the regulated markets it was Rs 35,054. But it is surprising to know that none of the sample traders have borrowed loans from institutional sources.



## **Chapter-5 ISSUES AND CHALLENGES WITH E-NAM IN ODISHA: AN ANALYSIS OF PRIMARY DATA**

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### **5.1 Introduction**

The strategy behind the formulation of agricultural marketing policies in India has changed from the accessibility of markets to expand market eco-system, wider participation of stakeholders, and empower farmers due to the changing environment in the sector (Government of India, 2017). The functions of an efficient marketing system are not only confined to monetize the products and to make a balance between demand and supply, but also influence the capital formation and investment in farm technology. To achieve these objectives the Government of India has been introducing various reforms like Model Agricultural Marketing Act (2003), electronic National Agricultural Markets (e-NAM), and Model Agricultural Produce and Livestock Marketing Act (2017) (ibid).

The role of institutions, incentives to the stakeholders, and up-gradation of infrastructure considered as three important milestones for the success of electronic national agricultural markets. There are positive and negative feedback from the respondents during the field survey in Karnataka state. The objectives based on which e-tendering markets have been introduced well but in reality, all the stakeholders of agricultural markets are not happy. This is because farmers believe that still there is collusion taking place among the traders, and commission agents are unhappy because they believe that this system aims to eliminate them from the marketing activities (Narayanan et al., 2017).

Quality assessment, transaction, and transportation logistics are the three major obstacles to get success in e-NAM facilitate markets in India. One of the important objectives behind the introduction of e-NAM is to enhance competition through more participation of traders. But here also there is a chance of collusion. The actual benefits of e-NAM will be realized when intra and inter-market trade will take place (within the state and outside of the state). It is a pre-requisite that market infrastructure should increase in the sphere of assessing, storing, and grading (Gulati et. al., 2020).

The Odisha State Agricultural Marketing Board (OSAMB) is also actively working to integrate its regulated agricultural markets with e-NAM. But the low level of arrivals into regulated markets, lack of market infrastructure, inadequate well-trained market staff, inadequate availability of information technology, lack of information about e-NAM, and inappropriate location of the markets are the major challenges of e-NAM in the state. Require to educate the

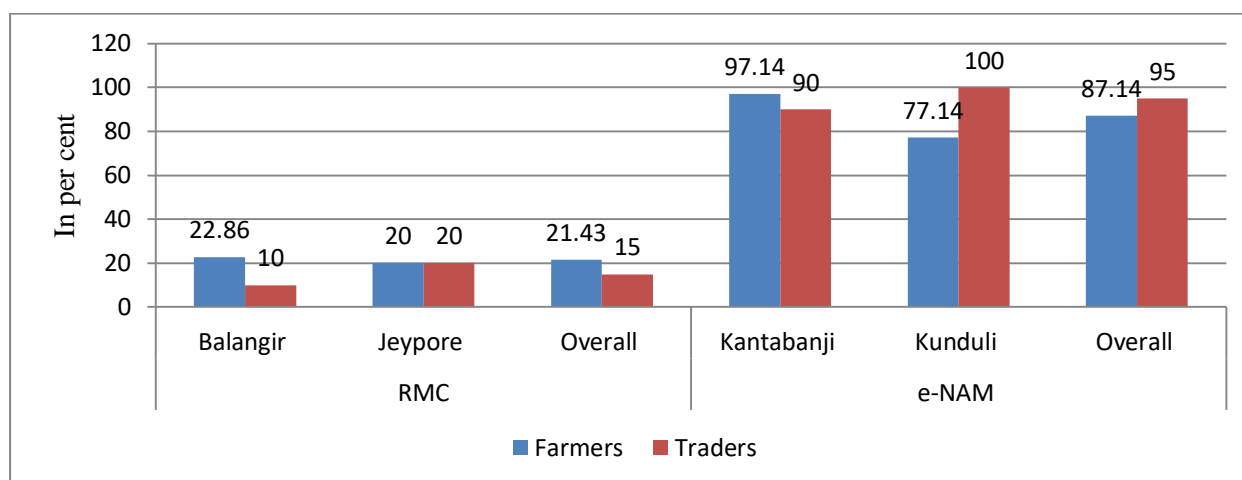
farmers about the benefits of e-markets for the successful implementation of the program (NIAM, 2017).

This chapter analyses the issues and challenges associated with e-NAM in Odisha by using the field survey data and traces out the factors that influence the farmers’ decision to participate in the e-NAM enabled markets. The chapter also design to assess the status of sample markets infrastructure in the state by using primary data. Likert scale has used in this chapter to understand the implementation status of various agricultural market components by sample farmers.

## 5.2 Assessment of Implementation Status of e-NAM in Odisha

With a vision to make “One nation, one market”, the Government of India introduced the e-platform in agriculture markets. Some scholars believe that e-NAM will be a game-changer to bring efficiency and transparency in agricultural marketing. But it is a pre-requisite that farmers should be aware of e-NAM, required to conduct more training to stakeholders about the unique process of trade through e-NAM for the accomplishment of e-NAM.

**Figure 5.1** Sample stakeholders in different markets aware of e-NAM



Source: Field Survey

Some of the researchers claim that e-NAM will be a game-changer in the field of agricultural marketing and it will also help to enhance farmers' share in the ultimate consumer’s price by improving efficiency in price discovery and eliminating long marketing channel. But the ground reality shows that large sections out of the total farmers are still not aware of e-NAM. It can be seen from Figure 5.1 that there are very few farmers and traders aware of the concept of e-market. Only 21.43 per cent out of total sample farmers were aware of e-NAM in overall regulated agricultural markets. It indicates that the policymakers should make an advertisement

about e-NAM and its benefits which will help for the wide acceptance of e-NAM among farmers and traders.

It is necessary to register in the e-platform by the stakeholder to make trade as per the provision of e-NAM. But it is surprising to know that there were some farmers whose names were registered in the e-NAM platform to make the trade but they were themselves not aware of that. It is more in Kunduli market where 22.86 per cent of sample registered farmers were not aware of anything about e-NAM. In Kantabanji market there were 10 per cent of traders were unaware of e-NAM. It indicates that the market officials should make justice to make aware to farmers and traders during the registration process.

**Table 5.1** Source of information of sample stakeholders about e-NAM (%)

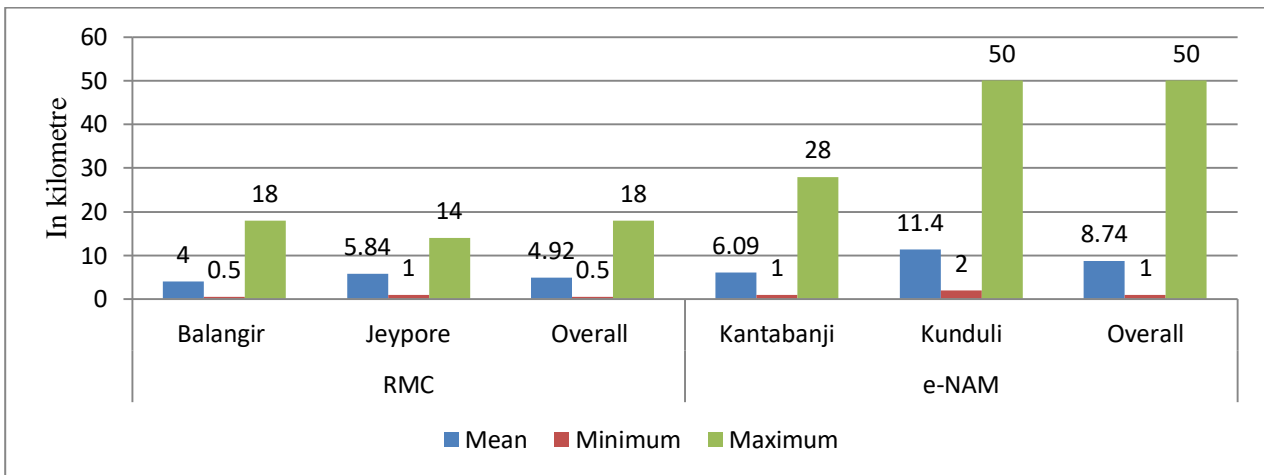
Market	TV/Radio	Newspaper	Market officials	Fellow farmers	Fellow traders	Total
Sample Farmers						
RMC	43.75	6.25	0	43.75	6.25	100
e-NAM	6.56	0	36.07	57.37	0	100
Overall	14.29	1.30	28.57	54.54	1.30	100
Sample Traders						
RMC	0	0	0	0	100	100
e-NAM	10.53	0	31.58	36.84	21.05	100
Overall	9.09	0	27.27	31.82	31.82	100

Source: Field Survey

Table 5.1 shows the source of information about e-NAM by different stakeholders in sample markets. It can be seen that the role of neighboring farmers and traders is more to proliferate the news of e-NAM. In regulated markets, a large part of information about this e-market disseminated by TV/Radio and fellow farmers. Market officials have zero contributions in regulated markets to spread the news of e-NAM among farmers. Whereas in e-NAM enabled markets the role of fellow farmers and market officials is more crucial. There is 57.37 per cent of sample farmers received information from fellow farmers. None of the sample farmers have received information about e-NAM from traders and newspapers.

The role of market officials, fellow farmers, traders, and TV/Radio have a significant contribution to spread this news among sample traders. In regulated markets total sample traders have received information about e-NAM from fellow traders only.

**Figure 5.2** Details of distance covered by sample farmers from home to market (Km)

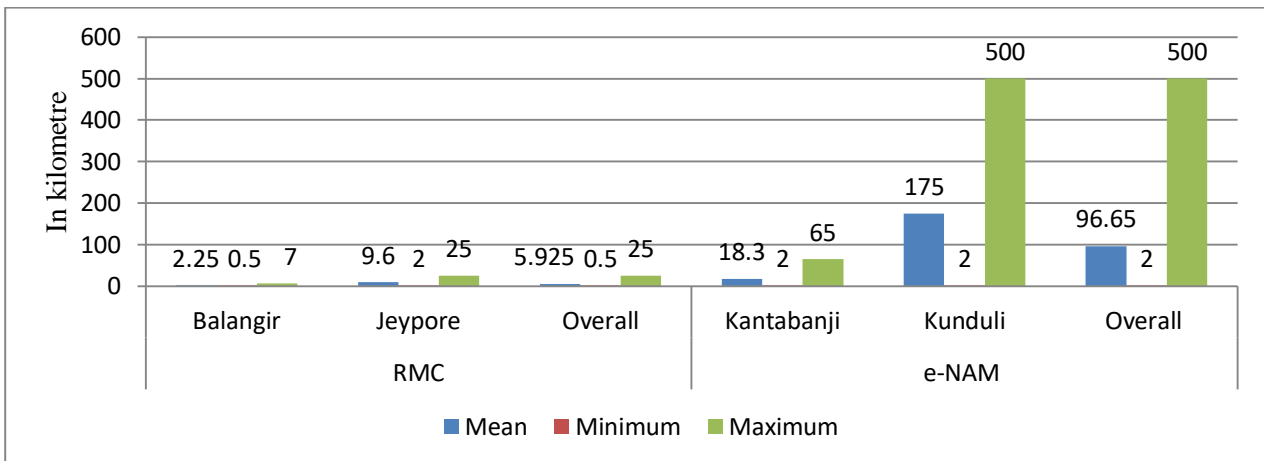


Source: Field Survey

Figure 5.2 demonstrates detailed information about the distance covered by sample farmers from home to market. The existing literature on the topic shows that proximity is one of the important determinants of farmers' choice to sell their crops in different markets. It can be seen from the figure that the mean distance covered by farmers in regulated markets is lower than e-NAM enabled markets. The average distance in the overall regulated market is about 4.92 km and it is 8.74 km for e-NAM enabled markets. It shows that farmers used to come from more distance to electronic agricultural markets than regulated markets.

The minimum distance covered by sample farmers in regulated markets is 0.5 km whereas it is 1 km in e-NAM enabled markets. The maximum distance in overall e-NAM enabled markets is also 32 km more than the regulated agricultural markets. The reason for the divergence between both types of markets in terms of mean, minimum, and maximum distance can be the marketing infrastructure developed in the market place after the introduction of the e-NAM platform.

