A STUDY ON EFFECTIVENESS OF e-NAM IN DUGGIRALA MARKET OF ANDHRA PRADESH

M. SHANMUKH RAJU
B. Sc. (Ag.)

MASTER OF SCIENCE IN AGRICULTURE
(AGRICULTURAL EXTENSION)

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A STUDY ON EFFECTIVENESS OF e-NAM IN DUGGIRALA MARKET OF ANDHRA PRADESH

By

M. SHANMUKH RAJU

B. Sc. (Ag.)

THESIS SUBMITTED TO THE
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CHAIRPERSON: Dr. M. RAMA DEVY

ANGRAU

DEPARTMENT OF AGRICULTURAL EXTENSION
AGRICULTURAL COLLEGE, BAPATLA
ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
GUNTUR – 522 034. A.P.

2020

DECLARATION

I, **Mr. M. SHANMUKH RAJU** hereby declare that the thesis entitled **"A STUDY ON EFFECTIVENESS OF e-NAM IN DUGGIRALA MARKET OF ANDHRA PRADESH"** submitted to **Acharya N.G. Ranga Agricultural University** for the degree of **MASTER OF SCIENCE IN AGRICULTURE** is the result of original research work done by me. I also declare that any material in the thesis has not been published earlier in any manner.

Place : Bapatla **(M. SHANMUKH RAJU)**

Date : **(ID. No. BAM-18-53)**

CERTIFICATE

Mr. M. SHANMUKH RAJU has satisfactorily prosecuted the course of research and the thesis entitled **"A STUDY ON EFFECTIVENESS OF e-NAM IN DUGGIRALA MARKET OF ANDHRA PRADESH"** submitted is the result of original research work and is of sufficiently high standard to warrant its presentation to the examination. I also certify that the thesis or part thereof has not been previously submitted by him for a degree of any university.

Place : Bapatla

Date :

(M. RAMA DEVY)
Chairperson
Professor
Dept. of Agricultural Extension
Agricultural College
Bapatla – 522 101

CERTIFICATE

This is to certify that the thesis entitled **"A STUDY ON EFFECTIVENESS OF e-NAM IN DUGGIRALA MARKET OF ANDHRA PRADESH"** submitted in partial fulfillment of the requirements for the degree of '**MASTER OF SCIENCE IN AGRICULTURE'** of the Acharya N.G. Ranga Agricultural University, Lam, Guntur is a record of the bonafide original research work carried out by **Mr. M. SHANMUKH RAJU** under our guidance and supervision.

No part of the thesis has been submitted by the student for any other degree or diploma. The published part and all assistance received during the course of the investigations have been duly acknowledged by the author of the thesis.

Thesis Approved by the Student's Advisory Committee

Chairperson : **Dr. M. RAMA DEVY**
Professor
Department of Agricultural Extension
Agricultural College
Bapatla – 522 101

Member : **Dr. P. V. SATHYA GOPAL**
Professor
Department of Agricultural Extension
S. V. Agricultural College
Tirupati – 517 502

Member : **Dr. M. SREE REKHA**
Senior Scientist & Head (Agronomy)
College Farm
Agricultural College
Bapatla – 522 101

Date of final viva-voce:

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Place *: Bapatla* **(M. Shanmukh Raju)**
Date *:*

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LIST OF SYMBOLS AND ABBREVIATIONS

%	:	Percentage
i.e.	:	That is
$\overline{X}$	:	Arithmetic mean
σ	:	Standard deviation
>	:	Greater than
<	:	Less than
≥	:	Greater than or equal to
≤	:	Less than or equal to
=	:	Equal to
&	:	And
A	:	Agree
ADA	:	Assistant Director of Agriculture
ADH	:	Assistant Director of Horticulture
AEO	:	Agriculture Extension Officer
ANGRAU	:	Acharya N. G. Ranga Agricultural University
APMC	:	Agricultural Produce Market Committee
ATIF	:	Agri-Tech Infrastructure Fund
BHIM	:	Bharat Interface for Money
CA	:	Commission Agent
CIG	:	Commodity Interest Group
DA	:	Disagree
DARPG	:	Department of Administrative Reforms and Public Grievances
DDH	:	Deputy Director of Horticulture
DEO	:	Data Entry Operator
DPC	:	Direct Purchase Centre
e-NAM	:	National Agricultural Market
e-NWR	:	Electronic Negotiable Warehouse Receipts
et al.	:	And others
etc.	:	Et cetera

F	:	Frequency
FGD	:	Focus Group Discussion
Fig	:	Figure
FIG	:	Farmer Interest Group
FPO	:	Farmer Producer Organization
FYM	:	Farm Yard Manure
GFPCL	:	Girimala Farmers Producer Company Ltd.
GOI	:	Government of India
H_0	:	Null hypothesis
H_1	:	Alternate hypothesis
HEO	:	Horticulture Extension Officer
ID	:	Identity Document
IFSC	:	Indian Financial System Code
INR	:	Indian Rupee
IT	:	Information Technology
JDA	:	Joint Director of Agriculture
JDH	:	Joint Director of Horticulture
KCC	:	Kisan Credit Card
Ltd.	:	Limited
MAO	:	Mandal Agricultural Officer
MGNREGS	:	Mahatma Gandhi Employment Guarantee Scheme
MHO	:	Mandal Horticultural Officer
MPFSRPCL	:	Mahakaushal Progressive Farmers Self Reliant Producer Company Ltd
MSP	:	Minimum Support Price
MT	:	Million Tons
n	:	Sample Size
N	:	Number of Respondents
NEFT	:	National Electronic Funds Transfer
NGO	:	Non-Government Organisation
NHM	:	National Horticulture Mission
NS	:	Non-Significant
PG	:	Post Graduate

PIB	:	Press Information Bureau
PMFBY	:	Pradhan Mantri Fasal Bima Yojana
PPP	:	Public Private Partnership
ReMS	:	Rashtriya e Market Services Private Limited
RFIS	:	Reliance Foundation Information Services
RKVY	:	Rashtriya Krishi Vikas Yojana
RMC	:	Regulated Market committee
RTGS	:	Real Time Gross Settlement
SA	:	Strongly Agree
S.D.	:	Standard Deviation
SDA	:	Strongly Disagree
SFAC	:	Small Farmers Agribusiness Consortium
SHC	:	Soil Health Card
SMS	:	Short Message Service
S. No.	:	Serial Number
SOP	:	Standard Operating Procedure
SSC	:	Secondary School Certificate
TV	:	Television
UD	:	Undecided
UMP	:	Unified Market Portal
UT	:	Union Territory
VHA	:	Village Horticulture Assistant
viz.	:	Namely
Vs	:	Against
WDRA	:	Warehousing Development and Regulatory Authority
YSRHU	:	Y.S.R Horticulture University

ABSTRACT

Name of the Author	:	**M. SHANMUKH RAJU**
Title of the thesis	:	**"A Study on Effectiveness of e-NAM in Duggirala Market of Andhra Pradesh"**
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The study was conducted to analyse the profile of e-NAM registered farmers and to explore the functioning of e-NAM in Duggirala market of Andhra Pradesh. Knowledge of e-NAM registered farmers in the functioning / features of e-NAM was examined. Effectiveness of e-NAM in enhancing farm income as perceived by e-NAM registered farmers was assessed. The relationship between profile and knowledge of e-NAM registered farmers was elicited. The constraints faced by e-NAM registered farmers and suggestions given by them to overcome their constraints were educed. A strategy was developed to fulfil the objectives of e-NAM.

Exploratory research design was followed for the study. The investigation was purposively carried out in Guntur district of Andhra Pradesh during the year 2019-20 as the locale consists of highest number of e-NAM registered farmers in the state. Duggirala e-NAM was selected purposively as it was only the e-NAM integrated APMC having 100 per cent online transactions in the state. Six mandals with highest number of e-NAM registered farmers namely Kollur, Kollipara, Bhattiprolu, Tenali, Mangalagiri and Duggirala in Guntur district were purposively selected for the study. From each mandal 20 e-NAM registered farmers were selected randomly thus, making a total of 120. The data was collected with the help of semi-structured interview schedule through personal interview method and focused group discussions. The data obtained was analyzed by using suitable statistical methods.

The detailed analysis of the study has shown that majority of e-NAM registered farmers were in middle age, completed high school education, small farmers, had medium level of social participation, mass media exposure, extension contact, risk orientation, market orientation, income orientation, telescopic faculty and economic motivation. The study revealed that majority of e-NAM registered farmers had medium level of knowledge on functioning / features of e-NAM. Further, the study also revealed that majority of e-NAM registered farmers' perceived medium effectiveness of e-NAM in enhancing their farm income.

The entire functioning of e-NAM was categorized phase-wise *viz*., Gate entry, Assaying, Online trading, Weighment & Invoice, Online payment and Gate exit. The functioning under each phase was explored by taking the components of each phase in to consideration as well as the prescribed guidelines of e-NAM for each component. Accordingly, the deviations were documented with proper reasoning. Further, the consequences of deviation were also documented keeping in view of the effective functioning of e-NAM.

Among the major constraints faced by e-NAM registered farmers, lack of remunerative prices was the major constraint while trading in e-NAM followed by cartelization of traders, complexity of e-NAM trading process, price doesn't match with quality of produce, substantial decrease in bid prices, low participation of traders, difficult to meet immediate cash requirements, poor functioning of quality assaying unit and lack of digital literacy. The major suggestions given by them were bid prices should start from MSP, payment settlement on the same day of trading, Provision of live trading experience, proper awareness and trainings should be given to farmers on operation of scheme, effective feedback mechanism should be established, dissemination of market information and hamali charges regulation.

Chapter - I

Introduction

Chapter I

INTRODUCTION

One third of Indian population is rural and depend directly or indirectly up on agriculture for their sustenance, that is why Indian economy is considered predominantly as Agrarian because it is centered upon the production, consumption, trade and sale of agricultural commodities, including plants and livestock and had been the backbone of Indian economy from times immemorial.

Though our county had witnessed a spectacular advancement in agriculture productivity, farmers are being fall back on to distress in selling the produce even though their achievement in harvest is stupendous. At the same time high priced agri-commodities are testing the patience of the consumers.

The Indian Agricultural Marketing had witnessed transformation of the selling of the agriculture produce from barter basis followed by exchange for money in rural haats, local markets *etc.* to cooperatives. Finally, the well-established network of cooperatives took the lead of agricultural marketing at local, regional, state and national levels. Policy distortions, inadequate infrastructure and other operational constraints are the main aches of this Cooperative marketing. Under the Model APMC Act, 2003 the State Governments in India had established Agriculture Produce Market Committee (APMC) as a statutory body to safeguard the farmers from exploitation of middlemen, to reduce the price spread from farmer to consumer and to trade certain notified agricultural, horticultural and livestock products. Due to its localized specific marketing avenued nature, the effective functioning of the APMC is narrowed down by limited participation of the buyers, adoption of traditional methods of auction, low income, unequal spread of prices and licensing barriers.

Better price realization is one pivotal way to accomplish the ambitious goal of doubling the farmer's income by 2022.This can be attained by providing real time price discovery and remunerative prices to their harvest through upgrading long established APMCs to Electronic Markets.

The Government of India had launched e-NAM in the Year 2016 with an objective of integrate markets at State as well as national level through a common online platform with uniform transactions across the country. It is envisioned as Pan India electronic trading portal and it brings interconnectivity among the existing APMC markets across the country. Its main objective is to create a national network of virtual agricultural market which has a physical market (mandi) at the back end that can be accessed online.

The NABARD created "Agri-Tech Infrastructure Fund" (ATIF) for promotion of e-NAM. Small Farmers Agribusiness Consortium (SFAC) is the lead agency for implementing e-NAM and Nagarjuna Fertilizers and Chemicals Ltd. is the strategic partner which is accountable for development, operation and maintenance of the platform. Farmers, Traders, APMCs, Farmer Producer Organizations' (FPO), Logistics operators, Assaying Bodies, Banks, Warehouses, Mandi board *etc.* are the key stakeholders involved in e-NAM with an objective of achieving win-win solution for agricultural marketing.