**Figure 5.3** Details of distance covered by sample traders from home to market (Km)

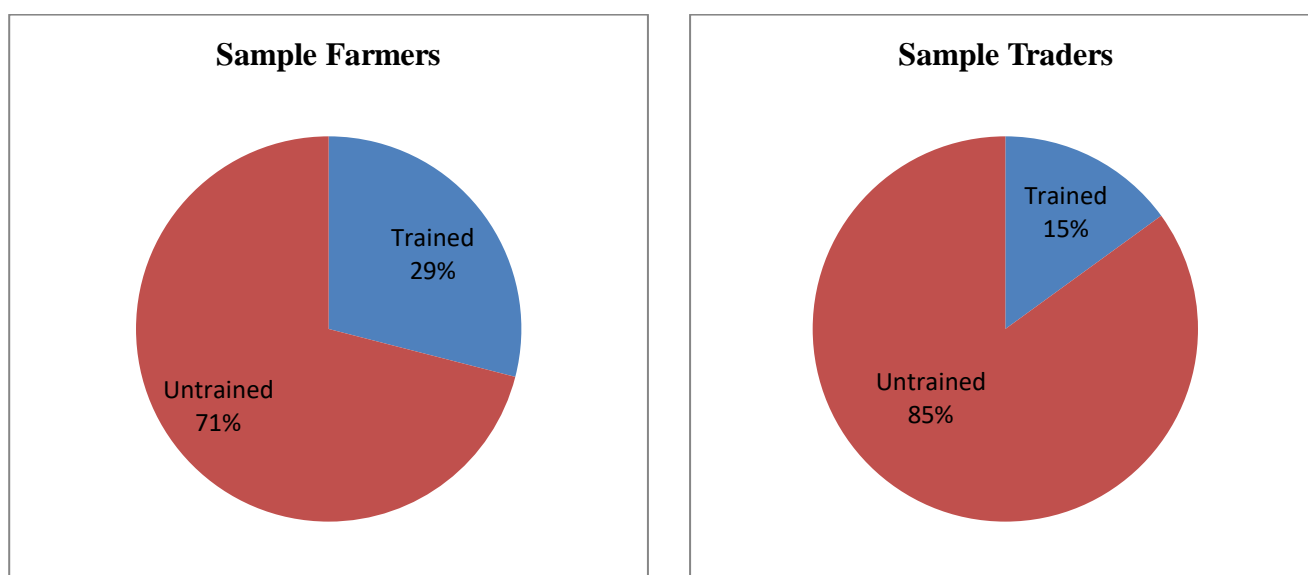


Source: Field Survey

It can be seen from figure 5.3 that the mean, median, and maximum distance covered by sample traders are more in electronic national agricultural markets than regulated agricultural markets. The mean distance in the overall regulated market is 5.93 km as against 175 km in electronic markets. In terms of minimum distance covered by sample traders in overall regulated markets is 0.5 km whereas in e-NAM enabled markets it is 2 km. There is a huge gap that exists among both types of markets in terms of maximum distance covered by sample traders.

The maximum distance covered by sample traders in the regulated markets is 25 km as against 500 km in e-NAM enabled markets. The reason for this is not only the e-NAM enabled markets but both Kantabanji and Kunduli markets are large markets in terms of volume of trade. Hence, traders used to come from long distances to purchase crops from the farmers.

**Figure 5.4** Sample farmers trained about the process of e-NAM (%)



Source: Field Survey

Figure 5.4 demonstrates the percentage of sample farmers and traders who were trained about the e-NAM facilities. This market has a unique method of trade which is generally different from the conventional method of agricultural trade. Farmers and traders have to follow specific rules and regulations made by the policymakers to trade through e-NAM. The literature based on socio-economic characteristics of Indian farmers shows that most of the farmers are not well educated to use computer and mobile app to manage their trade. It indicates that there is a need to provide training about the specific process of trade through e-NAM and the literature also describes the importance of training among the stakeholders for the success of e-NAM.

But the ground reality shows that very few sample farmers and traders were trained about the process of trade through e-NAM by the market officials. In sample e-NAM markets only 29 per cent and 15 per cent of farmers and traders were trained about the process of e-NAM, respectively.

### **5.3 Details of Infrastructure in All Sample Markets**

Agricultural market infrastructure is one of the key factors that attract the farmers to participate in the market. The electronic national agricultural markets follow the e-auction process of trade for which it is necessary to have a separate quality assessment lab, computers, public address system, and separate e-auction hall for traders.

**Table 5.2** Information about existing infrastructure in e-NAM and RMC

Particulars	RMC		e-NAM	
	Balangir	Jeypore	Kantabanji	Kunduli
Gate entry	✓	✓	✓	✓
Weight bridge	✓	✓	✓	✓
Quality assessment lab	✗	✗	✗	✓
Generator	✗	✗	✓	✓
Computers/ Desktop	✓	✓	✓	✓
Information display board	✓	✗	✓	✓
Public address system	✗	✗	✓	✓
E-auction hall	✗	✗	✓	✓
Warehouse	✓	✓	✓	✓
Cold storage	✗	✓	✗	✓
Stockholders restroom	✓	✓	✓	✓
Gate Exit	✓	✗	✓	✓

Source: Field Survey

Table 5.2 shows the information about existing infrastructure in sample regulated and e-NAM enabled markets. It can be seen from the table that the status of market infrastructure is not good in regulated markets as compared to e-NAM enabled markets. The government of Odisha has introduced an electronic platform in existing regulated agricultural markets. So, it can be concluded that market infrastructure has improved a lot after the implementation of e-NAM in sample markets.

It can be seen from Table 5.2 that all the components of the basic market infrastructure are available in e-NAM, Kunduli. But it is also true that most of the sample farmers of Kunduli market are not satisfied with the cold storage and warehouse facilities. In Kantabanji market the entire required market infrastructure is available except cold storage and a separate quality assessment lab for technicians. Table 5.2 also shows that lots of market infrastructures are not available in regulated agricultural markets. Some of the sample farmers said due to lack of market infrastructure and lack of proper management of existing facilities their cost of marketing has been increasing. It results in physical loss of output, more marketing load, and more time required to sell crops in markets, etc.

#### **5.4 Factors Influencing Farmers' Participation in e-NAM: Logit Regression Analysis**

The present section has designed to assess the factors that influence farmers' decision to participate in e-NAM markets in Odisha state. The dependent variable is participation in e-NAM (1=Yes, 2=No) which is binary. The independent variables are the age of the farmers, age square, years of schooling completed, computer knowledge, total operational land holding, and distance from farm to the market. The existing literature concludes that education and

computer knowledge positively influence the traders of Karnataka to participate in the information technology integrated markets (Chenggappa, et. al., 2012).

**Table 5.3** Results of Logit Regression

Number of Observations = 140 LR chi2(6) = 23.25 Prob > chi2 = 0.0007 Pseudo R2 = 0.1198 Log Likelihood = -85.415494			
Explanatory Variables	Odds Ratio	Standard Error	P> z
Age	0.7679**	0.0903	0.025
Age Square	1.0032**	0.0013	0.022
Years of Schooling Completed	1.1044*	0.0663	0.098
Computer Knowledge	0.7251	0.6680	0.727
Distance from farm to market	1.1425***	0.0514	0.003
Total Operated Land	0.8939*	0.0563	0.075
_cons	109.9573	374.0635	0.167

Note: Level of Significance: \* p<0.1 and \*\*p<0.05 and \*\*\*p<0.01

Table 5.3 shows the result of odd ratios of participation in the e-NAM market by independent covariates. The primary data has been collected from 140 farmers from different markets of Odisha.

The result shows that with a one-unit increase in the age of farmer, the likelihood of participation in the e-NAM enabled market decreases by 0.76 times. The result is significant at the 5 per cent level. It indicates that the young farmers are more interested to participate in e-NAM enabled markets. Square of age is considered in the model to predict participation in e-NAM facilitate markets more adequately by the lower age group farmers. The role of Education is found significant in participation. It is found that with a one-unit increase in the year of schooling, the odd ratios of participation increase by 1.10 times. The odds ratio of years of schooling is significant at the 10 per cent level. This result also substantiates the conclusion of existing literature (Chenggappa, et. al., 2012).

Hypothetically it can be assumed that those farmers who have computer knowledge their chance is more to participate in e-NAM enabled markets. But the probability value is showing an insignificant result for this. It is because of the very small numbers of sample farmers aware of computer knowledge. There were only 5.71 per cent of sample farmers aware of computer knowledge in e-NAM facilitate markets.



It can be presumed that farmers used to sell products in nearby markets due to the advantages of proximity. Moreover, the likelihood of participation in the e-NAM enabled markets is higher among farmers whose distance from home to market is longer, odd ratios increases by 1.14 times with a one-unit increase in distance. So, it can be concluded that farmers can participate in distance e-NAM integrated markets to get a reasonable price for their products.

We found no significant association between total operated land and participation in e-NAM markets. It is because of the problem in the selection of crops to trade through e-NAM by the policymakers. Generally, the large farmers in Odisha state used to devote a major part of total cultivation land towards the production of staple crops like rice and wheat. But the policymakers have not included these crops to trade through e-NAM.

### 5.5 Perspective of Stakeholders about various Components of Sample Markets

**Table 5.4** Details of sample farmers able to check price through the e-NAM mobile app (%)

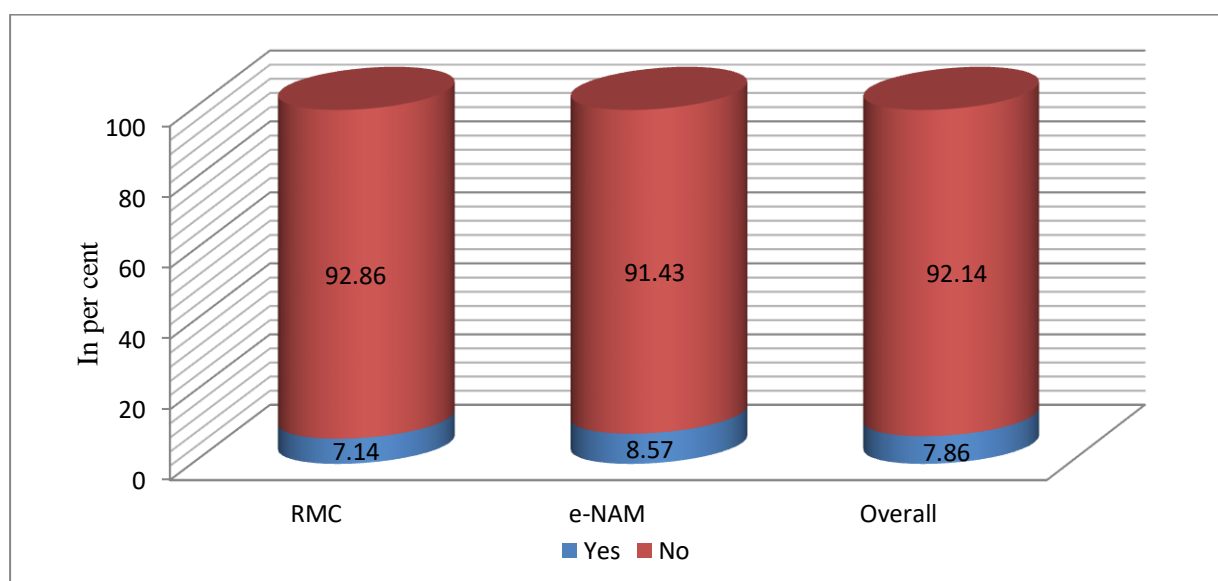
Market	Sample Farmers		Sample Traders	
	Yes	No	Yes	No
RMC	5.71	94.29	5	95
e-NAM	11.43	88.57	30	70
Overall	8.57	91.43	17.50	82.50

Source: Field Survey

In an open auction, the agricultural markets price of the products determined by the seller and buyer directly. But as per the provision of e-NAM, there is no direct contact between farmers and traders. This market price is determined by e-auction. Farmers can be aware of the highest bid price for their product through printed slips, SMS, information dissemination board, the announcement by the market officials, and the e-NAM mobile app.

It is visible from Table 5.4 that a large proportion of sample traders and farmers in both types of markets were not aware of how to check the price announced by the traders through the mobile app. So, to overcome all these problems faced by the stakeholders the government should deploy enough well-efficient market officials.

**Figure 5.5** Details of the perspective of farmers about overall price realization after e-NAM



Source: Field Survey

Figure 5.5 demonstrates the perception of sample farmers about price realization of crops after the implementation of e-NAM. According to AGMARKNET data, average price of all the crops has increased during the time of the post-eNAM period. But there is 91.43 per cent of total sample farmers believe that price realization is not good in e-NAM enabled markets. Most of the sample farmers stated that it is true that prices of most of the agricultural crops have increased but it is not due to the introduction of e-NAM rather it is due to the decline in overall agricultural production.

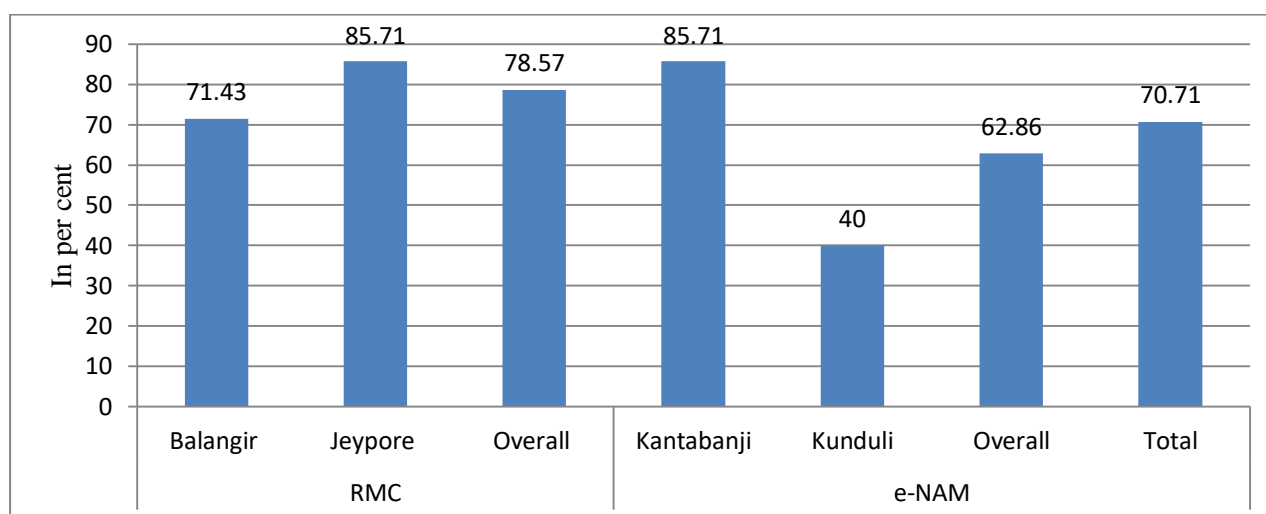
**Table 5.5** Perspective of farmers about declined in overall price volatility after e-NAM (%)

Market	Farmers respond as 'yes'	Traders respond as 'yes'	Market Officials respond as 'yes'
RMC	0	0	50
e-NAM	2.86	10	100
Overall	1.43	05	75

Source: Field Survey

Price volatility is a major component to assess the performance of agricultural markets. Secondary data shows that price volatility has declined for stable crops whereas it has increased for seasonal and perishable crops even after the introduction of e-NAM. But Table 5.4 shows that none of the sample farmers and traders believes that price volatility has declined due to the implementation of e-NAM. There are only 2.86 and 10 per cent of sample farmers and traders respectively believe that price volatility has declined after e-NAM. But all the sample market officials from e-NAM enabled markets believe that price volatility has declined due to e-NAM.

**Figure 5.6** Awareness about Minimum Support Price by the sample farmers (%)



Source: Field Survey

Minimum Support Price is the safeguard introduced by the Government of India to protect the farmers from agricultural price crash. The minimum support price is the price at which the Government of India purchases agricultural products from the farmers to maintain buffer stock and Public Distribution System (PDS). For the first time, the government of India introduced the minimum support price in the year 1975. These are the important price policies that have been undertaken by the government to protect the farmers from distress selling. But it is surprising to know that its actual implementation uneven across the states and very few farmers took the benefits of MSP in India.

Figure 5.6 shows that in overall sample regulated markets there was 78.57 per cent of farmers aware of MSP. In overall sample electronic national agricultural markets the awareness about MSP among farmers is much lower than regulated markets. It can be seen from the figure that in overall electronic markets around 37.14 per cent of sample farmers were not aware of MSP.

It is visible from Figure 5.6 that in Kunduli (Koraput district) e-NAM enabled markets the proportion of sample farmers unaware about MSP is more as compared to other markets because it is the home for a large proportion of tribal people where illiteracy is more. One thing that can be concluded from Figure 5.6 that despite the introduction of MSP since long back there were lots of farmers not aware of this. The Government of India newly introduced electronic markets about this. So, there is needed to make massive advertisements through various modes.

**Table 5.6** Information about various components by sample farmers, traders, and market officials (%)

Questions	RMC			e-NAM		
	Farmers respond as 'yes'	Traders respond as 'yes'	Market officials respond as 'yes'	Farmers respond as 'yes'	Traders respond as 'yes'	Market officials respond as 'yes'
Has marketing cost declined after the introduction of e-NAM?	0	05	0	1.43	30	75
Do you think arrival has increased after e-NAM?	1.43	20	0	4.29	10	100
Has competition among traders increased after the e-platform?	1.43	–	0	12.86	–	100
Can you use a mobile app to manage your trade through e-NAM?	06	0	–	11	20	–
Does price manipulation decline because of more traders?	4.29	–	50	7.14	–	75
Is the process of trade through e-NAM more complicated?	82.86	90	–	64.29	85	–
Is e-NAM help to save time compared to other agricultural markets?	0	0	–	0	25	–
Do you think marketing load is less in e-platform?	0	0	–	0	0	25
Are you getting any problem regarding bidding?	0	0	–	56.52	80	–
Are you satisfied with the available infrastructure in the market?	46.67	15	–	35.29	50	–
Is there any problem regarding mode of payment?	0	0	–	22.86	35	–

Note: None of the stakeholders were aware of the software design of the e-NAM app.

Source: Field Survey

Table 5.6 shows information collected from farmers, traders, and market officials about various components of sample agricultural markets after the introduction of e-NAM. It can be seen that the impact of the introduction of e-NAM in regulated markets in the context of marketing cost reduction is not much. Only 1.43 per cent of sample farmers believe that marketing cost has declined in e-NAM enabled markets. But there were 30 and 75 per cent of sample traders and market officials respectively believe that marketing cost has declined.

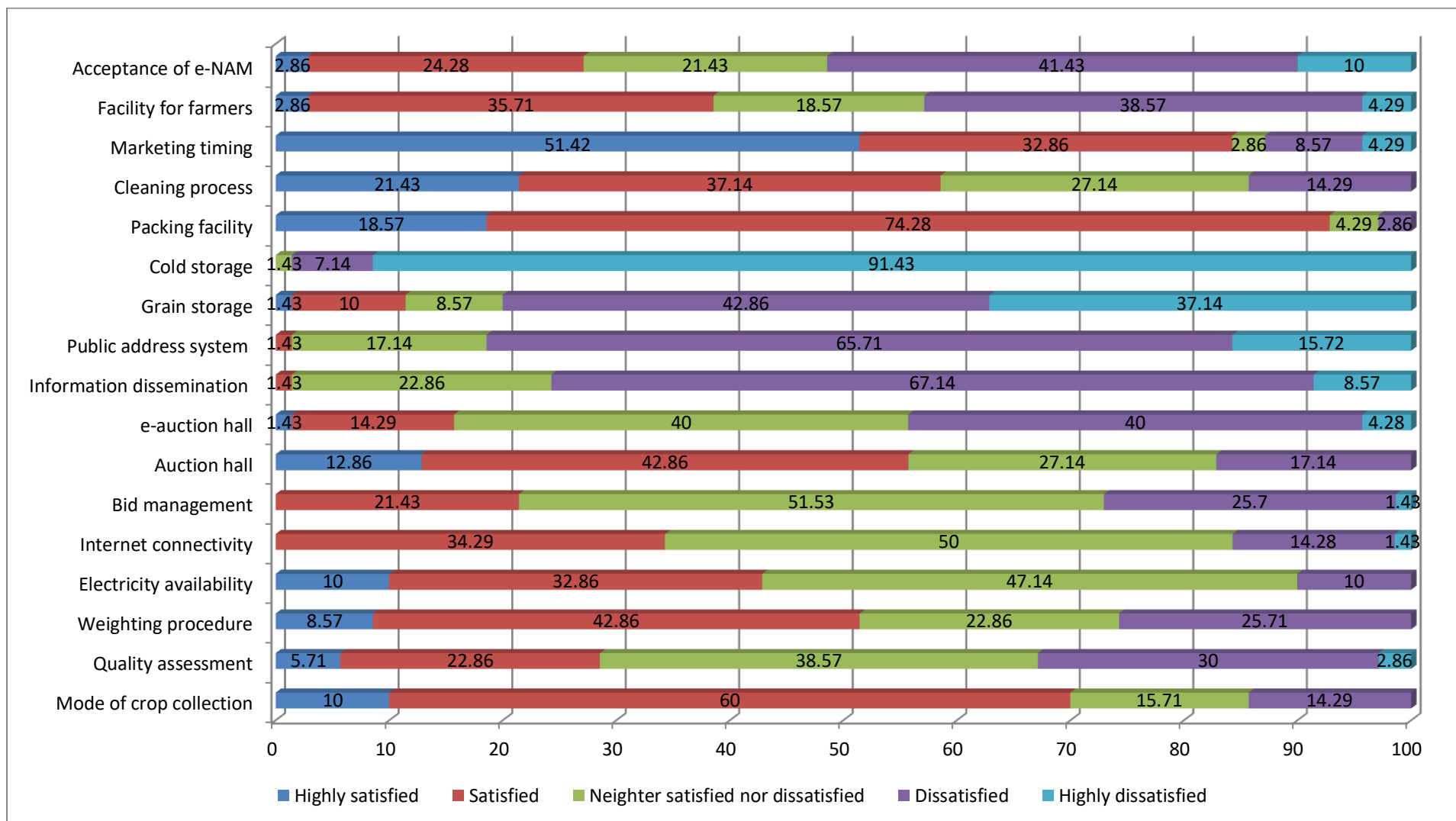
Market arrival one of the important indicators to assess the performance of e-NAM. Most of the sample farmers and traders believe that market arrival has not increased due to e-NAM. But all the market officials from e-NAM enabled markets believe that arrivals have increased into the market after the implementation of e-NAM. There were 12.86 per cent of sample farmers believe that competition among traders has increased after e-NAM. There were only 6 per cent of sample farmers from regulated markets can use the mobile app to manage their trade. In e-NAM enabled markets there were 11 per cent and 20 per cent of sample farmers and traders can use the mobile app to manage their trade respectively.

Very few proportions of sample farmers and traders in both regulated and e-NAM enabled markets believe that manipulation has declined after the introduction of e-NAM. The policymakers have introduced a unique process of trade through e-NAM. But, indeed, most of the sample farmers are not educated. There were 82.86 per cent and 90 per cent of sample farmers and traders respectively in regulated markets felt that the process of trade through e-NAM is more complicated. A large proportion of sample farmers and traders in e-NAM enabled markets also believe that the process is more complicated.

It can be seen from Table 5.6 that none of the sample framers in both types of markets believe that e-NAM is not helpful to save time and none of the sample farmers and traders believe that the marketing load is less in electronic markets. But 25 per cent of the officials believe that it helps to save marketing time. There were about 56.52 per cent and 80 per cent of sample farmers and traders affiliated with e-NAM enabled markets argued that they are facing difficulties in bidding through e-NAM.

It can be understood that there is a need to make more improvements in agricultural market infrastructure for the success of e-NAM. There were 22.86 per cent of sample farmers and 35 per cent of sample traders expressed that they are getting difficulties with the mode of payment of e-NAM.

**Figure 5.7** Rating by farmers based on their satisfaction level about sample e-markets (%)



Source: Field Survey

Figure 5.7 demonstrates the rating by sample farmers about various components of sample e-NAM. The rating has sub-divided into five different categories ranging from highly satisfied to highly dissatisfied.

The quality assessment considers as one of the important requirements of the e-NAM enabled markets because in this marketing system there is no direct contact between farmers and traders. It's the new thing that has introduced in e-NAM which was not present earlier in regulated agricultural markets. But the primary data shows that only 5.71 per cent of sample traders were highly satisfied with quality assessment and 22.86 per cent satisfied with that. It can be seen from the figure that 38.57 per cent of sample farmers were neither satisfied nor dissatisfied with the quality assessment made by the market officials and the rest 32.86 per cent of sample farmers were dissatisfied and highly dissatisfied in this context.

Only 40 per cent of sample farmers were satisfied and highly satisfied with electricity availability and internet connectivity. In the case of the auction hall, about 55.72 per cent of sample farmers were highly satisfied and satisfied. It indicates the need for better infrastructure in the e-NAM markets. The information dissemination board helps farmers to understand their product prices announced by the traders. But primary data shows that only 24.29 per cent of sample farmers were happy with the existing information dissemination devices in these markets.

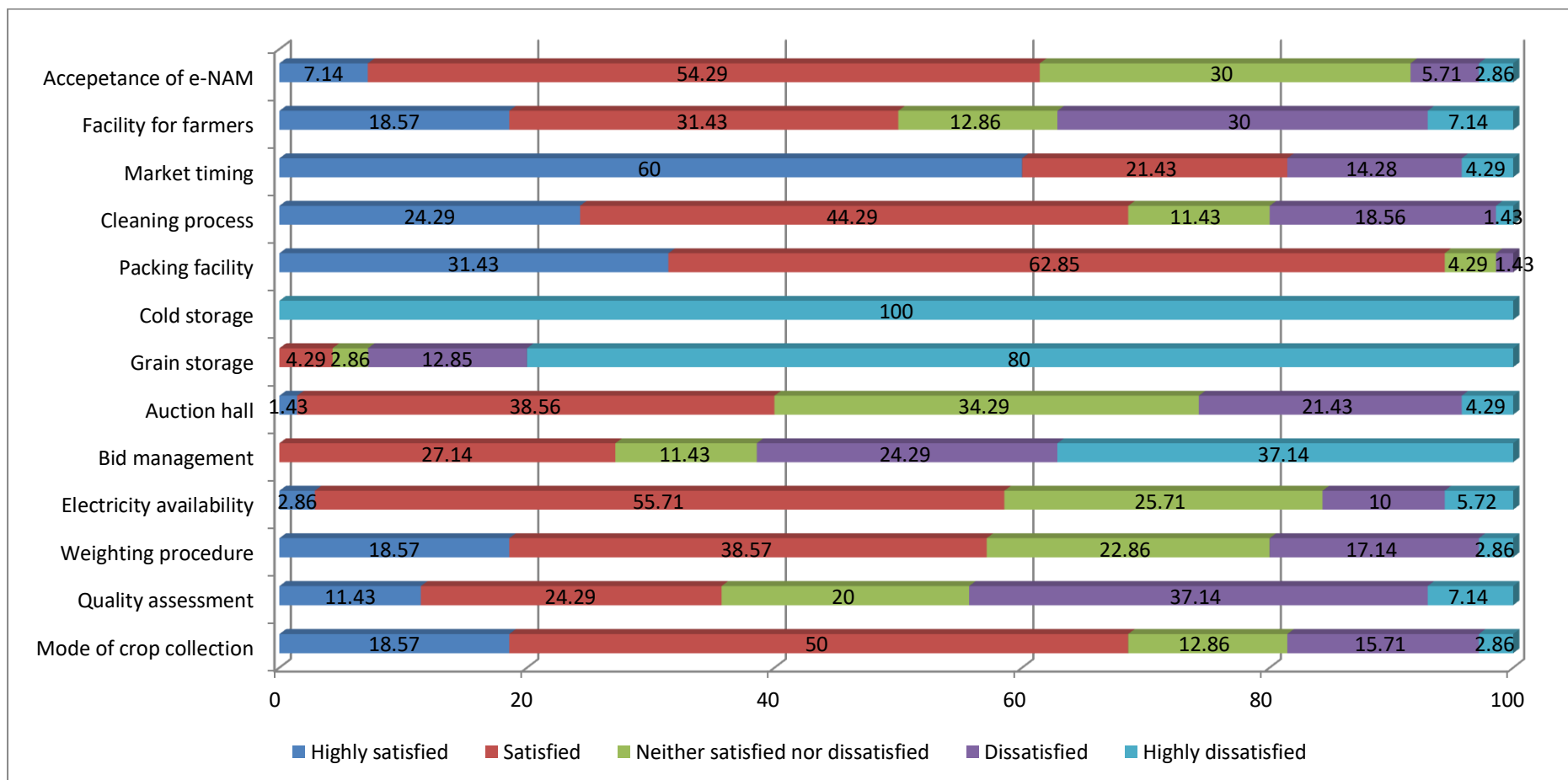
Grain storage and cold storage help farmers a lot to reduce marketing costs and also help to receive a large share of consumer's prices. But the distribution of grain storage and cold storage is not adequate across the district of Odisha state. Primary data shows that only 11.43 per cent of sample farmers were highly satisfied and satisfied with the grain storage facilities and 80 per cent of farmers were dissatisfied and highly dissatisfied with this. It is surprising to know that not even a single farmer was satisfied with the cold storage facilities in the sample markets.