Eligibility criteria of APMC to integrate with e-NAM

In order to facilitate both unification of market and online trading, it is necessary for the state to undertake reforms prior to seeking assistance under the scheme in respect of 1. A single license to be valid across state, 2. Single point levy of market fee and 3. Provision for electronic auction as a mode for Price discovery.

Only that state/UT, that has completed these three prerequisites, will be eligible for assistance under the scheme. The states must ensure that the reforms are carried out both in letter and spirit through appropriate and unambiguous provisions in the APMC acts and rules. The state marketing boards / APMC's must enable the promotion of e-auction platform. The states will need to ensure that the mandis that are integrated with e-NAM makes provision for requisite online connectivity, hardware and assaying equipment.

Vision

To promote uniformity in agriculture marketing by streamlining of procedures across the integrated markets, removing information asymmetry between buyers and sellers and promoting real time price discovery based on actual demand and supply.

Mission

Integration of APMCs across the country through a common online market platform to facilitate Pan-India trade in agriculture commodities, providing better price discovery through transparent auction process based on quality of produce along with timely online payment. (National Agriculture Market, 2016)

Objectives of e-NAM

- To establish a national e-market platform for transparent sale transactions and price discovery initially in regulated markets.
- To make sure that willing States enact suitable provisions in their APMC Act for promotion of e-trading by their State Agricultural Marketing Board/APMC.
- Liberal licensing of traders / buyers and commission agents by State authorities without any pre-condition of physical presence or possession of shop /premises in the market yard.
- To provide one license for a trader valid across all markets in the State.
- Harmonization of quality standards of agricultural produce and provision for assaying (quality testing) infrastructure in every market to enable informed bidding by buyers.
- Single point levy of market fees, i.e. on the first wholesale purchase from the farmer.
- Extend provision of Soil Testing Laboratories near the selected mandi to facilitate visiting farmers to access this facility in the mandi itself.

Features of e-NAM

e-NAM is the largest e-trading platform for farmers in India. It is envisaged to protect the farmers' as well as consumers' interest in fair agricultural marketing practices. Many features such as the provision of online trading for better transparency and accountability, assaying facilities for fair prices against quality, online auction for fair and transparent price discovery, weighment integration for accuracy, online payment for right time price realization makes e-NAM superior to the traditional system. In addition, e-NAM Mobile application provides handy information to the stakeholders at any place and time.

Process flow of e-NAM

a. **Gate entry:** The trade process flow starts from the gate entry. Once a farmer has entered into the market along with his/her commodity, an electronic gate entry slip is generated. An entry slip consists of lot code (as a sequence of Mandi code-year-month-date-lot of the day), Farmer's name, contact details of the farmer, Village, Commission Agent's name and Company, Commodity, number of bags, bag type, approximate quantity, vehicle number, market/sub market detail, lot type (primary or secondary sales) and government ID. In this process, registration is done for the first time mandi visitor.
b. **Unloading of Commodity at Auction / Trading platform and Assaying:** If farmers prefer a particular commission agent, allotment of the commission agent to the farmer is done at the gate entry as per his/her demand, otherwise, farmers can unload their produce in any of the trading platforms. The lot ID (gate entry slip) is displayed on the top of the lot in the trading platform. The Assaying Lab technician from the APMC will visit the lot and collect a minimum of 250 grams of the sample of the commodity for assaying. After drawing the sample, the assaying process is completed and the assaying report against the lot number is uploaded to e-NAM website for the next process. However, if the assaying machinery is not available (for some of the commodities like moth and spices) the quality of the commodity is assessed on the basis of a physical examination by traders'/commission agents.
c. **Generate e-bidding:** Based on the assaying report, mandi officials generate the e-bidding and fix the maximum bidding time. Traders will be quoting their price electronically for their interested lot. The same will be displayed on the display board at APMC.
d. **Bid Declaration:** Once the bidding time is over, a message of the highest bid price is sent to the farmer's registered mobile number or he can view lot number wise final price displayed on the e-display board at APMC. If the farmer accepts the final price, the lot will be allotted to the trader for final purchase. If the farmer does not agree with the price, he/she may again go for e-auction.
e. **Weighment of sold commodity:** After successful completion of the auction process, the next process is Weighment of the commodity. Weighing of the commodity is done on the electronic weighing machine by the weigh men appointed by the mandi.
f. **Generation of Sale Agreement:** A primary bill is generated after weighment. The sale bill contains trader name and license number, farmers' detail, commission agent

name and his license number, agreement number, commodity detail, packaging type and weight of the bag, commodity price, farmers' price, commission agent fee, mandi fee *etc.*

g. **Payment to farmers & others:** Once the sale bill is generated, the buyer sends the money through RTGS / NEFT / cash deposit through bank challan. At present farmers are demanding immediate cash, hence, the buyer pays cash to the farmer directly.

h. **Gate exit pass and gate exit:** After successful payment to the farmer, the commodity is handed over to the trader and subsequently the mandi official generates the exit pass which contains gate exit number, exit type, vehicle number, APMC detail, trader, lot type, commodity type, lot code, bag type, number of bag and weight/ total number.

i. **Generate e-Permit for Secondary Trade:** After completing primary trade in primary market, if buyer is interested to resale the same commodity within the state in any e-NAM mandi, e-Permit is prerequisite for exemption of mandi fees from the secondary market. It will be generated in primary mandi with consent of mandi secretary and same will be approved by mandi secretary from secondary mandi. Buyer can check the status of his/her permit through online. Once e-permit process is completed, gate entry receipt has been generated in secondary mandi for secondary sale

Current status of e-NAM in India

In last 4 years the e-NAM has registered a user base of 1.66 Cr Farmers, 1.31 lakh Traders, 73,151 Commission Agents, 1012 FPOs and 1000 mandis. Total volume of 3.43 Crore MT & 38.16 Lakh numbers (Bamboo & Coconut) collectively crossed a remarkable business milestone worth Rs. 1 lakh crore on e-NAM platform. Digital payment worth Rs. 708 crores have been done benefitting more than 1.25 lakh farmers. Presently 150 commodities, including Food grains, Oilseeds, Fibers, Fruits & Vegetables, are traded on e-NAM. (Press Information Bureau, 15 May, 2020).

The Union Minister of Agriculture & Farmers' Welfare, Shri Narendra Singh Tomar, on 2nd April 2020 launched 3 new modules of e-NAM.

i. FPO Module on e-NAM: This enables FPOs to conduct trade of commodities from their collection centers declared as "Deemed Market" or "Sub Market yards". As on 14th May 2020, FPOs have traded 3053 MT of agri-produce worth Rs 8.11 Crore. Among these, 42 FPOs traded from their own collection center through recently introduced FPO module.

ii. Warehouse based Electronic Negotiable Warehouse Receipts (e-NWR) trading: For e-NWR based trading, WDRA accredited warehouses from Andhra Pradesh (23) and Telangana (14) have been declared as deemed market by respective State Governments.

iii. Logistics Module: This facilitates transportation of the commodities from farm to Mandis and from Mandis to warehouse/consumption centers. Nine logistic service providers/aggregators linked with 2.3 lakh transporters and 11.37 lakh vehicles have been on-boarded on e-NAM platform.

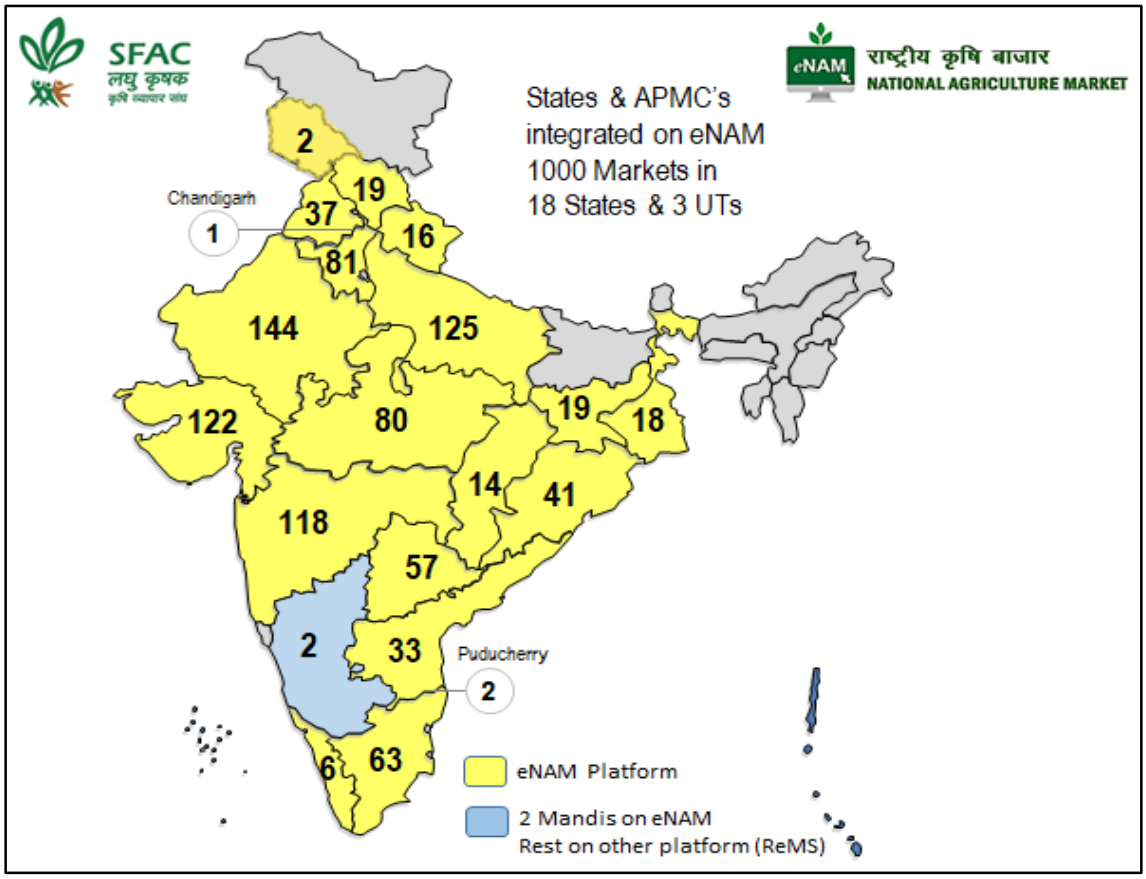

Figure 1.1. e-NAM coverage states

Duggirala e-NAM integrated APMC had set an example for other mandis in Andhra Pradesh State as well as those across the country with its quick acceptance of the online platform and payment.

As the scheme is new born having four years of its existence, needs a thorough analysis to identify the ground level difficulties in its operation as well as to strengthen its performance to become the sole e-market avenue for the farming community. Hence an attempt was being made to explore the ground realities as well as the ways and means to explore the functioning of e-NAM as an ideal platform for farming community. The study was taken up with the following objectives.

OBJECTIVES OF THE STUDY

1. To study the profile of the registered farmers of e-NAM.
2. To explore the functioning of e-NAM and to assess the knowledge of registered farmers in the functioning / features of e-NAM.
3. To assess the effectiveness of e-NAM in improving farmers' income as perceived by the registered farmers.
4. To unearth the constraints of e-NAM as perceived by the registered farmers.
5. To document a few successful case lets of e-NAM registered farmers.