About 2.86 per cent and 35.71 per cent of sample farmers were highly satisfied and satisfied with the facilities provided within the market complex<sup>14</sup>. Only 27.72 per cent of sample farmers were agreed to accept e-NAM. But 21.43 per cent of sample farmers were neither happy nor unhappy with the introduction of e-NAM. The reason for this can be attributed to the poor performance of e-NAM in Odisha.

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<sup>14</sup> Facilities for farmers include the existence of farmers' rest house, drinking water facilities, and washrooms.

**Figure 5.8** Rating by farmers based on their satisfaction level in sample regulated markets (%)



Note: There is no internet connectivity; e-auction hall, information dissemination board, and public address system available in regulated market.

Source: Field Survey



Figure 5.8 shows that 11.43 per cent and 24.29 per cent of sample farmers were highly satisfied and satisfied with the quality assessment in sample regulated markets. About 20 per cent of sample farmers were neither satisfied nor dissatisfied and the rest 44.28 per cent of sample farmers were highly dissatisfied and dissatisfied with the quality assessment in these markets. The market officials of regulated markets do not make quality assessments in the physical lab. In regulated markets, there is a provision for an open auction process of trade.

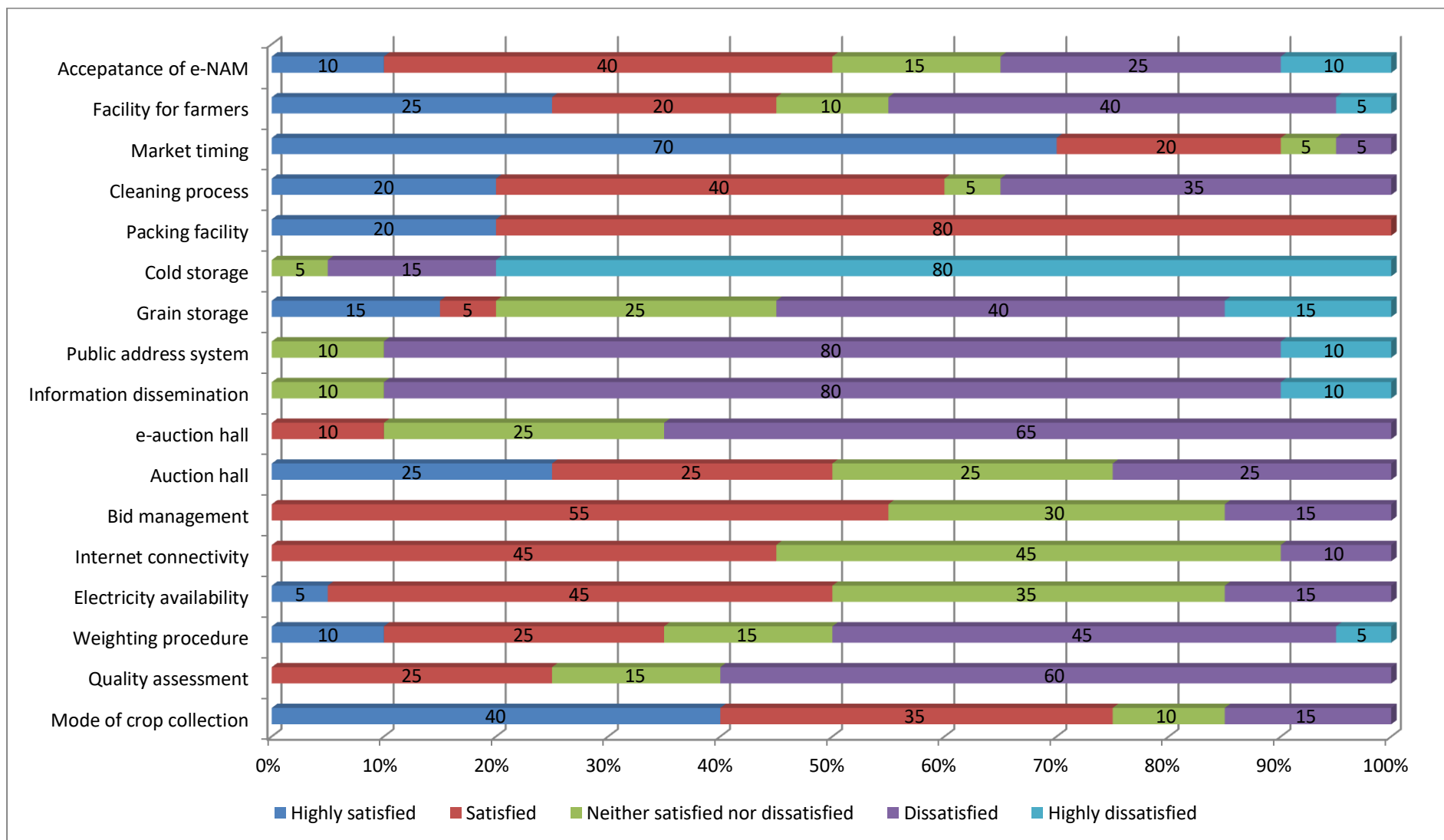
It can be seen from the figure that 18.57 per cent of sample farmers were highly satisfied with the weighting procedure and 38.57 per cent of sample farmers were satisfied with this. But it is also true that 20.72 per cent of sample farmers were dissatisfied and highly dissatisfied with the weighting procedure in these markets. Auction hall is considered as one of the important elements of market infrastructure in regulated agricultural markets. About 40 per cent of sample farmers were highly satisfied and satisfied with the existing auction hall in regulated markets. Out of total sample farmers, 34.29 per cent neither were satisfied nor dissatisfied with the auction hall and the rest was 25.72 per cent of farmers highly dissatisfied and dissatisfied with the existence of auction hall.

Grain storage and cold storage facilities are considered a crucial indicator of infrastructure in regulated markets. Figure 5.8 shows that only 4.29 per cent of sample farmers were satisfied with the grain storage facility in the markets. It is noted that none of the sample farmers have highly satisfied with this facility. It can be seen from Figure 5.8 that around 92.85 per cent of farmers in the study were highly dissatisfied and dissatisfied with available grain storage facilities in the sample regulated agricultural markets. The study reveals that not even a single farmer was satisfied with the available cold storage facilities in the sample regulated markets.

About 60 and 21.43 per cent of sample farmers were highly satisfied and satisfied with the market time, respectively. So, it can be concluded that most of the farmers are happy with market timing. Out of the total sample, about 50 per cent of farmers are happy with the facilities provided by the regulated market officials.

Farmers associated with the regulated markets were not practically acquainted with the e-auction trade. But some of the farmers were aware of e-NAM. About 61.43 per cent of sample farmers accept e-NAM as an ideal agricultural marketing system and this is much higher than the acceptance of farmers about e-platform in e-NAM enabled markets.

**Figure 5.9** Rating by sample e-NAM traders based on their satisfaction level (%)



Source: Field Survey

Figure 5.9 demonstrates ratings by sample traders about various components of sample electronic national agricultural markets. None of the sample traders was highly satisfied with the quality assessment undertaken by e-NAM market officials and only 25 per cent out of the total sample traders were satisfied with the quality assessment. Approximately 60 per cent of traders were dissatisfied with the quality assessment. The study reveals that there was 35 per cent of sample traders highly satisfied and satisfied with weight procedure in e-NAM facilitate markets.

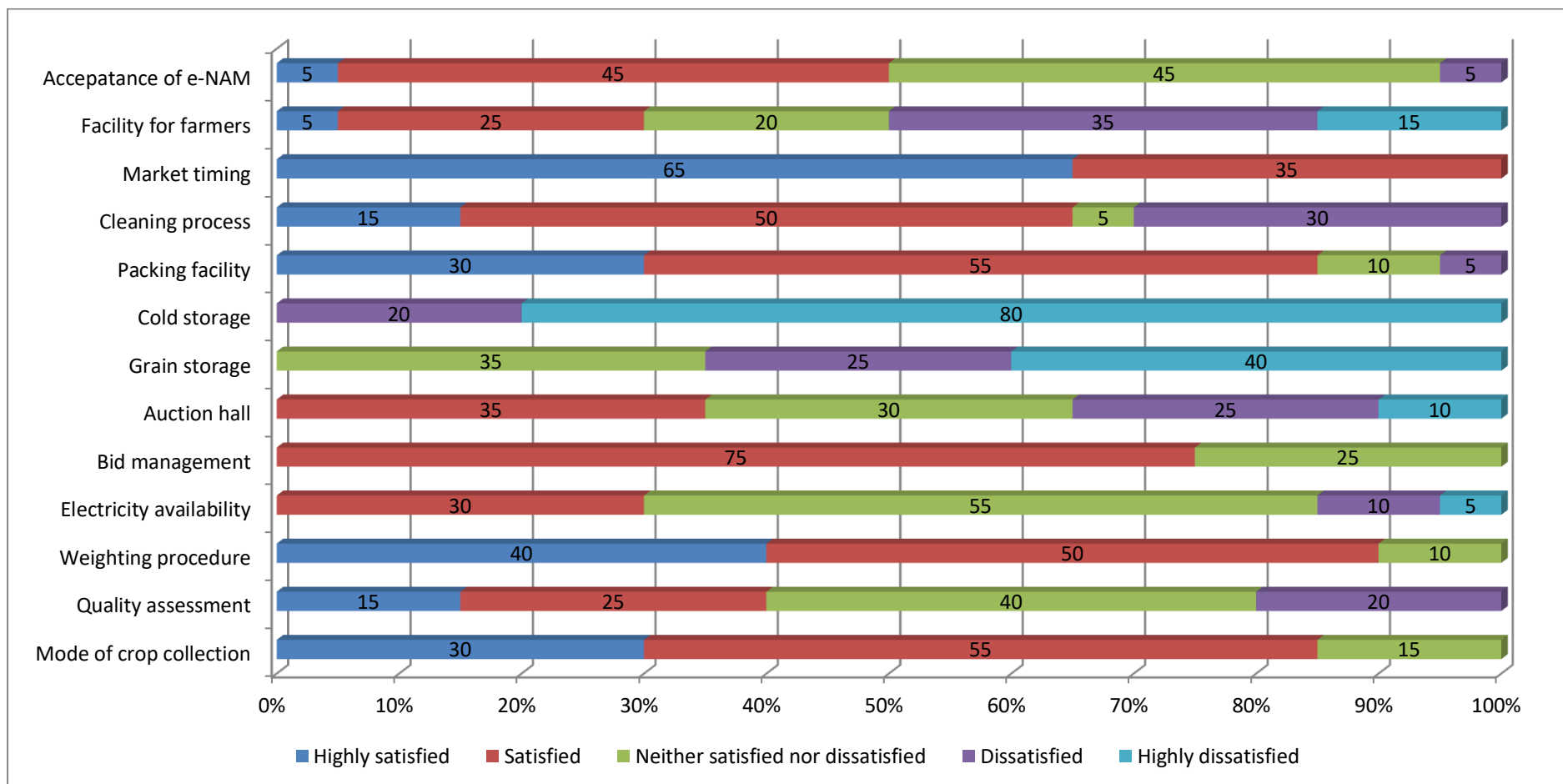
Electricity availability and internet connectivity are the major requirements of e-NAM affiliated markets. But it can be seen that there was only 50 per cent of sample traders are highly satisfied and satisfied with the electricity availability and the rest 50 were neither satisfied nor dissatisfied, and dissatisfied with this. There were not even single traders highly satisfied with the internet connectivity available at sample e-NAM enabled markets.

Electronic national agricultural markets follow a unique procedure of bid management. It can be a positive indicator that 55 per cent of sample traders were satisfied with bid management. It can be understood from Figure 5.9 that most of the farmers have a positive response towards auction hall whereas about 90 per cent of sample traders were neither satisfied nor dissatisfied and dissatisfied with separate auction hall.

Information dissemination board and public address system are the major requirements to give consent to sell or purchase by the stakeholders. But 90 per cent of sample traders were dissatisfied and highly dissatisfied with this. It can be seen that none of the sample traders were satisfied with the available cold storage facilities in the e-NAM enabled markets. All the sample traders were highly satisfied and satisfied with the packing facility provided by the sample e-NAM enabled markets.

Market timing is a crucial determinant of agricultural crop prices because some of the crops are perishable in nature. It is a positive indicator that about 90 per cent of sample traders were highly satisfied and satisfied with the market timing of e-NAM. The policymakers should have focus on enhancing facilities for traders in e-NAM enabled markets. There was 50 per cent out of total sample traders accept the new agricultural markets and its procedure to make the trade.