NEED AND IMPORTANCE OF THE STUDY

After having existence of 4 years, e-NAM has made its own mark in fulfilling its own goals and objectives towards the welfare of the farming community. Several amendments have been made in terms of features, rules, regulations, operational mechanisms to suit to the current situation. With the overall success of 585 mandis in Phase 1 and further expanding its wings to integrate 415 new mandis in Phase 2, the e-NAM platform now has a total number of 1000 mandis across 18 States & 3 UTs (PIB, 2020). The brain child of central government had faced several pros and cons in its implementation. A great deal of market networking has been conceptualized and formalized at different levels to meet the marketing demands of farming community for the realization of remunerative prices to their produce. Accordingly, all the initiations of e-NAM one way or other tried to motivate farmers to be a successful stakeholder of e-NAM. However, several anomalies both at organizational and personal level thwarted the ultimate goal of provision of remunerative prices for farmers produce. As the scheme is aimed at achieving utmost success in supporting the farming community in enhancing their farm income. The participation of the farming community in both qualitative and quantitative terms was supposed to be at higher side. But realistically the scheme has not been reaching the farming community because of its operational encroachments by the other stakeholders of the scheme. Hence the present study is proposed to explore the current operational mechanism been followed in e-NAM both in line and in contrary with the guidelines prescribed for effective implementation of e-NAM. The study also projects the best possible ways and means to improve the quality of functioning of e-NAM and to give strong support to farming community.

SCOPE OF THE STUDY

Being an exploratory study, the present research investigated the strengths as well as bottlenecks of e-NAM in its implementation. This study provided an overview about the knowledge of registered farmers about functioning / features of e-NAM and its service towards farmers. It also analysed several factors influencing the utilization of e-NAM by the farming community. The suggestions given by the farmers throw light on redesigning the structure and functioning of e-NAM. Accordingly, a road map has been designed to transform e-NAM as potential marketing avenue for farming community.

LIMITATIONS OF THE STUDY

i. One of the important limitations of the study is lack of adequate time and conveyance facilities that would normally be encountered by a student researcher.

ii. The findings of the study were based on verbal expressions of the respondents. Therefore, the findings were conditioned by the extent of reliable and valid information provided by those selected for the purpose of investigation

iii. Since the study was conducted under the aegis of the Department of Agriculture Extension, it did not have mandate to critically study the purely economic aspects of the e-NAM.

iv. This study was confined to Duggirala market in Guntur district of Andhra Pradesh. Hence generalizations if any based on this could be restricted to other areas with similar conditions.

v. As there were no previous investigations in this area of research there is shortage of literature related to the study.

In spite of limitations, the findings of the study would provide a better insight for studying the knowledge and effectiveness of e-NAM in Duggirala APMC.

PRESENTATION OF THE STUDY

The report of the study is presented in five chapters.

i. The first chapter deals with “Introduction” highlighting the objectives, scope and limitations of the study.

ii. The second chapter “Review of Literature” deals with the review of available and related studies in the light of the present investigation.

iii. The third chapter “Material and Methods” deals with the details of the process of investigation.

iv. Results along with illustrations and discussion were placed in fourth chapter “Results and Discussion”.

v. The fifth chapter “Summary” deals with implications of the study. The “Literature Cited” is presented following the guidelines of “ANGRAU” on thesis presentation. Annexures pertaining to prepared schedule in English is presented at the end.

Chapter - II

Review of Literature

Chapter II

REVIEW OF LITERATURE

"***A good, systematic review is always a wonderful surprise***" - ***Joyce Carol Oates***

A thorough review of literature on the topic under investigation would provide a deep insight into the subject which is inevitable for rigorously performing the research study. An acquaintance with earlier pertinent studies has been felt necessary to develop a good understanding of the research study and to formulate appropriate research methodology. The systematic presentation of the relevant aspects drawn from various literatures not only provides a strong base for the empirical investigation but also facilitates to arrive at a proper understanding of the different components of the problem under study. Considering the objectives of the study, an attempt was made to review the literature which had a meaningful relation to the study and is presented under the following heads:

2.1 Profile characteristics of e-NAM registered farmers

2.2 Knowledge of e-NAM registered farmers on functioning / features of e-NAM.

2.3 Effectiveness of e-NAM as perceived by registered farmers

2.4 Constraints faced by the e-NAM registered farmers

2.5 Successful case lets of e-NAM registered farmers

2.1 PROFILE CHARACTERISTICS OF e-NAM REGISTERED FARMERS

2.1.1. Age

Nirban (2004) depicted that nearly two third (63.50%) of the APMC participant farmers belonged to the middle age group followed by young (19.00%) and old (17.50%) age groups.

Manisha (2009) reported that more than two-fifth (43.00%) borrowers of Kisan Credit Card scheme belonged to 'middle' age group of 36 to 50 years.

Ganeshagouda *et al*. (2013) reported that nearly half (46.36%) of the farmers belonged to 25-40 years' age category followed by 41-60 years (40.00%), 20-25 years (9.09%) and above 61years (4.55%) age category.

Rehman and Selvaraj (2013) reported that nearly one fourth (24.6%) of regulated market farmers belonged to age group of 41-50 and 51-60 followed by 31-40 years (25.4%), above 60 years (14.2%) and up to 30 (11.20%) age category.

Pandya (2015) depicted that nearly three fifth (59.48%) of the APMC respondents found in middle age group followed by old (32.33%) and young age (8.19%) group.

Archana (2016) indicated that majority (70.84%) of MGNREGS beneficiaries belonged to middle age category followed by young age (17.50%) and old age (11.66%) categories.

Rao (2016) stated that nearly three fifth (57.50%) of turmeric farmers belonged to middle age category followed by young (19.17%) and old age (23.33%) category.

Sultana (2016) observed that nearly half (48.90%) of the chilli market yard farmers belonged to 41-50 years' age category followed by 31-40 years (22.20%), above 50 years (20.60%) and 20-30 years (8.30%) age categories.

Pattnaik (2018) inferred that nearly three-fifth (57.00%) of the RMC farmers were belonged to below 50 years' age followed by above the age of 50 years (43.00%) age category.

Chandana (2018) reported that more than half (52.50%) of the Guntur chilli market yard farmers belonged to 36-45 years' age category followed by 46-55 years (23.33%), below 35 years (14.16%) and (10.00%) above 55 years' age categories.

Dhruw (2018) revealed that nearly three fifth (58.75%) of the NHM respondents belonged to middle age group, followed by old age (24.38%) group and young age (16.87%) group.

Maya *et al*. (2018) reported that more than half (55.00%) of turmeric growers belonged to middle age category followed by young age (25.00%) and old age (20.00%).

Tyngkan (2018) revealed that nearly three-fifth (58.66%) of APMC farmers were of middle age (age between 15 to 60 years) followed by young (29.74%) and old (11.60%) age groups.

Wahab (2018) indicated that nearly half (45.00%) of the PMFBY farmers belonged to the age group of 34-50 years while 31.67 per cent of them aged between 18-34 years and 23.33 per cent of them aged 50-60 years.

Geethavani (2019) reported that nearly two third (65.33%) of e-NAM farmers belonged to middle age category followed by young age (25.33%) and old age (0.09%).

Nagesh (2019) indicated that nearly three fourth (74.13%) of PMFBY beneficiaries belonged to middle age category, followed by old age (16.70%) category and young age (9.17%) category.

Natthu (2019) reported that more than two third (70.00%) of farmers belonged to middle age category followed by young age (15.83%) and old age (14.17%).

Shende (2019) revealed that more than three fifth (61.34%) of turmeric growers belonged to middle age category followed by old age (25.33%) and young age (13.33%).

Smitha and Jahagirdar (2019) depicted that three fifth (60.00%) of farmers belonged to middle age category followed by old age (23.33%) and young age (16.67%).

Swarna (2019) inferred that nearly three fifth (58.33%) of the e-NAM farmers' belonged to age group of 36-50 followed by age group below 35 years (21.67%) and above 50 years (20%) age group.

2.1.2. Education

Nirban (2004) observed that nearly one fourth (24.50%) of the APMC participant farmers were educated up to pre-primary level followed by secondary school (23.50%), primary school (19.00%), higher secondary school (14.50%), college (10.00%) and illiterates (8.50%).

Ganeshagouda *et al*. (2013) revealed that nearly one third (29.09%) of the farmers were educated up to degree followed by pre university education (25.45%), primary school (22.73%), secondary school (18.18) and illiterate (4.55%).

Rehman and Selvaraj (2013) depicted that more than one third of regulated market farmers had completed intermediate followed by below SSC (31.90%), degree and above (21.90%) and illiterate (10.00%) category.

Shinde (2014) shows that nearly one third (32.50%) of the soybean seed growers were educated up to high school level, 23.34 percent of the soybean seed growers

were college level, 18.33 per cent of them have middle school level of education, 15.83 per cent educated up to primary school level, 09.17 per cent of them were can read and write only while, 00.83 per cent of the soybean seed growers were non educated.

Pandya (2015) revealed that nearly half (48.71%) of the APMC respondents of belonged to secondary level education category followed by college and above level (25.86%) and primary level (25.43%) of educational categories.

Archana (2016) indicated that one fourth (25.00%) of MGNREGS beneficiaries were illiterate followed by primary education (23.30%), high school education (21.70%), functionally literate (15.80%) and college education (14.20%) categories.

Rao (2016) stated that more than one third (35.00%) turmeric farmers belonged to middle school education category followed by intermediate education (20.00%), high school (15.83%), primary school (13.33%), illiterate (12.50%) and graduation and above (3.33%) education category.

Sultana (2016) observed that nearly one third (29.40%) of the chilli market yard farmers had primary school education followed by secondary school (28.90%), illiterate (20.00%), intermediate (15.00%) and collegiate education (6.70%) category.

Chandana (2018) reported that nearly two-fifth (37.50%) of the chilli market yard farmers had primary school education followed by secondary school (18.33%), illiterate (17.5%), intermediate (14.16%) and degree education (12.50%) category.

Dhruw (2018) indicated that more than one fourth (27.81%) of the NHM respondents were educated up to primary school level, followed by middle school (25.94%), higher secondary (13.44%), illiterate (11.56%), high school (10.31%), graduate (7.81%) and post-graduates (3.13%).

Maya *et al*. (2018) reported that more than two fifth (42.00%) of turmeric growers were educated up to high school level followed by higher secondary school (16.00%), middle school (15.00%), under graduation (10.00%), primary school (9.00), post-graduation and illiterate each (3.00%) and diploma (2.00%) education category.

Tyngkan (2018) inferred that nearly one third (30.40%) of APMC farmers were educated up to secondary school followed by primary school (27.15%), illiterate (17.86%), higher secondary (16.74%) and graduate/post graduate education (7.65%) category.

Wahab (2018) indicated that nearly than two fifth (38.33%) of the PMFBY beneficiaries had educated up to 12th class, followed by graduation (18.33%), matric (16.67%), post-graduation (15.00%) and diploma (11.67%).

Geethavani (2019) reported that more than two fifth (42.66%) of e-NAM farmers belonged to illiterate category followed by secondary education (32.00%), primary education (14.86%), graduate (5.33%) and post graduate (5.33%) education category.

Nagesh (2019) indicated that less than one-fourth (23.17%) of the PMFBY beneficiaries had middle school, followed by high school (21.66%), illiterate and primary school (19.16%), functionally literate (10.00%), intermediate (4.15%), Graduation (2.50%).

Natthu (2019) reported that nearly one third (32.92%) of the farmers were educated up to college level, followed by high school level (29.17%), middle school level (19.59%), primary school (12.91%) and illiterate (5.41%) education category.

Shende (2019) revealed that nearly two fifth (38.00%) of turmeric growers were educated up to high school followed by college level (24.67%), middle school (16.67%) primary (11.33%), illiterate (06.00%) and can read and write (03.33%).

Smitha and Jahagirdar (2019) reported that more than one fourth (25.83%) of the farmers were educated up to high school level followed by graduation (24.16%), pre university education (20.00%), middle school (16.67%), primary pass out (7.5%) and illiterate (5.00%).

Swarna (2019) revealed that more than one fourth (26.67%) of e-NAM farmers belonged to illiterate category followed by primary school (21.67%), secondary school (21.67%), higher secondary (18.33%) and graduate (11.67%) education category.