**Figure 5.10** Rating by sample regulated market traders based on their satisfaction level (%)



Source: Field Survey

Figure 5.10 reveals the satisfaction level of sample traders about different components of the regulated agricultural markets. It can be seen from the figure that there was about 85 per cent of sample traders highly satisfied and satisfied with the mode of crop collection in sample regulated agricultural markets. Around 40 per cent of traders out of total sample traders were happy with the quality assessment because there is direct contact exists between farmers and traders. There were 90 per cent of sample traders highly satisfied and satisfied with the weighting procedure in regulated agricultural markets.

There were 75 per cent of sample traders satisfied with the bid management in regulated markets. Auction hall is a major requirement for traders in regulated markets. But there were none of the sample traders highly satisfied with the availability of the auction hall and there were only 35 per cent of sample traders satisfied with this. Due to the lack of auction halls, both farmers and traders used to get a lot of difficulties during the rainy season to make the trade.

Grain storage and cold storage play a significant role to provide a reasonable price to farmers and normal profit to traders. But due to the poor function of grain storage and cold storage, none of the sample traders were satisfied with this. The policymakers should focus to improve this sphere for the betterment of the agrarian community. There were 65 per cent of the sample traders highly satisfied and satisfied with the cleaning process of regulated agricultural markets.

As e-NAM enabled markets all the traders are also highly satisfied and satisfied with the market timing of regulated agricultural markets. But it can be understood that the facilities for traders are not good in regulated markets. There were only 30 per cent of the sample traders happy with the facility provided by the sample regulated markets. About 50 per cent of sample traders gave their consent to accept e-NAM facilitates agricultural markets.

## **5.6 Challenges of Electronic National Agricultural Markets (e-NAM) in Odisha**

About 83.22 per cent of the total population of Odisha lives in rural areas (Population Census, 2011). Agriculture is the mainstay of a large section of rural inhabitants of the state. But there are indeed many obstacles that exist to achieve agricultural prosperity. The average number of villages served by the regulated agricultural markets is more in the state than the national average. The Government of Odisha has integrated e-NAM in 2017 whose frequency is not enough to access the markets by all farmers of the state. The following are the major challenges associated with e-NAM in Odisha.

**Box 5.1** Major challenges of e-NAM in Odisha state

<ul style="list-style-type: none"><li>• Need to create awareness among farmers and traders about the opportunities of e-NAM.</li><li>• Required to employ more well efficient market officials at e-NAM enabled markets.</li><li>• Rationalization should be on the collection of market fees.</li><li>• Need to provide training to farmers, traders, and market officials.</li><li>• Need to increase the number of e-NAM enabled markets.</li><li>• Proper quality assessment should be made by the market officials.</li><li>• The govt. should adopt all major crops grown within the market jurisdiction in the e-NAM list to trade.</li></ul>	<ul style="list-style-type: none"><li>• It is a pre-requisite to improve market infrastructure for the success of e-NAM.</li><li>• Farmers used to sell their crops immediately after harvest because there is no place to store and requirement of immediate cash. Hence, market timing should be fixed as per that.</li><li>• Transportation facilities should be improved which is a major issue.</li><li>• Efficient grain storage and cold storage facilities should be provided to all farmers.</li><li>• The loan from the institutional source should be available to all categories of farmers.</li><li>• The process of trade through e-NAM should be simpler as much as possible.</li></ul>
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Source: Field Survey

Box 5.1 shows the major requirement need to fulfill for the success of e-NAM in Odisha. The above statements have been given from the response collected from the field survey. It is true for many states of India that farmers are not aware of e-NAM. Hence, the policymakers should take necessary auctions to make awareness to the stakeholders. Simultaneously, the government should give opportunities to the market officials of Odisha to visit states like Karnataka, Punjab, Haryana, and Telangana to acquire more knowledge about the functioning of e-NAM.

Indeed, the OSAMB has not included all major crops in the list of commodities approved for trading in e-NAM including rice and wheat which share a large part of the gross cropped area of the state. The government should include all those crops to trade through e-NAM. Farmers used to sell crops immediately after harvest because they do not have enough space to store and for the requirement of cash to pay labour wage, repayment of old debt, children's education, to expenses on social and cultural activities like marriage, festivals, etc. So, the policymakers should open these markets at the appropriate time to purchase crops from the farmers.

Government of Odisha has formulated law to collect uniform market fee from the farmers associated with regulated agricultural markets. But some of the sample farmers have argued that there is no uniformity in market fee collection in these markets. At the ground level it differs from one market to another market. In electronic national agricultural markets there is no provision to collect fees from the farmers. In this market the entire burden of market fee fall upon the traders.

Farmers used to sell their crops at distress prices due to the unavailability of good cold storage and grain storage facilities. Some of the crops are perishable. So, the government should focus on improving these facilities in the state. The study empirically proved that there was 56.52 per cent of sample farmers and 80 per cent of sample traders felt difficulties to trade through e-NAM in the sample markets. Because e-NAM has a unique process of trade that uses the e-auction process of trade. Hence, the process of trade through e-NAM should be made simpler as much as possible.

### **5.7 Major Findings**

The chapter has used completely primary data for analysis. Here, efforts were made to assess the issues and challenges of e-NAM in the state and to trace out the factors that influence farmers to participate in e-NAM enabled markets. The following are the major findings of the chapter.

The Government of India has introduced e-NAM since 2016. But most of the farmers in regulated markets are not aware of the e-NAM and the process of trading. In overall sample regulated markets, only 21.43 per cent and 15 per cent of farmers were aware of e-NAM. It is a surprise to know that some of the farmers were selling at nearby markets of e-NAM but unaware of the implementation of this new platform of agricultural marketing. The role of TV/Radio, fellow farmers, fellow traders, and the market officials are more to proliferate the concept of e-NAM among the farmers and traders.

E-NAM follows a unique process of trade which includes the e-auction process. The electronic markets use more computers and internet to include more numbers of traders across the nation in the process of trade. But farmers in India are not much educated to understand this process. Hence, it is necessary to provide training to market stakeholders about e-NAM and its process of trade. But only 29 per cent and 15 per cent of sample farmers and traders were trained about e-NAM, respectively which needs to be enhanced. The study reveals that none of the sample stakeholders from regulated agricultural markets were trained about e-NAM.

The mean distance covered by sample farmers and traders in electronic national agricultural markets is more than the farmers associated with regulated agricultural markets. The empirical result of the study shows that distance does not matter a lot to participate in e-NAM enabled markets by the farmers.

The government had granted a special package to improve the market infrastructure for e-NAM. The study shows that market infrastructure has significantly increased after the implementation of e-NAM. All basic market infrastructure available in sample e-NAM enabled markets except separate quality assessment lab and cold storage facility in e-NAM Kantabanji of Balangir district. But farmers and traders of regulated markets in the state are deprived to get basic facilities.

One of the important objectives behind the introduction of e-NAM was to provide better price realization and to bring stability in crop prices. But a large proportion of farmers believe that price realization has not increased and price volatility has not declined after the implementation of e-NAM. Some of the sample farmers were believed that the price of most of the crops increased because of the decline in total production. A significant proportion of sample farmers were not aware of the minimum support price and procurement price policies of the government.

Logit regression model was estimated to empirically assess the factors that influence farmers' decision to participate in e-NAM enabled markets of Odisha. The result shows that with a unit increase in the age of farmer, the likelihood of participation in e-NAM facilitates markets decreases by 0.76 times. The role of education is found significant in participation in e-NAM markets. It is found that with a unit increase in the year of schooling, the odd ratios of participation increase by 1.10 times. Farmers are also interested to participate in long-distance electronic markets. The chance of participation of small and marginal, medium and semi medium farmers is more in electronic markets of Odisha state.

The study concludes that very few sample stakeholders believe that the cost of marketing, price manipulation, marketing time, and load has declined after the implementation of e-NAM. But the market officials of e-NAM have a positive response on these components. It can be concluded from the sample study that a very small number of sample farmers and traders believe that competition and arrivals have increased after e-NAM. The policymakers should take necessary policy reforms so that the objectives based on which e-NAM has been introduced will be achieved.



The Likert scale was used in the present study to demonstrate the qualitative response of the sample farmers and traders. The study concludes that the majority of the sample farmers and traders were highly satisfied and satisfied with the market timing in both types of markets. It has been noticed that the performance of cold storage and grain storage facilities are not good in sample markets. Most of the sample farmers and traders are dissatisfied and highly dissatisfied with these components. There were only 28.57 and 25 per cent of sample farmers and traders respectively satisfied with the quality assessment made by market officials of e-NAM enabled markets. There were 38.29 and 40 per cent of sample farmers and traders satisfied with internet connectivity in e-NAM enabled markets.

Unawareness among the stakeholders, lack of efficient market staff, lack of training, problems in the selection of crops to trade in e-NAM, lack of market infrastructure, poor transport facilities, unavailability and poor function of cold storage and grain storage facilities, and the difficult process of trade through e-market are the major challenges in Odisha on the way to achieve success in electronic national agricultural markets.

## Chapter-6 CONCLUSION AND POLICY IMPLICATIONS

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### 6.1 Introduction

During 1950s focus of the Government of India related to the agriculture sector was confined to land reforms. But during the time of mid-1960s objectives has got shifted from the redistribution of landholding to enhance food grains production to the adoption of the green revolution (Chatterjee S. et. al., 2020). India's agricultural sector has transformed over time moving from the state of food deficit to food surplus. At present, India is one of the top producers of many commodities in the world and has boosted its agricultural export by manifold. But still, problems exist from production to marketing of agricultural produces. The central and state governments have adopted various policies and reforms for the holistic development of the sector. But despite the adoption of reforms in various aspects of the sector distress present in the recent past (Kathayat, 2018).

Being one of the agriculturally less developed states, the Government of Odisha enacted APMC Act in 1956 and made amendments in the years 1974, 1975, 1984, 1996, and 2005. OSAMB has integrated 10 regulated agricultural markets in 2017 with the e-NAM portal to bring transparency in the marketing system of the state. But one of the important obstacles on the way to the successful implementation of e-NAM in the state is to convince the farmers and traders for online marketing of agricultural produces.

The present study analyses the performance of e-NAM enabled markets in India in general and Odisha in particular. Specific objectives have been formulated based on the research gap in the existing literature on the topic. The first objective of the study was to analyze the performance of e-NAM in India and Odisha state context. The second objective was to analyze socio-economic differences between stakeholders affiliated with regulated agricultural markets and e-NAM enabled markets. The third objective was to study the issues and challenges involved with e-NAM in Odisha state and to trace out the factors that influence farmers' decision to participate in e-NAM. Both quantitative and qualitative data have been used to evaluate the performance of the newly introduced marketing system in a better way.

The study was carried out by using both primary and secondary data. Primary data was collected in October and November 2019 from four agricultural markets located in Balangir and Koraput districts of Odisha. Secondary data was compiled from various agencies of the Government of India and Odisha.

## **6.2 Summary of the Major Findings**

An extensive literature review has been made for the present study which segregated into five different sections in Chapter-II. It has been analyzed to understand the importance of an efficient agricultural marketing system in India, reforms in agricultural marketing policies, price policies, the nature and characteristics of agricultural markets in Odisha, and electronic national agricultural markets in the context of national level, Karnataka, and Odisha.

The concept of marketing has originated from agriculture. In the micro sense, the activities of marketing have been confined to production and consumption. But in the macro sense, it determines production, distribution, price, investment, and welfare of the agriculturalists. The Government of India and the state government of Odisha have been taking various reforms like APMC, ECA, MAPMC, MAPLMA, and e-NAM in the sphere of marketing for the betterment of the agrarian population. Institutions, incentives, and infrastructure are the major requirement for the better implementation of e-NAM. There is both positive and negative response among the researchers about the success of e-NAM in India.

The integration of regulated markets with the electronic platform is not equal across the states and Union Territories of India. Rajasthan, Gujarat, Maharashtra, and Uttar Pradesh share 51 per cent of the total e-NAM enabled markets of India. Unawareness among the stakeholders and the unique process of trade through e-NAM are the major obstacles to get success. The share of small and marginal category farmers is 92.98 per cent in Odisha whereas 86.20 per cent in India (Agricultural Census, 2015-16). To provide the advantage of economies of scale to the small and marginal farmers, the Government of India has included FPOs in e-NAM enabled markets. But the participation of FPOs of all the states and UTs are not equal. The performance of Odisha on this ground is not satisfactory.

Secondary data has been collected from AGMARKNET source for seven crops to empirically assess the pattern of arrival and price in both pre-eNAM and post-eNAM periods. The study concludes that average arrival into different markets of Odisha has declined for green gram, cashew nut, maize, brinjal, and tomato and it has increased only for cotton and turmeric. It is a good sign that the average price has increased for all crops taken into consideration after the introduction of e-NAM. But price volatility has increased after e-NAM for all selected crops except maize and cashew nuts.

Balangir and Koraput districts have been selected for the sample study based on agro-climatic zones. Both of these districts came under the KBK region of the state. Koraput district is known for its traditional pattern of cultivation system. But various socio-economic indicators show that Balangir district is more developed than Koraput district. Most of the sample farmers were from the Hindu religion and Scheduled Caste, Scheduled Tribes, and Other Backward Caste in both types of sample markets. All the sample traders were from the Hindu religion only and the OBC categories traders have dominance in sample agricultural markets.

At present, there are 68 regulated agricultural markets and 428 market yards are working under the Odisha State Agricultural Marketing Board (OSAMB), Bhubaneswar. But the distribution of these markets across the districts of Odisha is not equal. The average number of villages served by the regulated markets in the state is more than the national average. There are 41 regulated agricultural markets have integrated with the e-NAM platform in the state at present. The study has found that the participation of female farmers is more in regulated markets than the e-NAM enabled markets in Odisha. The less number of female farmers participating in e-NAM enabled markets can be attributed to the use of more computer work and adoption of the e-auction process of trade.