2.1.3. Land Holding

Nirban (2004) found that nearly two-fifth (38.50%) of the APMC participant farmers' possessed marginal category of land holding followed by small category (28.00%), semi-medium (18.00%), medium (13.00%) and big (2.50%) farmers' category.

Ganeshagouda *et al*. (2013) reported that nearly than one third (31.82%) of the farmers belonged to medium land holding category followed by small (26.36%), marginal (21.82%) and large (20.00%) land holding category.

Rehman and Selvaraj (2013) revealed that more than half (54.60%) of the regulated market farmers belonged to 2-3 acres' land holding category followed by 4-5 acres (26.90%), up to 1 acre (11.90%) and above 5 acres (6.50%) landholding category.

Shinde (2014) reported that nearly two fifth (38.35%) of soybean seed growers were found in medium land holding category, 28.33 per cent were in semi medium land holding category and 20.83 percent and 06.66 per cent of them from small and marginal land holding category, respectively. Only, 05.83 per cent of the soybean seed growers were found in big land holding category.

Pandya (2015) reported that half (50.00%) of the APMC farmers had medium landholding followed by big (31.87%) and small size (18.13%) of land holding.

Rao (2016) stated that nearly one third (31.67%) of turmeric farmers belonged to medium land holding category followed by semi-medium (25.83%), small (18.33%), marginal (13.33%) and large (10.83%) land holding categories.

Dhruw (2018) revealed that more than two fifth (41.25%) of the NHM respondents were small farmers followed by semi-medium farmers (40.62%), medium farmers (10.94%), marginal farmers (5.94%) and big farmers (1.25%).

Dubey (2018) revealed that nearly two fifth (39.00%) of the SHC beneficiary farmers were practicing agriculture in medium landholding category followed by large (27.00%), and semi-medium (18.00%) landholding category.

Maya *et al*. (2018) reported that that more than half (53.00%) of the turmeric growers were medium farmers followed by semi-medium (25.00%), small farmers (14.00%), large (5.00%) and marginal farmers (3.00%).

Pattnaik (2018) inferred that nearly two-third (64.00%) of RMC farmers were marginal farmers followed by small (29.00%) and large farmers (7.00%).

Tyngkan (2018) concluded that nearly three-fifth (58.67%) of the APMC farmers were small farmers followed by marginal (22.67%), semi-medium (14.67%) and medium farmers (4.00%).

Wahab (2018) reported that nearly one third (31.67%) of PMFBY farmers were medium farmers followed by semi-medium (30.00%), small and large farmers each (16.67%) and marginal farmers (5.00%).

Geethavani (2019) reported that nearly half (45.33%) of e-NAM farmers were medium farmers followed by large farmers (28.00%), small farmers (18.66%) and marginal farmers (8.00%).

Nagesh (2019) indicated that more than half (51.66%) of the PMFBY beneficiaries had small land holding, followed by marginal (30.85%), semi medium (14.16%), medium (2.50%) and large (0.83%) land holdings.

Natthu (2019) found that nearly two fifth (38.34%) of the farmers were having small land holding, followed by semi medium size (35.83%), medium (15.83%), marginal size (5.83%) and big (4.17%) land holding.

Shende (2019) indicated that more than one third (35.33%) of the turmeric growers belonged to category of semi-medium land holding category followed by small land holding (32.67%), marginal land holding category (19.34%) and big (5.33%) land holding category.

Smitha and Jahagirdar (2019) revealed that more than two fifth (44.17%) of the farmers belonged to semi-medium land holding category followed by small and medium each (22.50%), marginal (5.83%) and big (5.00%) land holding category.

Swarna (2019) revealed that nearly one third (30.00%) of e-NAM farmers were small farmers followed by medium scale (23.33%), landless (20.00%), marginal (15.00%) and large farmers (11.67%).

2.1.4. Social Participation

Nirban (2004) inferred that nearly three-fourth (73.00%) of the APMC participant farmers' had a medium level of social participation followed by low (16.50%) and high (10.50%) levels of low social participation.

Pandya (2015) reported that majority (79.38 per cent) of the farmers of APMCs were having membership in more than one social organization followed by 13.12, 5.00 and 2.50 per cent of them had membership in one organisation, holding the position and do not having membership in any social organisation respectively.

Rao (2016) stated that nearly three fifth (57.50%) of turmeric farmers belonged to medium social participation followed by high (22.50%) and low (20.00%) social participation categories.

Dhruw (2018) revealed that three fourth of the NHM respondents (75.00%) had membership in one organization, followed by 8.75 per cent respondents had

membership in more than one organization, while 6.88 per cent respondents had office bearer and 6.87 per cent had no membership in any organization.

Maya *et al*. (2018) inferred that more than half (55.00%) of the turmeric growers had a medium level of social participation followed by low (27.00%) and high (18.00%) levels of low social participation.

Wahab (2018) revealed that nearly half (45.00%) of the PMFBY farmers had high social participation in agriculture related institution existing in their village society set up and almost equal percentage of respondents were having medium social participation group.

Shende (2019) indicated that more than three fourth (77.33%) of the turmeric growers had high social participation, while, 12.67 per cent of turmeric growers were having medium level of social participation. Only, 2.00 per cent of them had low social participation.

2.1.5. Mass Media Exposure

Nirban (2004) inferred that three-fourth (71.00%) of the APMC participant farmers' had medium level of mass media participation followed by low (42.00%) and high (8.00%) levels of mass media participation.

Rao (2016) stated that nearly two third (64.16%) of turmeric farmers belonged to medium mass media exposure followed by low (19.17%) and high (16.67%) mass media exposure categories.

Maratha and Badodiya (2017) depicted that more than two third (68.33%) of vegetable growers belonged to medium mass media exposure category followed by high (18.33%) and low (13.33) mass media exposure category.

Dhruw (2018) revealed that nearly half (48.13%) of the NHM respondents had medium level of mass media exposure, followed by low (40.31%) and high (11.56%) level of mass media exposure.

Maya *et al*. (2018) inferred that more than two third (68.33%) of the turmeric growers had medium level of mass media exposure, followed by high (18.33%) and low (13.33%) level of mass media exposure.

Wahab (2018) depicted that nearly half (45.00%) of the PMFBY beneficiaries had medium level of mass media utilization, followed by those with high (31.67%) and low (23.33%) mass media exposure.

Nagesh (2019) indicated that more than half (51.64%) of the PMFBY beneficiaries had medium level of mass media utilization, followed by those with low (31.66%) mass media exposure whereas, only 16.70 per cent of the farmers had high level of mass media exposure.

Smitha and Jahagirdar (2019) depicted that two fifth (40.00%) of farmers belonged to high mass media utilization category followed by medium (35.00%) and low (25.00%) mass media utilization category.

2.1.6. Extension Contact

Nirban (2004) depicted that two third (66.00%) of APMC participant farmers' had medium level of extension contact followed by low (18.00%) and high (16.00%) level of extension contact.

Pandya (2015) revealed that majority (78.75 per cent) of the farmers of APMCs had moderate level of extension contact followed by low (18.13%) and high (03.12%) level of extension contact.

Rao (2016) stated that nearly three fifth (58.33%) of turmeric farmers belonged to medium extension contact followed by high (22.50%) and low (19.17%) extension contact categories.

Maratha and Badodiya (2017) revealed that more than two third (66.67%) of the vegetable growers had medium level of extension contact followed by low (18.33%) and high (12.50%) level of extension contact.

Dhruw (2018) reported that nearly half (48.12%) of the NHM respondents had medium level of extension contact, followed by low (40.63%) and high (11.25%) level of extension contact.

Maya *et al*. (2018) revealed that more than half (53.00%) of the turmeric growers had medium level of extension contact followed by low (25.00%) and high (22.00%) level of extension contact.

Wahab (2018) depicted that nearly two third (63.33%) of PMFBY farmers' had high level of extension contact followed by medium (23.33%) and low (13.33%) level of extension contact.

Nagesh (2019) reported that three-fourth (75.00%) of the PMFBY beneficiaries had medium level of extension contact, followed by those with low (14.16%) extension contact whereas, only 10.84 per cent of the farmers had low level of extension contact.

Natthu (2019) stated that 59.58 per cent of respondents were having medium level of extension contact. While 20.84 per cent and 19.58 per cent of them were having high and low level of extension contact respectively.

Smitha and Jahagirdar (2019) depicted that more than half (51.67%) of farmers had low extension contact followed by medium (25.83%) and high (22.50%) extension contact.

2.1.7. Risk Orientation

Pandya (2015) reported that majority (80.63%) of the farmers of APMCs had moderate level of risk orientation followed by lower (14.37%) and higher (05.00%) level of risk orientation.

Archana (2016) reported that half (50.84%) of the MGNREGS beneficiaries had high risk orientation followed by medium (28.33%) and low (20.83%) risk orientation.

Dhruw (2018) reported that majority (80.31%) of the NHM respondents had medium level of risk orientation, followed by low (11.56%) and high (8.13%) level of risk orientation.

Nagesh (2019) indicated that more than two-thirds (70.83%) of the PMFBY beneficiaries had medium level of risk orientation, followed by those with high (11.67%) and low level (17.05%) of risk orientation.

Shende (2019) revealed that more than two third (69.33%) of the turmeric growers had medium risk bring ability followed by low (20.00%) and high level (10.67%) of risk bearing ability.

2.1.8. Market Orientation

Rao (2016) stated that more than half (55.00%) of turmeric farmers belonged to medium market orientation category followed by low (25.83%) and high (19.17%) market orientation.

Maratha and Badodiya (2017) depicted that nearly two third (65.83%) of the vegetable growers belonged to medium market orientation category followed by high (20.00%) and low (14.17%) market orientation.

Maya *et al*. (2018) reported that more than two third (67.00%) of the turmeric growers belonged to medium market orientation category followed by high (20.00%) and low (13.00%) market orientation.

Natthu (2019) stated that nearly two third (63.75%) of the farmers were having medium level of market orientation followed by low market orientation (22.50%) and high market orientation (13.75%).

Shende (2019) revealed that more than half of the turmeric growers (70.00%) had medium level of market orientation followed by low market orientation (16.67%) and high market orientation (13.33%).

2.1.9. Income Orientation

Pandya (2015) reported that more than three fifth (60.63%) of the farmers of APMCs had moderate level of economic orientation followed by lower (23.75%) and higher (15.62%) level of economic orientation.

Rao (2016) stated that three fifth (60.00%) of turmeric growers belonged to medium economic orientation followed by low (23.33%) and high (16.67%) economic orientation.

(As there is no direct review related income orientation and hence the related review pertaining to economic orientation is included in the review of literature.)

2.1.10. Economic Motivation

Archana (2016) indicated that two fifth (40.00%) of MGNREGS beneficiaries belonged to medium economic motivation category followed by high (37.50%) and low (22.50%) economic motivation.

Dhruw (2018) revealed that majority (75.62%) of the NHM respondents had medium level of economic motivation followed by low (20.00%) and high (4.38%) level of economic motivation.

Dubey (2018) revealed that nearly three fourth (72.00%) of SHC beneficiary farmers were belonging to the middle category, followed by high (19.00%) and low (9.00%) category.

Natthu (2019) stated that more than half (58.75%) of the farmers had medium level of economic motivation followed by high (20.84%) and low (20.41%) economic motivation.

Smitha and Jahagirdar (2019) depicted that nearly two fifth (36.57%) of the farmers belonged to medium economic motivation category followed by low (34.17%) and high (29.16%) economic motivation.

2.2 KNOWLEDGE OF e-NAM REGISTERED FARMERS ON FUNCTIONING / FEATURES OF e-NAM

Goudappa *et al*. (2012) revealed that eighty per cent of farmers were not aware of extent of premium paid, last date, procedure for insuring crops and method of loss of determination and compensation worked out by different insurance companies.