Mobile phone, cattle, shed, tube well, bore well, and pump sets are the major assets captured by sample farmers. Mobile phone, bike, scooter, computer, and radio are the major assets owned by sample traders. Approximately 91.43 per cent and 95 per cent out of the sample farmers and traders respectively have a mobile phone which is used as an essential requirement to make the trade through e-NAM. The study concludes that the sample farmers associated with e-NAM facilitate markets had earned less average annual income than farmers of regulated agricultural markets but it is reverse for the sample traders. The study reveals that 52.86 per cent of sample farmers of regulated markets in the trap of debt as against 40 per cent in e-NAM in the year 2018-19.

It has been four years since the inception of e-NAM in different states and UTs of India. The present study exhibits that a large proportion of farmers associated with regulated markets are not aware of e-NAM which is a major hurdle. The existing literature demonstrates that in states like Karnataka, Rajasthan, and Haryana also most of the farmers were not aware of e-NAM. TV/Radio, fellow farmers, fellow traders, and market officials play a significant role to proliferate the concept of e-NAM in Odisha.

It can be concluded from the study that the market infrastructure has increased a lot after the implementation of e-NAM, especially in Odisha. The government had announced a special package to each electronic market for infrastructural development. All necessary market infrastructure available in sample e-NAM enabled markets. But most of the sample farmers of e-NAM enabled markets criticized poor function of cold storage and grain storage facilities of these markets. The farmers and traders of regulated markets in the state are deprived to get basic market facilities.

The study concludes that very few sample stakeholders believe that the cost of marketing, price manipulation, and marketing load has declined after the implementation of e-NAM. But the market officials of e-NAM have a positive response on these components. It can be concluded from the sample study that a very small number of sample farmers and traders believe that competition and arrivals have increased due to e-NAM. The policymakers should take necessary reforms so that the objectives based on which e-NAM has been introduced will be satisfied.

The study concludes that majority of the stakeholders were highly satisfied and satisfied with the market timing in both types of markets. It has been noticed that the performance of cold storage and grain storage facilities are not good in sample markets. There were only few farmers and traders satisfied with quality assessment in e-NAM enabled markets. Only 40 per cent of sample farmers and traders were satisfied with internet connectivity in e-NAM enabled markets.

Unawareness, lack of market staff, lack of training facilities to stakeholders, biased in selection of crops to trade through e-NAM, poor function of cold storage and grain storage, inefficient transport facilities, and difficulties in process of trade are the major challenges in Odisha state which need to be solved to the successful implementation of electronic national agricultural markets.

### **6.3 Conclusions**

The following are the important conclusions of the present study.

- The number of registered farmers and traders in electronic markets is an important indicator to assess performance. The study concludes that the number of registered farmers and traders is not enough at the national and Odisha state level. It can be

understood from the study that the participation of farmers and traders has declined in the year 2019 as compared to previous years.

- Average arrivals have declined for five different crops such as green gram, maize, brinjal, tomato, and cashew nuts and it has increased only for turmeric and cotton after the implementation of e-NAM. But the average price has increased during the time of post-eNAM for all crops. Some of the samples farmers believe that price of most of the crops have increased during recent years because of the decline in production and not because of the introduction of electronic platform in agricultural markets.
- Price volatility is an important indicator which inspires farmers to make long term investment in cultivation. But the study empirically proved that price instability has declined after e-NAM for only maize and cashew nuts. The existing literature on the topic demonstrates that the pattern of price volatility has not changed for perishable crops even after the introduction of e-NAM. This statement is also applicable in Odisha state concern.
- A large proportion of sample farmers and traders from regulated agricultural markets were not aware of e-NAM. In overall regulated markets only 21.43 per cent and 15 per cent of farmers and traders were aware of the e-NAM, respectively. It is surprising to know that there were some farmers and traders nearby the e-NAM enabled markets but do not have any information about e-NAM and the process of trading of this market.
- e-NAM follows a unique strategy of trade which includes the e-auction process. But farmers in India are not highly educated to understand this process. Only 29 and 15 per cent of sample farmers and traders respectively were trained about e-NAM which needs to be enhanced. Hence, it is a pre-requisite to provide training to market stakeholders about e-NAM and its process of trade.
- The participation of female farmers in regulated agricultural markets is more than the electronic national agricultural markets in Odisha state. It is due to the differences in process of trading in both of these markets.
- A major part of the Gross Cropped Area (GCA) of these sample districts devoted to the cultivation of paddy, maize, finger millet, vegetables, and groundnuts. Paddy is the most important crop grown by the farmers in Odisha. But it is surprising to know that the policymakers have not included paddy in the list of e-NAM for trading.
- The study empirically concludes that with a one-unit increase in the age of farmers, the likelihood of participation in the e-NAM market decreases by 0.76 times. The role of

education is found to be significant in participation at the e-NAM facilitate markets. It is found that with a one-unit increase in the year of schooling, the odd ratios of participation increase by 1.10 times. It has been presumed that farmers used to sell in their nearby markets. But it is not applicable in e-NAM enabled markets. The large farmers have less likelihood to participate in the e-NAM of Odisha.

- Small and marginal farmers are not willing to sell their products through regulated and e-NAM enabled markets due to small amount of production, late payment, more transportation cost, and not having mandi card. These problems can be solved with the inclusion of more FPOs in the marketing activities.
- In the case of both RMC and electronic markets, the government has made provision that the payment will be directly deposited to the bank account of the farmers but some of the farmers do not have a bank account and it is a major problem for small and marginal farmers.
- The agricultural market should be established in plain place. Kunduli electronic market located on a top of a hill. Here, farmers and traders are getting problems to take their vehicle to the market complex. Due to the problem in construction stakeholders have to pay more for transportation and labour costs.
- There is also no uniform market fees collected from farmers and traders by officials in various markets in Odisha.
- Different markets have not yet been integrated which was one of the most important objectives of e-NAM. If all agricultural markets are integrated then only farmers will get competitive prices due to more participation of traders.
- Trade-in regulated markets especially for paddy is very complex. Sometimes it used to take 4-5 days. Due to this farmers have to stay in mandi at night to protect their crops from theft. It also increases the cost of marketing through more vehicle and labour costs.
- Farmer's restroom, washroom, warehouse, and banking service facilities in the electronic national agricultural market complex are appreciable. These facilities should be provided at regulated agricultural markets complex.
- In the electronic national agricultural markets, the government does not charge anything from farmers to manage the trade. The entire amount of market fee has to be paid by the traders. In Odisha, the traders have to pay one per cent of value of produce as market fee to the government.

## 6.4 Policy Implications

The following are the important policy implications from the present study.

- The market officials should organize more and more awareness programs so that the participation of farmers and traders in e-NAM enabled markets will increase rapidly. It's also important to enhance the volume of the transaction through these markets.
- The process of sale through e-NAM should be simpler as much as possible because most of the farmers are not well educated. The frequency of e-NAM and other regulated agricultural markets should increase because proximity is a major determinant of marketing costs.
- Self Help Groups (SHGs) should involve in agricultural marketing activities through e-NAM because the number of Farmers Producers Organizations (FPOs) are not enough. It will help the small and marginal farmers to decrease marketing cost and incentivize to participate in the e-NAM enabled markets through indirectly.
- In e-NAM enabled markets also there is a chance of collusion among traders. To avoid adverse effects of the cartel on farmers trading in e-NAM auction should begin from a minimum price level as like the minimum support price announced by the government before harvesting as the base.
- Enough number of well-trained manpower is necessary for the success of e-NAM and the marketing officers should get exposure to visit other states like Telangana, Punjab, and Karnataka where e-NAM is more successful. It will help them to understand the process of e-NAM in a better way.
- Due to the perishability nature of some crops and the unavailability of proper grain storage and cold storage facilities farmers are being forced to sell at distress prices immediately after harvest. Hence, the policymakers should focus to establish well-efficient grain storage and cold storage facilities, and most importantly the vegetable markets should work daily at e-NAM enabled markets.
- Trade-in both APMC markets and e-NAMs used to take lots of time. Sometimes farmers have to wait for two or three days to sell their produces in regulated markets. These farmers have to pay more rent for the transport vehicle. It means the opportunity cost of time for the farmers is more. Hence, policymakers should focus on decreasing trading time in these markets.
- Farmers in Odisha used to sell produces immediately after harvest because there is no place to store and for the requirement of cash. But it has been noticed that regulated



markets and co-operative societies used to open much later after harvest. It forced the farmers to sell products at private markets. So, the government should timely open these markets.

- Rice and wheat are the major crops grown in Odisha. The co-operative societies have been established by the government to purchase paddy from the farmers at the MSP. Despite this arrangement, the government should include these crops in the e-NAM portal so that farmers can get competitive prices for their produces.
- Major agricultural produces grown within the market area should be made compulsory by the apex agricultural market institution to sell only through e-NAM enabled markets. It will help to decline the long agricultural marketing channel.

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## APPENDIX

### Appendix 1.1 List of Wholesale, Rural Primary and Regulated Markets in different States/UTs

States/UTs	Number of Markets				Regulated Markets			
	Wholesale	% of Total	Rural Primary	% of Total	Principal Markets	% of Total	Sub Markets	% of Total
Andhra Pradesh	190	3.31	157	0.76	190	7.67	157	3.69
Bihar	325	5.67	1469	7.13	-	-	-	-
Chhattisgarh	02	0.03	1132	5.50	69	2.78	118	2.78
Goa	04	0.07	24	0.12	01	0.04	07	0.16
Gujarat	205	3.58	129	0.63	213	8.59	187	4.38
Haryana	281	4.90	195	0.95	107	4.32	174	4.08
Himachal Pradesh	42	0.73	35	0.17	10	0.40	44	1.03
Jammu & Kashmir	-	-	08	0.04	11	0.44	-	-
Jharkhand	201	3.51	602	2.92	28	1.13	173	4.05
Karnataka	315	5.50	730	3.55	157	6.33	356	8.34
Kerala	348	6.07	1014	4.92	-	-	-	-
Madhya Pradesh	-	-	-	-	254	10.25	284	6.66
Maharashtra	881	15.36	3500	17.00	305	12.30	603	14.13
Odisha	398	6.94	1150	5.59	54	2.18	382	8.95
Punjab	424	7.40	1390	6.75	150	6.05	274	6.42
Rajasthan	446	7.78	312	1.51	134	5.41	312	7.31
Tamil Nadu	-	-	-	-	277	11.17	06	0.14
Telangana	150	2.62	110	0.53	150	6.05	110	2.58
Uttar Pradesh	584	10.19	3464	16.82	250	10.08	365	8.55
Uttarakhand	36	0.63	30	0.15	26	1.05	32	0.75
West Bengal	279	4.87	3250	15.79	20	0.81	464	10.87
Assam	405	7.07	735	3.57	20	0.81	206	4.83
Arunachal Pradesh	05	0.09	66	0.32	-	-	-	-
Manipur	24	0.42	95	0.46	-	-	-	-
Meghalaya	35	0.61	85	0.41	02	0.08	-	-
Mizoram	07	0.12	218	1.06	-	-	-	-
Nagaland	19	0.33	174	0.85	18	0.73	-	-
Sikim	07	0.12	12	0.06	-	-	-	-
Tripura	84	1.47	470	2.28	21	0.85	-	-
UTs	35	0.61	33	0.16	12	0.48	13	0.30
Total	5732	100	20589	100	2479	100	4267	100

Source: <http://agricoop.gov.in/sites/default/files/DFI%20Volume%203.pdf> (As of 31.03.2015)

### Appendix 3.1 List of Commodities traded through different e-NAM in India

Foodgrains/ Cereals		Oil Seeds	Fruits		Vegetables		Spices	Misc	
Arhar	Rajma	Castor seed	Amla	Pear	Banana Raw	Jimikand	Ajwain	Areca nut	Bamboo
Arhar Dal Split	Urad Dal Split	Cotton Seed	Apple	Pineapple	Beetroot	Lobia Pods	Black Pepper Whole	Betel leaves	Raw Jute
Bajra	Urad whole	Kusum seed	Apricot	Plum	Bhindi/Okra	Mustard leaf	Cardamoms Whole	Carnation	Rittha
Barley	Wheat	Linseed	Banana	Pomegranate	Bitter gourd	Onion	Cloves Whole	Chhappan Kaddu	Rose Cut Flower
Basmati rice	White Peas	Neem Seeds	Ber	Raw Mango	Bottle gourd	Pea	Coriander whole	Coconut	Saffron
Buck Wheat		Nigar Seed	Cherry Red / Black	Sapota	Brinjal	Pointed gourd	Cumin	Coconut with Husk	Tamarind
Chana Dal Split		Peanut kernel	Custard apple	Stawberries	Cabbage	Potato	Dried Raw Mango Slices	Cotton	Tender coconut
Chana whole		Pongam seeds	Grapes	Sweet orange	Capsicum	Pumpkin	Dry Ginger	Gladiolus	Tuberose
Horse Gram		Sal Seed	Guava	Watermelon	Carrots	Reddish	Fennel seed	Ground nut with pods	Walnuts Inshell
Jowar		Sesame seed	Jackfruit		Cauliflower	Ribbed celery	Fenugreek seed	Guar seed	
Kabuli Chana Whole		Soyabean	Jamun		Cluster beans	Ridge Gourd	Large cardamom	Isabgol	
Lobia		Sunflower seed	Kinnow		Colocasia vegetable	Safed Petha	Red chilli	Jaggery	
Maize			Lemon		Coriander leaves	Sem	Tejpata	Jute Seeds	
Masoor whole			Litchi		Cucumber	Snake Guard	Turmeric	Mahua flower	
Moong Dal Split			Mango		Drumstick	Spinach		Mahua Seed	
Moong whole			Musk melon		Fenugreek Leaves	Sweet Corn		Marigold	
Moth			Orange		Garlic	Sweet potato		Nutmeg Whole	
Oats Raw			Papaya		Ginger	Tapioca		Persimmon	
Paddy			Papaya Raw		Green chillies	Tinda		Raisins	
Ragi			Peach		Ivy gourd	Tomato		Raw Cashew nut	

Source: <https://enam.gov.in/web/commodity/commodity-list>

**Appendix 3.2** Details of change in arrivals during Pre and Post e-NAM

Crop	Mean arrival		% Change in post-eNAM over Pre-eNAM
	Pre-eNAM	Post-eNAM	
Cotton	570.77	980.66	71.81
Turmeric	148.62	194.38	30.78
Green Gram	27.21	18.79	-30.95
Maize	9980.95	7928.67	-20.56
Tomato	1603.15	348.28	-78.28
Brinjal	1833.47	419.99	-77.09
Cashewnuts	66.65	49.29	-26.05

Source: AGMARKNET

**Appendix 3.3** Details of change in crop price during Pre and Post e-NAM

Crop	Mean price		% Change in post-eNAM over Pre-eNAM
	Pre-eNAM	Post-eNAM	
Cotton	4211.44	5033.05	19.51
Turmeric	4791.76	5910.02	23.33
Green Gram	4998.92	5398.01	7.98
Maize	1285.83	1413.81	9.95
Tomato	2041.17	2143.88	5.03
Brinjal	1890.68	2105.23	11.35
Cashewnuts	7870.12	13258.93	68.47

Source: AGMARKNET

**Appendix 4.1** List of Regulated Marketing Committee in all districts of Odisha

Name of the District	No of RMC	% of total RMC in Odisha	No of market yard	% of the total market yard in Odisha
Angul	4	6.16	13	3.04
Baleswar	3	4.61	09	2.10
Bhadrak	2	3.08	11	2.57
Balangir	3	4.61	14	3.27
Bargarh	3	4.61	76	17.76
Boudh	1	1.54	07	1.64
Cuttack	3	4.61	11	2.57
Dhenkanal	3	4.61	07	1.64
Deogarh	1	1.54	03	0.70
Ganjam	3	4.61	06	1.40
Gajapati	1	1.54	06	1.40
Jagatsinghpur	2	3.08	11	2.57
Jharsuguda	1	1.54	03	0.70
Jajpur	1	1.54	11	2.57
Khurdha	2	3.08	07	1.64
Kendrapara	1	1.54	09	2.10
Keonjhar	3	4.61	20	4.67
Kandhamal	2	3.08	08	1.87
Kalahandi	4	6.15	35	8.18
Koraput	2	3.08	49	11.45
Malkangiri	1	1.54	12	2.80
Mayurbhanj	4	6.16	16	3.74
Nabrangpur	1	1.54	18	4.21
Nuapada	1	1.54	07	1.64
Nayagarh	1	1.54	05	1.17
Puri	2	3.08	09	2.10
Rayagada	2	3.08	12	2.80
Sundargarh	3	4.61	15	3.50
Sambalpur	3	4.61	12	2.80
Sonepur	2	3.08	06	1.40
Total	65	100	428	100

Note: Only 9.57 percent out of the total market yards of Odisha have integrated with e-NAM.

Source: OSAMB, Bhubaneswar

CENTER FOR THE STUDY OF REGIONAL DEVELOPMENT

JAWAHARLAL NEHRU UNIVERSITY, NEW DELHI

FIELD SURVEY, 2019

TITLE OF THE DISSERTATION: AN ASSESSMENT OF PERFORMANCE OF ELECTRONIC NATIONAL AGRICULTURAL MARKET (e-NAM) IN ODISHA

REFERENCE PERIOD: JULY 2018- JUNE 2019

NAME OF THE STUDENT: CHANDAN KHANDAGIRI

INTERVIEW SCHEDULE FOR FARMERS

DISTRICT _____	BLOCK _____
LOCATION OF THE MARKET _____	
DATE OF INTERVIEW _____	

[A] FARMERS PERSONAL SCHEDULE

[1] FAMILY DETAILS OF FARMER				
NAME OF THE FARMER: _____				
VILLAGE: _____		CONTACT NUMBER: _____		
Age: _____	Social Group: _____ SC=1, ST=2, OBC=3, Others=4			
Sex: _____ Male=1, Female=2	For how many years are you cultivating? _____			
Marital Status*: _____	Annual income from crop farming: Rs. _____			
Years of schooling completed: _____	Annual income from livestock and allied activities: Rs. _____			
Computer Knowledge: _____ Yes=1, No=2	Annual income from non-agriculture: _____			
Religion: _____ Hindu=1, Muslim=2, Buddhist=3, Christian=4, others=5	Age: →	Below 15	15 to 60	Above 60
Total number of family members: _____	Male			
	Female			
Number of people engaged in agriculture: _____	Male			
	Female			

\* Married=1, Unmarried=2, Widowed=3, Divorced=4

[2] INFORMATION RELATED TO LAND HOLDING (JULY 2018-JUNE 2019) (in acre)

Land	Total value of land	Irrigated	Unirrigated	Source of irrigation*	Terms of lease#
Total owned land					
Area under cultivation					
Non-cultivable land					
Leased-in land					
Leases-out land					
Total operational land					

Code\*: Canal=1, Electric tube well=2, Diesel tube well=3, Bore well=4 Tank=5, others=6

Code#: Share cropping=1, Fixed rent in cash=2, Fixed rent in kind=3, Rent in both cash and kind=4, Others=5

[3] OWNERSHIP OF FARM MACHINERY AND LIVESTOCK

(In Rupees)

SL. NO.	Item	Number	Present value	SL. NO.	Item	Number	Present value
1	Tractors			12	Computer		
2	Trolley			13	Bullock cart		
3	Harrow			14	Farmhouse		
4	Power Tiller			15	Cattle		
5	Cultivator			16	Buffalo		
6	Planker			17	Sheep		
7	Harvester			18	Goat		
8	Diesel pump sets			19	Pig		
9	Agro-processing equipment			20	Poultry		
10	Tube well or Borewell			21	Cattle-shed		
11	Mobile phone			22	Any Others		

[4] INFORMATION RELATED TO FARMERS DEBT ISSUES

4.1. Have you borrowed loans during the last agricultural year? Yes  No

4.2. If yes, please give the following information.

(In rupees)

	Source	Total amount borrowed	Interest per annum	Loan outstanding as on the date of survey	Reason for borrowing	Are you facing any problem?	Suggestions
Formal source	Commercial Banks						
	RRBs						
	Co-operative credit society						
	Self Help Groups						
Informal source	Moneylenders						
	Traders						
	Relatives and friends						
	Commission agents						
	Landlords						

4.3. Are you under compulsion to sell your produces through them only? Yes  No



[5] CROPPING PATTERN (JULY 2018-JUNE 2019)

Season	Crop	Area (in acre)		Production (Qtl)		Total cost of production		Value of Output (Rs)		Sale Price Rs/Qt
		IRRI	UNIRRI	IRRI	UNIRRI	IRRI	UNIRRI	IRRI	UNIRRI	
Kharif										
Rabi										
Summer										
Perennial										

[6] SALE PATTERN OF CROP

(Price and marketing cost Rs. per quintal)

Crop	Total production		Self-consumption		Sold at unregulated market/ local market			Sold at regulated market			Sold at E-NAM enabled regulated market			Others#		
	Qty.	Price	Qty.	Price	Qty.	Price	Mar.c ost	Qty.	Price	Mar.c ost	Qty.	Price	Mar.c ost	Qty.	Price	Mar.c ost

# Crop preserved for seeds, given to relatives, crop loss etc.

\* Reason for large sale in the market \_\_\_\_\_

[B] AGRICULTURAL MARKETING WITH SPECIAL REFERENCE TO e-NAM

[1] Where do you sell your products? (i) Nearest market  (ii) Distant market

1.1. Do you sell in the nearest market or in the distance market? \_\_\_\_\_

1.2. Distance from your home to market \_\_\_\_\_ Km

1.3. If you sell in the distant market

1.2.1. Reasons \_\_\_\_\_

1.2.2. Problems regarding the mode \_\_\_\_\_

1.2.3. Transportation cost and other incidental costs (Rs./Qtl) \_\_\_\_\_

1.2.4. Suggestions \_\_\_\_\_

1.4. Whether the market is:

(i) Unregulated market  (ii) Regulated market  (iii) e-NAM

1.5. How many days you have to wait for sale through this mode? \_\_\_\_\_

1.6. Is there any help desk in the market? Yes  No

1.7. Reasons for sale through the mode:

(i) Immediate payment  (ii) Less role of middlemen

(iii) Right price  (iv) Time saving  (v) Accept small lots

(vi) Low marketing cost

(vi) Any other (please specify) \_\_\_\_\_

[2] Are you aware about the e-NAM scheme of the government of India? Yes  No

2.1. Where did you get the information?

(i) From Newspaper  (ii) From advertisement in TV/Radio

(iii) From market officials  (iv) From neighbouring farmer  (v) From traders

(vi) From any other source (specify) \_\_\_\_\_

[3] Have you attended any training program? Yes  No

3.1. Which was the conducting authority of training? \_\_\_\_\_

3.2. If yes, how many training programs have you attended? \_\_\_\_\_

3.3. What was the duration of the program? \_\_\_\_\_ Hour

3.4. Did you pay to attend the training program? Yes  No

3.5. If yes, how much have you paid? Rs. \_\_\_\_\_

3.6. Did it help to understand the process of e-NAM? Yes  No

3.7. Do you think that is enough to make the trade through e-NAM? Yes  No

3.8. Remarks \_\_\_\_\_

[4] Is it mandatory to register for trade through e-NAM? Yes  No

4.1. Do you have to pay for registration? Yes  No

4.2. If yes, how much you pay? Rs. \_\_\_\_\_

4.3. Can you sell your crop in all e-markets with the same license? Yes  No

[5] Are you paying market fees to sell your products through the market? Yes  No

5.1. If yes, how much are you paying per quintal? Rs. \_\_\_\_\_

5.2. Is it same for all markets in the state? Yes  No

[6] Are you satisfied with the available infrastructure in the market? Yes  No

6.1. If no, why \_\_\_\_\_

6.2. Is there any need to improve the software design of e-portal? Yes  No

6.3. Has transparency in sales increased after the introduction of e-NAM?

Yes  No

6.4. Is the process of sale through e-NAM more complicated? Yes  No

6.5. Is e-NAM help to save time as compared to other agricultural markets?

Yes  No

6.6. Do you think marketing loads less in the e-platform market? Yes  No

6.7. Has farm income to some extent increased after the introduction of e-market?

Yes  No

6.8. Any suggestions would you like to give? \_\_\_\_\_

---

[7] According to your perspective, how the following components have changed after the introduction of electronic platform in agricultural markets?

7.1. Has marketing cost declined? Yes  No

7.2. Is there more competition among traders in the e-platform market? Yes  No

7.3. Have market arrivals increased? Yes  No

7.4. If yes, do you think market arrivals have increased due to this system? (i) Yes

(ii) No  (iii) any other reason (please specify) \_\_\_\_\_

7.5. Are you getting any problem regarding bidding? Yes  No

7.6. If yes, what is that? \_\_\_\_\_

7.7. Can you check the price of your produces by yourself? Yes  No

7.8. Does price manipulation has declined because of more traders? Yes  No

7.9. Is price realization more in electronic markets? Yes  No

7.10. Has price volatility declined? Yes  No

7.11. Are you aware about the Minimum Support Price of GoI? Yes  No

7.12. Do you know about the procurement price of GoI? Yes  No

7.13. What was the MSP of three major crops in the last agricultural year?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7.14. Suggestion \_\_\_\_\_

[8] Do you get SMS after your consent to sell? Yes  No

8.1. If yes, do you get SMS in the local language? Yes  No

8.2. Can you use the mobile app to manage your trade? Yes  No

8.3. Through which mode did you get your payment?

(i) Cash  (ii) Internet banking  (iii) Challan  (iv) Any other mode (Please specify) \_\_\_\_\_

8.4. How many days you have to wait to get your payment

(i) Within 2 day  (ii) 3-5 days  (iii) 5-10 days

(iv) More than 10 days

8.5. Have you ever rejected lower bid prices? Yes  No

8.6. Is there any problem regarding the mode of payment? Yes  No

8.7. If yes (please specify) \_\_\_\_\_

[9] How would you rate the following on the basis of your satisfaction level?

Particular	Highly satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Highly dissatisfied	Reasons behind satisfaction or dissatisfaction	Suggestions
Mode of collection of crop produce							
Quality assessment of crop produce							
Weighting procedure							
Internet connectivity							
Bid management							
e-Auction hall							
Information dissemination							
Public address system							
Grain storage							
Cold storage							
Packing facility							
Cleaning process							

Particular	Highly satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Highly dissatisfied	Reasons behind satisfaction or dissatisfaction	Suggestions
Market timing							
Facility for farmers*							
Acceptance of e-NAM							

\* Farmers rest house, drinking water facility, washroom, etc.