Shalendra (2013) reported that three fourth (75.00%) of farmers had knowledge on implementation of e-Tendering system, computerized entry at the mandi gate (67.00%) and computerized entry at the gate is mandatory (55.00%).

Department of Administrative Reforms and Public Grievances report (2014) indicated that majority (75.83%) of the APMC trading farmers were aware about e-Tendering while the remaining (24.17%) were not aware about the same.

Pandya (2015) revealed that more than two third (66.88%) of the farmers of APMCs had adequate knowledge about the statutory activities of APMC followed by poor (18.75%) and authoritative (14.37%) level of knowledge.

Archana (2016) indicated that more than half (57.50%) of MGNREGS beneficiaries belonged to medium knowledge category followed by high (23.33%) and low knowledge (19.17%) categories.

Girish (2017) reported that 46.66 percent of the Gulbargha market farmers had knowledge on marketing procedure and mechanism of e tendering trade.

Dhruw (2018) revealed that nearly three fourth (71.56%) of the NHM respondents had medium level of awareness of the scheme, followed by low level (18.75%) of awareness and high level (9.69%) of awareness about the existence and functioning of NHM scheme.

Dubey (2018) reported that more than two third (66%) of the SHC beneficiaries were having medium knowledge, followed by SHC beneficiaries less (22%) and high (12%) knowledge.

Panigrahi (2018) depicted that nearly two fifth (39.17%) of PMFBY farmers were belonged to unaware category followed by fully aware (35.00%) and partial (25.83%) aware categories.

Wahab (2018) depicted that three fifth (60.00) of progressive PMFBY farmers had low awareness on the various aspects of the scheme followed by high (25.00%) and medium (15.00%) awareness.

Nagesh (2019) indicated that more than three fifth (61.67%) of the PMFBY beneficiaries had medium level of knowledge, followed by those with low (20.00%) and rest (18.33%) had low levels of knowledge.

Reddy and Mehjabeen (2019) indicated that 79.00 per cent of farmers had awareness on e-auction implementation while 63.00 per cent of them know that e-gate entry pass is mandatory for trading in e-NAM.

Smitha and Jahagirdar (2019) depicted that nearly two fifth (38.33%) of farmers belonged to high knowledge category, followed by medium (33.33%) and low (28.33%) knowledge categories.

Swarna (2019) revealed that more than three fourth (76.67%) of the e-NAM farmers were not aware of the scheme and 23.37 per cent of them had the knowledge of e-NAM.

2.3 EFFECTIVENESS OF e-NAM AS PERCEIVED BY REGISTERED FARMERS

Chengappa *et al.* (2012) reported that IT application in the form of introduction of e-tender system in the selected regulated agricultural markets of Karnataka has been found to improve the marketing efficiency through competitive and transparent bidding mechanism, and by minimization of manipulations in trading practices.

Goudappa *et al*. (2012) found that more than 80.00 per cent of respondents expressed that the Agriculture Department is not implementing crop insurance scheme properly. Further, they do not know any procedural and other information about crop insurance.

Dadabahu and Gopikrishna (2013) founded that the mean income of MGNREGS beneficiaries before and after introduction of MGNREGS was Rs.8840 and Rs.16230 respectively. It means that the scheme helped the beneficiaries to double their income.

Ganeshagouda *et al*. (2013) depicted that majority (86.36%) of the farmers expressed that the effectiveness of SMS was at appropriate time, accurate (79.09%), simple (96.36%) and enhanced income (70.09%).

Shalendra (2013) reported that 80.00 per cent of the farmers feel that the introduction of electronic tender system has made the operations of the market more transparent helping in better price realization (83.00%). In addition to transparency in operations and price discovery, quick completion of trade proceeds and payment settlement is very important for farmers. Three-fourth (75.00%) of farmers feels that the system has helped in faster completion of tender process and the trade transaction leading to faster payment settlement. The introduction of system has made the price discovery and overall 47 trade activities more competitive leading to better standing of farmers in the entire process (89.00%).

Adeppa (2014) stated that majority (78.89%) of MGNREGS beneficiaries in Anantapuram district confirmed that there was a real increase in their income as a result of MGNREGS. However, about 21.11 per cent of the respondents expressed neither negative nor positive impact of the scheme on their income levels.

Department of Administrative Reforms and Public Grievances report (2014) indicated that more than two third (68.86%) of APMC trading farmers informed that e-tendering system was beneficial followed by not beneficial (15.38%) and no impact (15.75%). Farmers opined it as time saving process (76.06%), absence of malpractices (72-87%), accurate Electronic Tender System of Sale in Agricultural Produce Market Committees process (54.26%), realization of competitive / better / higher prices for agricultural commodities (47.34%) and transparent process (34.04%).

Dhiraj and Premlata (2014) reported that 55.00 per cent of the respondents perceived medium effectiveness, followed by low (21.70%), high (15.00%), very low (55.00%) and very high (3.30%) effectiveness.

Rashtriya Krishi Vikas Yojana report (2014) revealed that there had been an increase (20.00%) in the arrivals of commodities and the farmers were able to get an

increase in prices for their commodities ranging from 4% to 50%. Further, there was a saving of time in completion of the process from 1 to 3 hours. The project has brought in accuracy in the system and removed the errors and mistakes in the prices quoted.

Reddy (2016) reported that there was 128.00 per cent increase in average prices in e-markets compared to only 88.00 per cent in non-e-markets between 2007 and 2015.

Pavithra *et al*. (2018) indicated that most important attributes of e- tendering system perceived by farmers include more competition (rank-1), transparency of pricing (rank-2), time saving (rank-3) and better price realization (rank-4).

Suriyapriya *et al.* (2018) found that 80.00 per cent of the FPO farmers expressed that the information provided was highly relevant, followed by reduced pest & disease incidence (70.00%), increased the yield (66.67%) and increased the price of produce (61.67%).

Wahab (2018) depicted that the degree of acceptance and willingness to buy the WBCIS is found to be more as compared to PMFBY by the farmers.

Geethavani (2019) reported that 100.00, 96.00 and 92.00 per cent of e-NAM farmers' opined promotion of stable price realization, price compatibility with quality of produce and increase in price received respectively as unfavorable in Duggirala e-NAM.

Kishore (2019) reported that more than three fifth (60.84%) of the beneficiaries perceived medium effectiveness of RFIS, followed by low (21.66%) and high (17.50%).

Nagesh (2019) reported that more than two-third (69.17%) of PMFBY beneficiaries had medium level of opinion, followed by those with high (15.83%) and rest (15.00%) had low levels of opinion.

Reddy and Mehjabeen (2019) indicated that majority (85.00) of farmers opined e-NAM as good followed by don't know (9.00%) and not good (5.00%). He also revealed that 55 per cent of the farmers perceived that e-NAM helped in reducing the collusion among traders, reduced incidences of deductions by commission agents in the name of recovery of previous loans of the farmers from the sales proceeds (36.00%), increased transparency in transactions (68 .00%) and payment on time (74.00%).

2.4 CONSTRAINTS FACED BY THE e-NAM REGISTERED FARMERS

Ovhar and Dhenge (2014) reported that low price to turmeric crop (72.22%), Non- availability of labour at the time of transplanting and harvesting (63.33%), Irregular supply of electricity (61.11%) are the major constraints faced by turmeric growers about improved cultivation in Buldana district of Maharashtra.

Thankachan and Kirubakaran (2014) concluded that majority of the farmers in country were not aware that mobile phones could be used to conduct businesses and receive information. He also stated that illiteracy among farmers in reading message was another factor that pertains the usage of technology in agriculture.

Rao (2016) found that price fluctuations, lack of market information, high marketing cost, insufficient pledge loan facility, delay in unloading services, poor government support and insufficient godown facilities were the marketing problems faced by the turmeric growers in Guntur region.

Girish (2017) reported the major constraints faced by the farmers according to Garrett's rank that include Lack of transportation facilities in the market (I), followed by undue charges by the traders (II),Lack of scientific storage at farm level (III), Malpractices adopted in weighing (IV), Distress sale (V), Insufficient information about market prices and market charges (VI), Delay in payments by the traders (VII), Lack of space of auction (VIII), Exploitative practices by the traders in the market (IX).

Gummula (2017) in his article "The national agriculture market currently benefits buyers far more than farmers" stated that in case of NAM, farmers had to take their produce to a designated location or a warehouse of the Agriculture Produce Market Committee (APMC) for quality checking and weighing, with no guarantee that they would receive a premium price for doing so. He stated that it does not seem to have provided facility to commission agents as they don't have licenses for multiple states. Farmers, although could access the information, they could not exploit this advantage as NAM did not have any facility to transport produce from a farmer's field or a local mandi and transport it to the mandi where higher prices for that commodity were prevailing. He further added the proposal by SFAC had created some ambiguity by stating in para 3.3.12 that, "If the farmer or commission agent refuses to honour the winning bid, appropriate

action will be taken against them as per prevailing rules and Acts". Again an electronic auction looked promising by helping technically educated farmers to get more bids for their produce, but there was a possibility that it might go against the farmer's interest.

Bachaspathi (2018) reported that the biggest constraint according to the farmers was e-NAM system use to be lengthier than open auction sale. The other factors include less awareness about e-NAM specially among small and marginal farmers, lower bidding prices compared to open auction method, lack of training to understand the e-NAM system, problem to understand the language displayed in the projection screen as it used to be written in English, long delay in payment realization which in turn used to force the famers to sell their lots through commission agents, force from banks to visit several times for payment as most of the farmers had their bank account in cooperative banks and the banks were unable to disburse more than 15,000 Rs per day, longer bidding process in e-NAM than the open auction process which used to waste the time and patience of the farmers, less number of lots sold in e-NAM system than open auction sale as in case of open auction sale even the inferior lots used to invite bids which was not possible in e-NAM sale, hectic and long cancelation process of sold lots, difficulty in sale of smaller lots in e-NAM system as the system was made to sale in large quantities, less number of bidders participating in e-NAM auction, less remunerative prices, inconsistent grading parameters and lack of proper visibility of display projected in e-NAM.

Bara (2018) revealed that higher transportation cost, delayed payments, inefficient qualitative and quantitative production, lack of awareness, internet connectivity, scientific sorting/grading, cold storage, godown and rest rooms were the constraints faced by farmers in 10 APMCs of Jharkhand.

Biswal (2018) revealed that the major problems faced by the farmers are problem during registration of produce in APMC mandis, lower rate of electronic education, changes in market price, untimely payment to the farmers, insufficient availability of computers and mainly lack of awareness.

Chandana (2018) revealed that the major problems faced by the e-NAM farmers are problems during registration (71.98%), lower rate of e-literacy (67.49%), fluctuations in market price (56.89%), untimely payments (48.73%), non-availability of computers (31.54%), and lack of awareness (23.57%).

Dhruw *et al.* (2018) revealed that more than half (53.75%) of the respondents faced the constraints of unavailability of processing unit, followed by high cost of manure and fertilizers (34.06%), unavailability of labour at planting and harvesting time (26.88%), unavailability of storage facilities (23.75%), distant market for selling produce (22.81%), unavailability of fertilizers at proper time (22.50%), high cost of plant protection chemicals (22.19%), inadequate availability of FYM (19.06%), lack of proper market (18.44%), high wages of labour (17.81%), unavailability of seed rhizomes at proper time (16.88%) and high cost of seed rhizomes (6.56%).

Kathayat (2018) found that high transportation cost, lack of market information, Non-remunerative price, lack of grading facility, exploitation by middlemen, lack of storage facility, delayed payment, lack of access to market credit and lack of basic amenities such as drinking water, farmer shed were the problems faced by farmers while selling in APMC.

Kumar and Bisen (2018) stated that e-NAM is facing initial hiccups for successful implementation and lesser density across the existing wholesale regulated markets.

Majhi (2018) revealed that lack of organized marketing institutions and infrastructure, lack of storage facility, lack of knowledge in proper marketing of produce, lower price realization the problems faced by farmers.

Mishra (2018) revealed that lack of competitive bidding due to poor arrivals was the major problem faced by the farmers followed by poor infrastructure facilities.

Nitesh (2018) reported that the management of perishable produce especially storage in mandi, strong trust in physical presence for selling, and problems regarding receiving payments for produce and lack of faith on online transaction were the major constraints which had impact in adoption of e-NAM among farmers with a garret score of 66.98, 57.97 and 46.93, respectively.

Pattnaik (2018) revealed that major constraints of e-NAM in Sakhigoal RMC were lack of storage facilities, distress sale, lack of transportation facilities and lack of grading facilities.

Roshini *et al.* (2018) observed that the farmers are not aware of e-NAM. For efficient work of e-NAM the farmers should be well informed about the availability of the facilities of e-NAM in order to avail them.

Sethi (2018) reported that problem during registration, lower rate of e-literacy, fluctuations in market price, high cost of transportation, non-availability of drying/threshing floor and lack of awareness were the major constraints faced by the farmers during e-NAM Trading.

Thakur (2018) stated that largely late information followed by inadequate information and misleading information were the key problems which were faced by the farmers regarding the e-NAM services.

Tyngkan (2018) reported that the major problems faced by the farmers while trading in e-NAM include time consumption of trading in e-NAM system followed by multiple visits to bank for payment realisation, lack of awareness about e-trading, farmers do not understand the context displayed in the computer and projector screen and Grading inconsistent.

Geethavani (2019) found that long process involved in e-NAM is the major constraint for Duggirala respondents, lack of awareness about e-NAM was major constraint for Kurnool respondents and connectivity and server problem is the major constraint in Kurnool market.

Nagesh (2019) concluded important constraints faced by PMFBY beneficiaries which include lack of knowledge regarding to PMFBY, lack of awareness of benefits of PMFBY, less compensation offered in crop insurance scheme, delay in payment of compensation, rate of premium is not universal for all crops, on-line registration and assessment of risk complexity in PMFBY, unavailability of experts for assessment of loss at visit time, lack of coordination between banks and farmers, high rate of premium, poor socio-economic status of the farmers, individual assessment is not allowed in this scheme, unavailability of reporting authority at the time of loss, lack of well-trained insurance professionals, corruption while settling claims by the insurance companies, lack of education of farmers, non-availability of source for doubt clarification, social stigma in getting crop insurance, low scale of finance, insufficient bank facilities in rural areas.

Reddy and Mehjabeen (2019) revealed that 50.00 per cent of the farmers reported that they do not understand the process flow of e-NAM and 72.00 per cent of the farmers are worried about the deduction on their loan amount (both principal and interest) from the payments they received from e-NAM.

Shende (2019) reported that 90.00 per cent, 85.33 per cent, 79.33 per cent, 80.00 per cent, 68.00 per cent and 64.00 per cent of the respondents expressed fluctuation in turmeric price, transportation problem, Exploitation by middle man, High cost of rhizome, Inadequate supply of rhizome and lack of market knowledge respectively.

Swarna (2019) revealed that 18.33 per cent of farmers were unaware of banking transactions, 15.00 per cent held the impression that the payments from banks were not immediate, 13.33 per cent each had no time to go to banks and traders were not making payments immediately. About 12.00 per cent of the farmers were of the feeling that the bid results were late and 10.00 per cent expressed that they were getting low price because of secret bidding. About eight per cent reported that they had no trust on traders.

2.5 SUCCESSFUL CASE LETS OF e-NAM REGISTERED FARMERS

National Agriculture Market (2019) indicated that Vidyasagar, soya bean farmer sold 26.16 quintals of soya white in e-NAM (Direct Purchase center) saved an amount of Rs.1427.00 through additional commission and Rs.1501.00 by way of reduced hamali charges.

National Agriculture Market (2019) indicated that Mahakaushal Progressive Farmers Self Reliant Producer Company Ltd. (MPFSRPCL) was able to provide Rs 70 to Rs.150 a quintal extra to maize farmers through active support of e-NAM.

National Agriculture Market (2019) revealed that Girimala Farmers Producer Company Ltd. (GFPCL) had realised Rs 200 per quintal higher for Maize commodity at Modasa e-NAM mandi after deducting handling expenses of around Rs 55 a quintal.

Department of Administrative Reforms and Public Grievances Report (2017) indicated that Chuttan, a farmer from Bareilly district cultivating 2.5 acres of potato expressed that his income had doubled by selling his produce through Bareilly e-NAM.

Chapter - III

Material and Methods

Chapter III

MATERIAL AND METHODS

This chapter deals with the methodology adopted for the present study. It includes research design, locale of the study, sample and sampling procedure, variables and their measurements, devices used for data collection, statistical tests used and analytical procedures followed to interpret the data. The details of the methodology followed are presented under the following heads

3.1 Research design

3.2 Sampling procedure

3.3 Operationalization & empirical measurement of variables

3.4 Constraints faced by e-NAM registered farmers and suggestions to overcome their constraints

3.5 Devices and methods used for data collection

3.6 Statistical tools and procedures followed

3.1 RESEARCH DESIGN

The design of research is the most important and critical aspect of research methodology. In a broad sense, research design is the process of planning and carrying out research. It is a systematic plan to study a scientific problem.

Exploratory research design was employed in the present research to achieve the objectives of the study.

Exploratory research design is to discover significant variables in the field situation and to lay the ground work for, more systematic and rigorous testing of hypothesis.

It is often used to generate formal hypotheses and develop more precise research problems. The research design will be employed when there are few or no earlier studies to refer to. The researcher out of curiosity and desire to gain better understanding starts investigation with a general idea and uses this research as a medium to identify key

issues that can be the focus for future research. An important aspect of this research design is that the researcher should be willing to change his/her direction subject to the revelation of new data or insight. Such a research is usually carried out when the problem is at a preliminary stage. It is often referred to address research questions of all types *i*.e., what, why and how.

Sabaratnam and Mulay (1983) indicated that the exploratory study is a pilot study conducted prior to main investigation. This study is planned to gain more knowledge and familiarity with the phenomena or the subject concerned. This is conducted to achieve new insights into the problem. Variables are not required, however there is sensitivity and awareness regarding the variances. It as a stage of science and conceptualized exploratory studies at two levels, the first level is discovery of the significant variables in the situation and the second is discovery of relationship between variables.

Wilkinson and Bhandarkar (1984) considered exploratory research design as the initial step in continuous research process rather than a detailed exercise. The following methods are likely to be very fruitful in exploratory research directed towards the search for meaningful hypothesis.

a) A review of related social science and other pertinent literature.

b) To study the people who had practical experience of the problem to be studied.

c) An analysis of "insight stimulating cases"

Focus group discussion is widely used in this type of research where a group of people is chosen and are allowed to express their insights on the topic that is being studied. The people selected for the focussed group discussion should have a common background and have comparable experiences on the problem.

A Focus Group Discussion (FGD) is a qualitative research method and data collection technique in which a selected group of people discusses a given topic or issue in-depth, facilitated by a professional external moderator. This method serves to solicit participants' attitudes and perceptions, knowledge and experiences, and practices, shared in the course of interaction with different people. The technique is based upon the assumption that the group processes activated during an FGD help to identify and clarify shared knowledge among groups and communities, which would otherwise be difficult to obtain with a series of individual interviews. Yet, this method does not presume that A) All the knowledge is shared equally among a studied group, (or) B) In each community

there is a common, underlying, homogeneous knowledge. FGD allows the investigator to solicit both the participants' shared narrative as well as their differences in terms of experiences, opinions and worldviews during such 'open' discussion rounds.

3.2 SAMPLING PROCEDURE

The procedure for selecting the sample differs according to the type of sample selected. When a small group is selected technically as the representative of the whole that small group is called 'sample' and the whole group is called 'Universe' or population. Sampling procedure followed for the investigation is given in Figure 3.4.

3.2.1 Location of the Study

The study was conducted in Andhra Pradesh state, since the researcher belongs to the same state and was familiar with the local language and culture which had facilitated the researcher to do in-depth study.

3.2.2 Selection of District

Guntur district of Andhra Pradesh was selected for the study by using purposive sampling method as it consists large number of e-NAM registered farmers in the State.

3.2.3 Selection of Market yard

Duggirala e-NAM integrated APMC was selected purposively as it is only the e-NAM integrated APMC having 100.00 per cent online transactions in Andhra Pradesh.

3.2.4 Selection of Mandals

Guntur district consists of fifty-seven mandals. Out of which six mandals *viz*., Bhattiprolu, Kollur, Kollipara, Tenali, Mangalagiri and Duggirala were selected purposively based on presence of highest number of Duggirala e-NAM registered farmers.

3.2.5 Selection of Respondents

From each of the selected mandal, 20 e-NAM registered farmers were selected using simple random procedure. Thus, total sample comprised of 120 respondents. Particulars of selected respondents were shown in Table 3.1.

Table 3.1. Particulars of selected mandals and e-NAM registered farmers

Locale of the study	Name of the selected mandals	Total number of e-NAM registered farmers
DUGGIRALA	Bhattiprolu	20
	Kollur	20
	Kollipara	20
	Tenali	20
	Mangalagiri	20
	Duggirala	20
Total		**120**