***THANK YOU FOR YOUR TIME AND CO-OPERATION!!***

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REFERENCE PERIOD: JULY 2018- JUNE 2019

NAME OF THE STUDENT: CHANDAN KHANDAGIRI

INTERVIEW SCHEDULE FOR TRADERS

DISTRICT _____	LOCATION OF THE MARKET _____
BLOCK _____	DATE OF INTERVIEW _____
NAME OF THE MARKET _____	

[1]DETAILS OF TRADER				
NAME OF THE TRADER _____				
VILLAGE: _____ CONTACT NUMBER: _____				
Age: _____	Social group: _____ SC=1, ST=2, OBC=3, Others=4			
Sex: _____ Male=1, Female=2	For how many years are you trading? _____			
Marital status*: _____	Annual income from trade: _____			
Years of schooling completed: _____	Annual income from other sources: _____			
Religion#: _____				
Total number of family members: _____	Age: _____ →	Below 15	Between 15 to 60	Above 60
	Male			
	Female			
Number of people engaged in trade:	Male			
	Female			

\* Married=1, Unmarried=2, Widowed=3, Divorced=4

# Hindu=1, Muslim=2, Buddhist=3, Christian=4, Others=5



[2] OWNERSHIP OF TRADE RELATED ASSETS

Item	Number	Present Value (Rs)	Item	Number	Present Value (Rs)
Radio			Farmhouse		
Television			Bullock cart		
Mobile Phone			Tractor		
Computer			Trolley		
Bike/Scooter			Any other assets (Specify)		
Personal car					

[3] INFORMATION RELATED TO LAND HOLDING (JULY 2018-JUNE 2019) (in acre)

Land	Total value of land	Irrigated	Unirrigated	Source of irrigation*	Terms of lease#
Total owned land					
Area under cultivation					
Non-cultivable land					
Leased-in land					
Leases-out land					
Total operational land					

Code\*: Canal=1, Electric tube well=2, Diesel tube well=3, Bore well=4 Tank=5, others=6

Code#: Share cropping=1, Fixed rent in cash=2, Fixed rent in kind=3, Rent in both cash and kind=4, Others=5

[4] DETAILS OF CROP TRADE (JYLY 2018-JUNE 2019)

Season	Crop	Quantity (Qt)	Purchase price (Rs/Qt)	Total Value (Rs)	Reasons behind the purchase of crop
Kharif					
Rabi					
Summer					
Perennial					

[B] AGRICULTURAL MARKETING WITH SPECIAL REFERENCE TO e-NAM

[1] Which is the nearest local market to purchase agricultural produce? \_\_\_\_\_

1.1. Where do you purchase your agricultural produces?

(i) Nearest market  (ii) Distant market

1.2. Distance from your home to market \_\_\_\_\_ Km

1.3. If you buy from the distance market

1.2.1. Reasons \_\_\_\_\_

1.2.2. Problems regarding the mode \_\_\_\_\_

1.2.3. Transportation and other incidental costs (Rs./Qtl) \_\_\_\_\_

1.2.4. Suggestions \_\_\_\_\_

1.4. Whether the market is:

(i) Unregulated market  (ii) Regulated market  (iii) e-NAM

1.5. How many days you have to wait to buy through the mode? \_\_\_\_\_

1.6. Is there any help desk in the market? Yes  No

1.7. Reason for trade through the mode: \_\_\_\_\_

[2] Are you aware about the e-NAM scheme of the government of India? Yes  No

2.1. If yes, from where did you get the information?

(i) Newspaper  (ii) Advertisement in TV/Radio

(iii) Market officials  (iv) Neighbouring farmer  (v) Traders

(vi) Any other source (specify) \_\_\_\_\_

[3] Have you attend any training program on e-NAM? Yes  No

3.1. If yes, how many training programs have you attended? \_\_\_\_\_

3.2. Which was the conducting authority of the training? \_\_\_\_\_

3.3. Have you paid to attain the training program? Yes  No

3.4. If yes, how much have you paid? Rs \_\_\_\_\_

3.5. What was the duration of the program? \_\_\_\_\_ Hour

3.6. Did it help to understand the process of e-NAM? Yes  No

3.7. Do you think that is enough to make the trade through e-NAM? Yes  No

3.8. Remarks \_\_\_\_\_

[4] Is it mandatory to register for trade through the market? Yes  No

4.1. Do you have to pay for registration? Yes  No

4.2. If yes, how much you pay? \_\_\_\_\_ Rs.

4.3. Can you trade in all e-markets with the same license? Yes  No

[5] Are you paying market fees to trade through the market? Yes  No

5.1. If yes, how much are you paying per quintal? \_\_\_\_\_ Rs.

5.2. Is it same for all markets in the state? Yes  No

[6] Are you satisfied with the available infrastructure in the market?

6.1. If no, why \_\_\_\_\_

6.2. Is there any need to improve the software design of e-portal? Yes  No

6.3. Has transparency increased after the introduction of the system? Yes  No

6.4. Do you think the process of sale through e-NAM more complicated? Yes  No

6.5. Is e-NAM help to save time as compared to other agricultural markets?

Yes  No

6.6. Do you think the marketing load has declined in e-NAM? Yes  No

6.7. Any suggestions would you like to give? \_\_\_\_\_

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[7] According to your perspective, how the following components have changed after the introduction of electronic platforms in agricultural markets?

7.1. Has marketing cost declined? Yes  No

7.2. Have market arrivals increased? Yes  No

7.3. If yes, do you think market arrivals have increased due to this system? (i) Yes

(ii) No  (iii) any other reason (please specify) \_\_\_\_\_

7.4. Are you getting any problem regarding bidding? Yes  No

7.5. If yes, what is that? \_\_\_\_\_

7.6. Can you check the price of your purchases by yourself? Yes  No

7.7. Has price volatility declined? Yes  No

7.8. Suggestions \_\_\_\_\_

[8] Do you get SMS after your consent to purchase? Yes  No

8.1. If yes, do you get SMS in the local language? Yes  No

8.2. Can you use the mobile app to manage your trade? Yes  No

8.3. Through which mode you make payments to farmers?

(i) Cash  (ii) Internet banking  (iii) Challan  (iv) Any other mode (Please specify) \_\_\_\_\_

8.4. How many days you have to wait to get your purchases

(i) Within 2 day  (ii) 3-5 days  (iii) 5-10 days

(iv) More than 10 days

8.5. Have you ever rejected higher bid prices? Yes  No

8.6. Is there any problem regarding the mode of payment? Yes  No

8.7. If yes (please specify) \_\_\_\_\_

[9] Do you have to deposit some security to trade through e-NAM? Yes  No

9.1. If yes, mention the amount Rs. \_\_\_\_\_

9.2. Are you trading with your own fund? Yes  No

9.3. If no, from where have you borrowed? \_\_\_\_\_

9.4. What is the rate of interest per month? \_\_\_\_\_

9.5. Are you advancing loans to farmers? Yes  No

9.6. If yes, is it mandatory for the farmers to sell their produces through you because of the loan? Yes  No

[10] Are you lending loans to farmers? Yes  No

10.1. If yes, is it compulsion for farmers to sell their produces only through you?

Yes  No

[9] How would you rate the following on the basis of your satisfaction level?

Particular	Highly satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Highly dissatisfied	Reasons behind satisfaction or dissatisfaction	Suggestions
Mode of crop collection							
Quality assessment of crop							
Weight procedure							
Internet connectivity							
Bid management							
e-Auction hall							
Information dissemination							
Public address system							
Warehouse							
Cold storage							
Packing facility							

Particular	Highly satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Highly dissatisfied	Reasons behind satisfaction or dissatisfaction	Suggestions
Cleaning process							
Market timing							
Facility for traders*							
Acceptance of e-NAM							

\* Traders rest house, Separate auction hall for traders, drinking water facility, washroom, etc.

***THANK YOU FOR YOUR TIME AND CO-OPERATION!!***

CENTER FOR THE STUDY OF REGIONAL DEVELOPMENT

JAWAHARLAL NEHRU UNIVERSITY, NEW DELHI

FIELD SURVEY, 2019

TITLE OF THE DISSERTATION: AN ASSESSMENT OF PERFORMANCE OF ELECTRONIC NATIONAL AGRICULTURAL MARKET IN ODISHA

REFERENCE PERIOD: JULY 2018- JUNE 2019

NAME OF THE STUDENT: CHANDAN KHANDAGIRI

INTERVIEW SCHEDULE FOR MARKET OFFICIAL

NAME OF THE MARKET: _____	
NAME OF THE MARKET OFFICER: _____	
DESIGNATION: _____	NUMBER OF SUB-YARD: _____
CONTACT. NO: _____	TOTAL AREA OF THE MARKET: _____
DISTRICT: _____	LOCATION OF THE MARKET: _____
BLOCK: _____	DATE OF INTERVIEW: _____

[1] INFORMATION RELATED TO MARKET

No of registered farmers	No of registered traders	No of commission agents	Area served by the market (Sq. Km)

[2] DETAILS OF CROP

Major crops grown in the market jurisdiction	Whether included in e-tender or not	Reasons behind selection or not	Market fee collection(Rs) (2018-19)



Major crops grown in the market jurisdiction	Whether included in e-tender or not	Reasons behind selection or not	Market fee collection(Rs) (2018-19)

[3] INFORMATION RELATED TO FUND AND TRAINING PROGRAMME

3.1. How much fund has the market received from the government to install market infrastructure? \_\_\_\_\_ (In rupees)

3.2. Do you think that is enough? Yes  No

3.3. Are you satisfied with the overall infrastructure of the market? Yes  No

3.3.1. Have you attended any training program on e-NAM? Yes  No

3.3.2. If yes, which was the conducting authority of training? \_\_\_\_\_

3.3.3. Have you paid for the training program? Yes  No

3.3.4. How many training programs have you attended? \_\_\_\_\_

3.3.5. Did it help to understand the process of e-NAM? Yes  No

3.3.6. Do you think that is enough to conduct trade through e-NAM? Yes  No

3.3.7. Suggestions \_\_\_\_\_

[4] DETAILS OF MARKET INFRASTRUCTURE

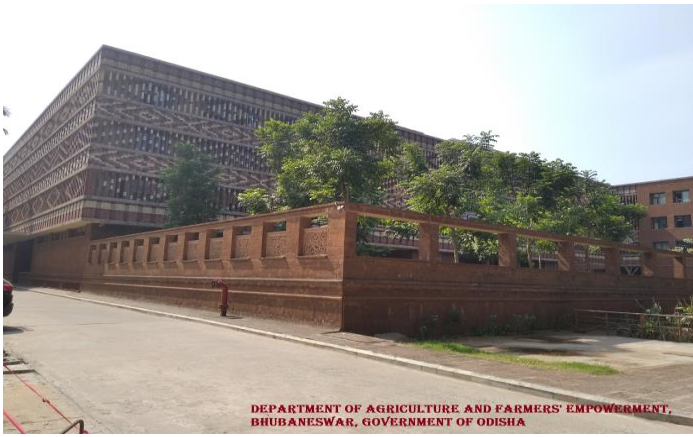
Particular	Available or not	No.	No of permanent market officials	No of temporary workers	Cost of installation (Rs)	Are you facing any problem under this head?	Suggestions
Gate entry							
Weight bridge							
Quality assessment equipment							
Quality assessment lab							
Generator							
Computer/Desktop/Laptop							
Information display board							
Public address system							
E-auction hall							
Separate auction hall for traders							
Warehouse							
Cold storage							

Particular	Available or not	No.	No of permanent market officials	No of temporary workers	Cost of installation (Rs)	Are you facing any problem under this head?	Suggestions
Office building							
Farmers/traders restroom							
Cleaning process							
Drinking water facilities							
Washroom							
Gate exit							
Others*							

[5] How do you think about the following features of marketing after the introduction of e-NAM?

Components	Yes	No
Has marketing cost declined?		
Do you think arrivals have increased?		
Have the prices of agricultural produces increased?		
Has price volatility declined after introduction of e-NAM?		
Has competition among traders increased?		
Has transparency in agricultural trade increased?		
Is there a need to improve software design?		
Do you think cartel among traders still takes place after e-NAM?		
Do you think traders still do malpractice activities in the e-NAM market?		

***THANK YOU FOR YOUR TIME AND CO-OPERATION!!***



DEPARTMENT OF AGRICULTURE AND FARMERS' EMPOWERMENT, BHUBANESWAR, GOVERNMENT OF ODISHA



ଜିଲ୍ଲା ଯୋଜନା ଓ ପର୍ଯ୍ୟବେକ୍ଷଣ ଶାଖା, କୋରାପୁଟ, (ଓଡ଼ିଶା)  
DISTRICT PLANNING AND MONITORING UNIT (DPMU), KORAPUT, (ODISHA) e-mail: plankpt1@gmail.com  
Phone: 06852-252316  
CICI Bank | [www.cici.co.in](http://www.cici.co.in)



ଓଡ଼ିଶା ସାଂଖ୍ୟିକ ଓ ପରିସଂଖ୍ୟା ଦିଗର ଦିଗ୍ଘୋଷ  
DIRECTORATE OF ECONOMICS & STATISTICS  
ODISHA



ଜାତୀୟ କୃଷି ବଜାର, କୁଣ୍ଡୁଳି  
NATIONAL AGRICULTURE MARKET KUNDULI



ଓଡ଼ିଶା ରାଜ୍ୟ କୃଷି ବିପଣନ ପରିଷଦ  
ODISHA STATE AGRICULTURAL MARKETING BOARD  
JSPFC BANK



NATIONAL AGRICULTURE MARKET, KUNDULI KORAPUT



NATIONAL AGRICULTURE MARKET, KUNDULI, KORAPUT



OFFICE OF THE DEPUTY DIRECTOR OF AGRICULTURE  
KORAPUT RANGE, JEYPORE  
କୃଷି ସହ ବିକେନ୍ଦ୍ର କୋରାପୁଟ ନିର୍ଦ୍ଦେଶକଙ୍କ କାର୍ଯ୍ୟାଳୟ, ଜୟପୁର