Figure 3.1. Map showing Andhra Pradesh state of India

Figure 3.2. Map showing Guntur district of Andhra Pradesh

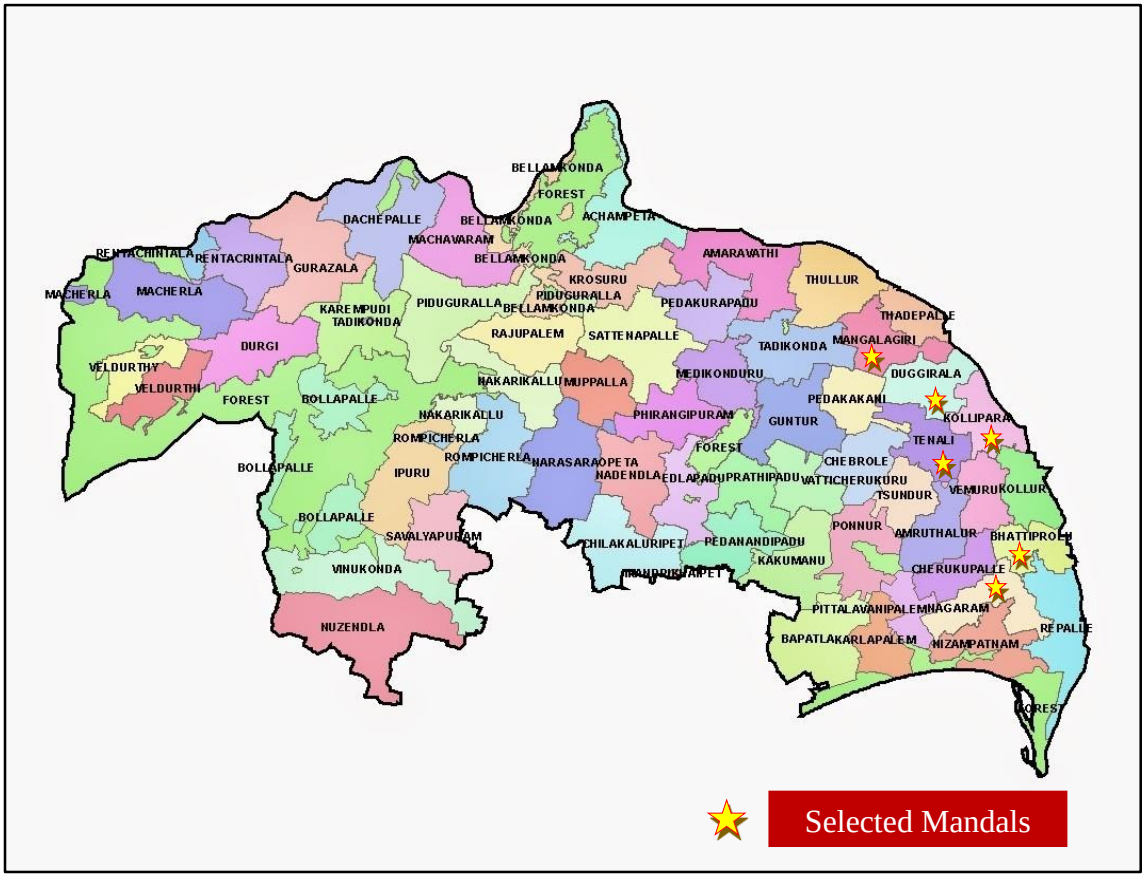

Figure 3.3. Map showing selected mandals of Guntur district

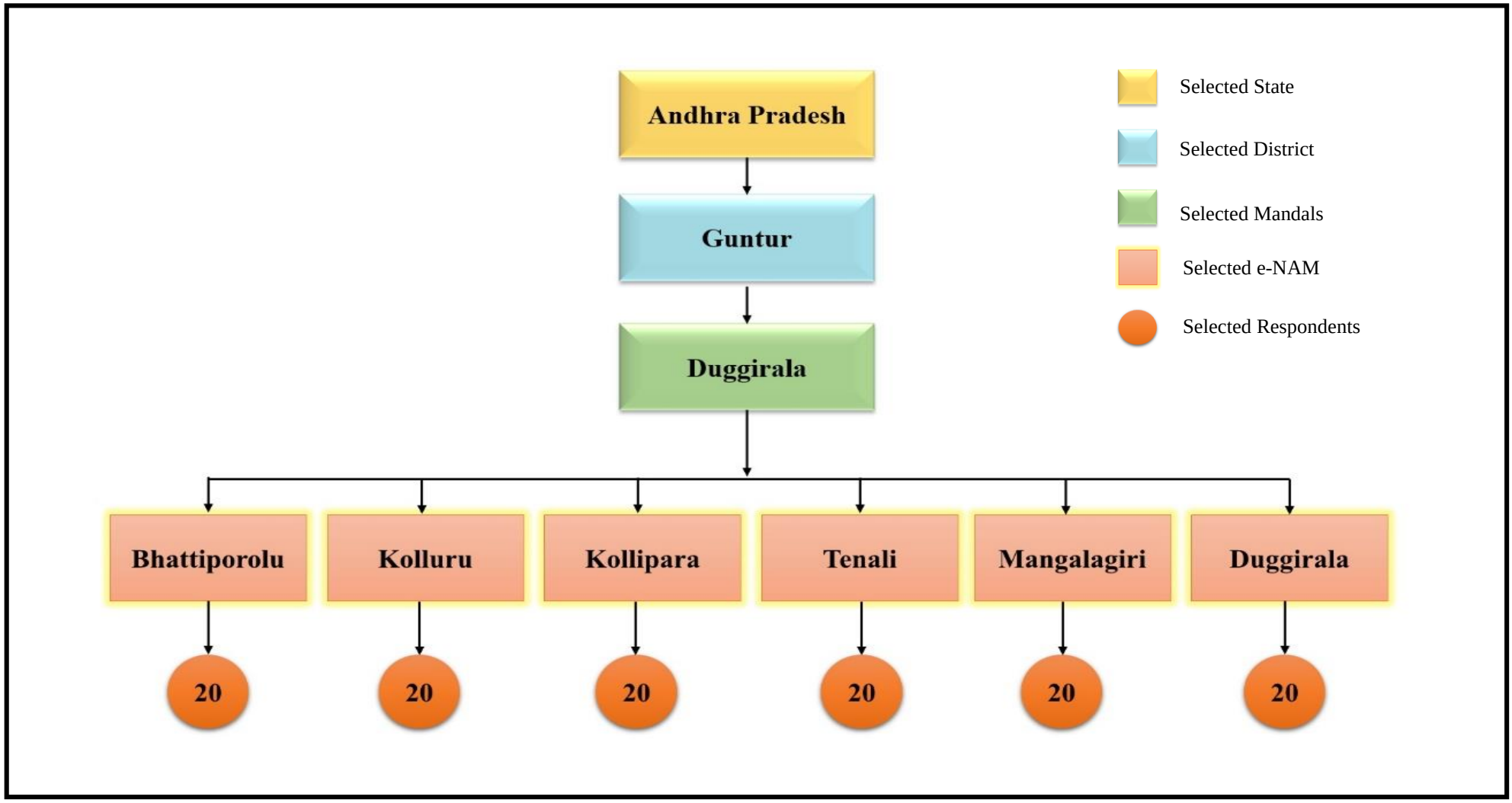

Figure 3.4. Schematic representation of sampling procedure

3.3 OPERATIONALISATION AND EMPIRICAL MEASUREMENT OF VARIABLES

The variables of the study were selected based on the relevant review of literature on the subject, in consultation with experts in the field of research and extension, members of the advisory committee and FGDs with stakeholders of e-NAM. The variables selected and their empirical measurements were represented in Table 3.2.

Table 3.2 Variables and their empirical measurement

S. No.	Variables	Instrument used for study
1.	Age	Chronological age of the e-NAM registered farmers in Duggirala.
2.	Education	Schedule developed for the study
3.	Land holding	Andhra Pradesh Land Reforms Act (1973)
4.	Social participation	Scale developed by Trivedi (1963) with suitable modifications.
5.	Mass media exposure	Schedule developed for the study.
6.	Extension contact	Scale developed by Ponnappan (1982) with suitable modifications
7.	Risk orientation	Scale developed by Supe (1969) with suitable modifications.
8.	Market orientation	Scale developed by Samantha (1977) with suitable modifications.
9.	Income orientation	Schedule developed for the study.
10.	Telescopic faculty	Schedule developed for the study.
11.	Economic motivation	Scale developed by Supe (1969) with suitable modifications.
12.	Knowledge	Schedule developed for the study.
13.	Effectiveness	Schedule developed for the study.

3.3.1 Age

Age was operationalized as the number of completed years at the time of investigation of e-NAM registered farmers and the chronological age was taken as score. The farmers were grouped into three categories based on number of completed years as follows.

S. No.	Category	Year
1.	Young age	Up to 35 years
2.	Middle age	Between 36 to 55 years
3.	Old age	Above 55 years

3.3.2 Education

It was operationally defined as the educational level attained by the Duggirala e-NAM registered farmers at the time of investigation. It was measured by using a schedule developed for the study. Scoring procedure followed is given below.

S. No.	Education Level	Score
1.	Illiterate	1
2.	Functional literacy	2
3.	Primary school (1^{st} to 5^{th} class)	3
4.	Middle school (6^{th} to 7^{th} class)	4
5.	High school (8^{th} to 10^{th} class)	5
6.	Intermediate	6
7.	Graduation	7
8.	Post-Graduation	8

3.3.3 Land holding

This was operationalized as the number of acres possessed by the Duggirala e-NAM registered farmers at the time of conducting the study. Considering the size of land owned by each of the Duggirala e-NAM registered farmers, they were grouped under five categories based on standard category of the Andhra Pradesh State Agricultural Land Reforms Act (1973).

S. No.	Category	Score
1.	Marginal (Up to 2.5 acres)	1
2.	Small (2.5 to 5 acres)	2
3.	Semi-medium (5 to 7.5 acres)	3
4.	Medium (7.5 to 10 acres)	4
5.	Large (>10 acres)	5

3.3.4 Social Participation

Social participation was operationalized as the degree of involvement of the e-NAM registered farmer in formal organizations such as FPOs, government, private, and other related organizations and associations either as member or as an office bearer in one or more of them.

The quantification of this variable was done in accordance with the scale developed by Trivedi (1963) with suitable modifications.

A score of 2 was given to office bearer, 1 was given to member of an organization and 0 was given to non-member of an organization. The e-NAM registered farmers were asked to indicate their responses on a three-point continuum of regular, occasional and never which indicate their participation in various organizations. A score of 3 was given to regular, 2 to occasional and 1 was given to never. Pooled scores were considered for the measurement of the variable. Based on the total scores obtained the e-NAM registered farmers were classified into three categories by using mean and standard deviation.

S. No.	Category	Score
1.	Low social participation	Below mean-S.D.
2.	Medium social participation	Between mean ±S.D.
3.	High social participation	Above mean + S.D.

3.3.5 Mass media exposure

Mass media exposure was operationally defined as the exposure to different mass media sources and its utilization by the e-NAM registered farmers. It was measured in three-point continuum of regular, occasional and never. The mass media components and scoring procedure was given below.

S. No.	Mass Media Source	Extent of mass media exposure		
		Regularly (2)	Occasionally (1)	Never (0)
1.	Radio			
2.	TV			
3.	Newspaper			
4.	Farm publications			
5.	Mobile			
6	Computer			
7.	Others			

The e-NAM registered farmers were grouped into three categories based on mean and standard deviation as given below.

S. No.	Category	Score
1.	Low mass media exposure	Below mean-S.D.
2.	Medium mass media exposure	Between mean ±S.D.
3.	High mass media exposure	Above mean + S.D.

3.3.6 Extension contact

Extension contact was operationalized as the degree to which the e-NAM registered farmer maintained contact with the extension agencies or personnel of formal or informal sources. For the purpose of studying the scale developed by Ponnappan (1982) was used with suitable modifications and the scores were assigned as given below.

The scores of e-NAM registered farmer is based on the frequency of contact with various extension personnel were summed up to arrive the total score of e-NAM registered farmers. Thus, the maximum and minimum scores for each e-NAM registered farmers were '33' and '11', respectively. Based on scores obtained, the e-NAM registered farmers were categorized into three groups based on mean and standard deviation.

S. No.	Category	Score
1.	Low extension contact	Below mean-S.D.
2.	Medium extension contact	Between mean ±S.D.
3.	High extension contact	Above mean + S.D.

3.3.7 Risk Orientation

It refers to the degree to which the e-NAM registered farmer was oriented towards risk, uncertainty and has the courage to face the problems in farming. Risk orientation was measured with the help of the scale developed by Supe (1969) with suitable modifications. The scale consisted of six statements out of which four were positive and two were negative. The response continuum was agree, undecided and disagree with weightage of 3, 2 and 1 for the positive statements and 1, 2 and 3 for the negative statements respectively.

S. No.	Category	Score
1.	Low risk orientation	Below mean-S.D.
2.	Medium risk orientation	Between mean ±S.D.
3.	High risk orientation	Above mean + S.D.

The maximum possible score was “18” and minimum was “6”. Based on the total score obtained by the respondents on risk orientation, they were grouped into three categories on mean and standard deviation.

3.3.8 Market Orientation

It was operationalized as the degree of willingness of e-NAM registered farmer to take judgment for selling his produce at better price by analyzing various marketing means, prevailing infrastructure and market intelligentsia. The scale developed by Samantha (1977) was used and it consists of six statements out of which three were positive and three were negative. The response continuum was agree, undecided and disagree with weightage of 3, 2 and 1 for the positive statements and 1, 2 and 3 for the negative statements respectively.

S. No.	Category	Score
1.	Low market orientation	Below mean-S.D.
2.	Medium market orientation	Between mean ±S.D.
3.	High market orientation	Above mean + S.D.

The maximum possible score was “18” and minimum was “6”. Based on the total score obtained by the respondents on risk orientation, they were grouped into three categories on mean and standard deviation.

3.3.9 Income Orientation

It was operationalized as degree of willingness of e-NAM registered farmer to enhance his income by following various methods for the realization of higher profits. For the study of income orientation of e-NAM registered farmers, a schedule was developed consisting of seven statements out of which six were positive and one was negative. The response continuum was agree, undecided and disagree with weightage of 3, 2 and 1 for the positive statements and 1, 2 and 3 for the negative statements respectively.

S. No.	Category	Score
1.	Low income orientation	Below mean-S.D.
2.	Medium income orientation	Between mean ±S.D.
3.	High income orientation	Above mean + S.D.

The maximum possible score was “21” and minimum was “7”. Based on the total score obtained by the respondents on risk orientation, they were grouped into three categories on mean and standard deviation.

3.3.10 Telescopic Faculty

It refers to the degree to which the e-NAM registered farmer was oriented to think ahead and alert to the changing conditions of the time. It is the tendency to anticipate the future at present situation. For the study of telescopic faculty, a schedule was developed consisting of six positive statements. The response continuum was agree, undecided and disagree with weightage of 3, 2 and 1 respectively.

S. No.	Category	Score
1.	Low telescopic faculty	Below mean-S.D.
2.	Medium telescopic faculty	Between mean ±S.D.
3.	High telescopic faculty	Above mean + S.D.

The maximum possible score was “18” and minimum was “6”. Based on the total score obtained by the respondents on Telescopic Faculty, they were grouped into three categories taking into consideration of mean and standard deviation.

3.3.11 Economic Motivation

It was operationally defined as the occupational success measured in terms of profit maximization and the relative importance placed on economic ends by the e-NAM registered farmer. It was measured with the help of economic motivation scale developed by Supe (1969) with suitable modifications. The scale consisted of six statements out of which five were positive and one was negative. The response continuum was agree, undecided and disagree with weightage of 3, 2 and 1 for the positive statements and 1, 2 and 3 for the negative statements respectively.

S. No.	Category	Score
1.	Low economic motivation	Below mean-S.D.
2.	Medium economic motivation	Between mean ±S.D.
3.	High economic motivation	Above mean + S.D.

The maximum possible score was “18” and minimum was “6”. Based on the total score obtained by the respondents on economic motivation, they were grouped into three categories low, medium and high categories by using mean and standard deviation.

3.3.12 Exploration of Functioning of e-NAM in Duggirala Market

The entire functioning of e-NAM was categorized phase-wise *viz*., Gate entry, Assaying, Online trading, Weighment & Invoice, Online payment and Gate exit. The functioning under each phase was explored by taking the components of each phase in to consideration as well as the prescribed guidelines of e-NAM for each component. Accordingly, the deviations were documented with proper reasoning. Further, the consequences of deviation were also documented keeping in view of the effective functioning of e-NAM.

3.3.13 Knowledge

It is the degree to which the e-NAM registered farmer possessed the factual information regarding the functioning / features of e-NAM. For the study of knowledge, a teacher made test was employed by discussing with experts in agricultural extension, marketing and officials of e-NAM which consists of twenty-three knowledge questions. The responses were obtained and scoring was given as 1 and 0 for correct and incorrect responses respectively. The total scores were calculated by adding all the scores of all the items.

S. No.	Category	Score
1.	Low knowledge level	Below mean - S.D.
2.	Medium knowledge level	Between mean ± S.D.
3.	High knowledge level	Above mean + S.D.

Knowledge of each e-NAM registered farmer was computed by summing up the total scores of all the twenty-three items. The maximum and minimum scores possible were “23” and “0” respectively. The respondents were categorized into three groups based on Mean and Standard deviation.

Further an attempt has been made to categorize e-NAM registered farmers based on their per cent knowledge on features / functioning of the scheme.

S. No.	Percent Knowledge
1.	Less than 25
2.	25 to 50
3.	50 to 75
4.	More than 75

3.3.14 Effectiveness

It was operationally defined as the degree to which e-NAM is successful in producing a desired result in enhancing farm income. For the study of Effectiveness of e-NAM, a schedule was prepared which consists of nineteen statements. The responses were recorded in three-point continuum good, fair and poor with weightage of 3, 2 and 1 respectively.

S. No.	Category	Score
1.	Highly effective	Below mean-S.D.
2.	Moderately effective	Between mean ±S.D.
3.	Less effective	Above mean + S.D.

Effectiveness of e-NAM as perceived by each registered farmer was computed by summing up the total scores of all the nineteen items. The maximum and minimum scores possible were 57 and 19 respectively. The respondents were categorized into three groups based on Mean and Standard deviation.

3.4 CONSTRAINTS FACED BY e-NAM REGISTERED FARMERS AND SUGGESTIONS TO OVERCOME THEIR CONSTRAINTS

For the present study, 'constraint' was operationalized as something that limits or controls the registered farmer in trading through e-NAM. The constraints perceived by each e-NAM registered farmer were recorded. An open ended schedule was developed to measure the constraints. Finally, the constraints were ranked one to fourteen based on the descending order of frequencies obtained.

Suggestion was operationally defined as the requirement expressed by e-NAM registered farmer for efficient implementation of e-NAM. The suggestions perceived by each e-NAM registered farmer were recorded. An open ended schedule was developed to measure the constraints. Finally, the suggestions were ranked one to thirteen based on the descending order of frequencies obtained.

3.5 DEVICES AND METHODS USED FOR DATA COLLECTION

3.5.1 Interview Schedule

The device used for collecting data in the present study was semi-structured interview schedule. Keeping in view of the specific objectives and different variables included in the study, a semi-structured interview schedule was developed. The interview schedule was appended in Appendix.

3.5.2 Pre-survey

Focused group discussions and personal interviews were organized by involving e-NAM registered farmers, traders, commission agents and mandi officials.

3.5.3 Method of Data Collection

The field investigation was carried out during the year 2020. The data was collected by administering the semi-structured interview schedule to e-NAM registered farmers. The e-NAM registered farmers were personally interviewed by the investigator which helped in getting first-hand information and gave an opportunity to observe them personally. It was made sure that all the items were correctly explained to e-NAM registered farmers and the responses were recorded accordingly in the interview schedule with due care. Every effort was made to check and cross check the data collected from all the sample of e-NAM registered farmers. Friendly atmosphere was maintained during the interview to see that the e-NAM registered farmers were at ease and expressed their opinions freely, fairly and frankly.

3.5.4 Presentation of Report

The data thus collected from the e-NAM registered farmers through interview schedule were coded and tabulated. Then the data were subjected to different statistical tests keeping in view the objectives of the study. The findings emerged out from the analysis of data were suitably interpreted, discussed and necessary conclusions and inferences were drawn.

3.6 STATISTICAL TOOLS AND PROCEDURES FOLLOWED

Statistical method is the scientific method of judging collective natural or social phenomena from the results obtained by the analysis or enumerated or collected estimates (Siegel, 1956). For the purpose of statistical analysis to fulfill the set objectives, the following statistical tools were used:

1. Arithmetic Mean ($\overline{X}$)
2. Standard Deviation (σ)
3. Frequency and Percentage
4. Standard Normal Deviate Test (Z test)

3.6.1 Arithmetic Mean ($\overline{X}$)

It is defined as the sum of all values of the observations divided by the total number of observations. Symbolically it is represented as $\bar{x}$.

$$\text{Arithmetic mean } (\overline{X}) = \frac{\Sigma xi}{n} = \frac{x_1 + x_2 + ...x_n}{n}$$

Where, $\overline{X}$ = Arithmetic mean; *xi* = Value of ith item of *x*; i = 1, 2, 3……n and n = Number of e-NAM Registered farmers

3.6.2 Standard Deviation (S.D.)

It is positive square root of the mean of the squared deviations taken from arithmetic mean. It is represented by symbol σ

$$\text{SD } (\sigma) = \sqrt{\frac{1}{n}\left[\Sigma x^2 - \frac{(\Sigma x)^2}{n}\right]}$$

Where, Σx^2 = Sum of squares of observations; $(\Sigma x)^2$ = Square of sum of 'x' values and n = Number of observations.

3.6.3 Frequency and Percentage

Frequency and percentages were used to know the distribution pattern of the e-NAM registered farmers according to the objectives under study. Percentages were used for standardization of sample size by calculating the number of individuals that would be under a given category, if the total number of cases were hundred. Frequency was represented by 'N' and percentage was represented by '%' in the results of the study.

3.6.4 Standard Normal Deviate Test (Z-Test)

Standard normal deviation test was used to measure the effectiveness of e-NAM in terms of identified components. Accordingly, the ranks were given to each component based on the z value. The formula used for the purpose was given below.

$$\bar{z} = \frac{\Sigma Z_i}{n}$$

$$Z_i = \frac{x_i - \bar{x}}{\sigma}$$

Where,

x_i = Score for ith statement

$\bar{x}$ = Mean score of all statements

n = Number of statements

σ = Standard deviation calculated on x_i values

Chapter - IV

Results and Discussion

Chapter IV

RESULTS AND DISCUSSION

The results of the investigation and the findings thus arrived were presented in this chapter and are being discussed duly considering the theoretical and available research in the area of investigation. The presentation of this chapter is grouped under the following sections for the purpose of clarity.

4.1 Profile characteristics of e-NAM registered farmers

4.2 Exploration of functioning of e-NAM in Duggirala Market

4.3 Knowledge of e-NAM registered farmers on functioning / features of e-NAM.

4.4 Effectiveness of e-NAM as perceived by registered farmers

4.5 Constraints faced by e-NAM registered farmers and suggestions to overcome their constraints

4.6 Successful case lets of e-NAM registered farmers

4.7 Strategy for effective functioning of e-NAM

4.1 PROFILE CHARACTERISTICS OF e-NAM REGISTERED FARMERS

4.1.1 Age

It is evident from the Table 4.1. and Figure 4.1. that nearly two third of the e-NAM registered farmers belonged to middle age (63.33%) category succeeded by old age (24.17%) and young age (12.50%) categories.

Table 4.1. Distribution of e-NAM registered farmers according to their age

(n= 120)

S. No.	Age	Frequency	Percentage
1.	Young Age (≤35 years)	15	12.50
2.	Middle Age (36-55 years)	76	63.33
3.	Old Age (≥56 years)	29	24.17
Total		**120**	**100.00**

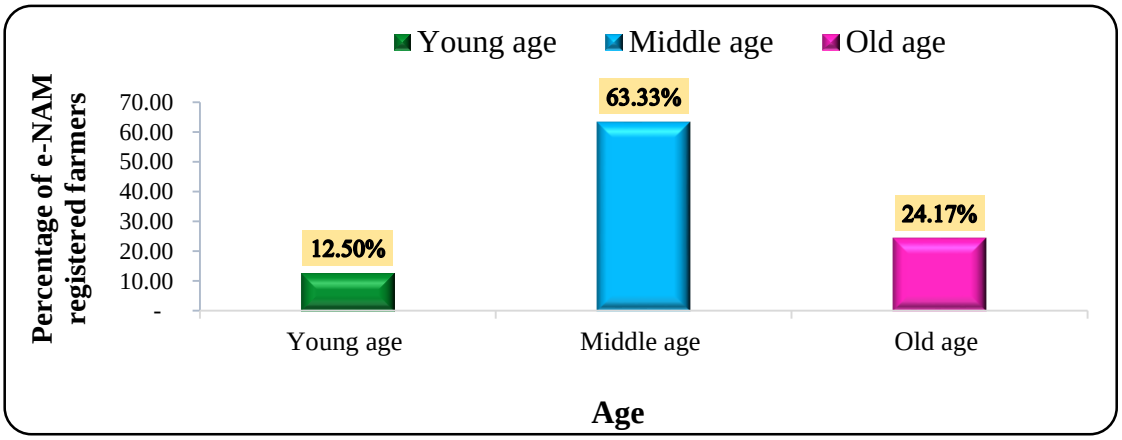

Figure 4.1. Distribution of e-NAM registered farmers according to their age

From the above data it could be inferred that the sample of e-NAM registered farmers consisted of all the age groups but middle age category is more compared to young and old age. The probable reason for above trend might be that, middle and old age category farmers were having more trading experience and association with the APMC which might had motivated them to sell their produce through reformed APMC *i.e.*, e-NAM. Because of the increased opportunities for education and employment, the younger generation is more attracted towards alternate employment rather than farming. The findings were in conformity with that reported by Dhruw (2018) and Shende (2019).

4.1.2 Education

The Table 4.2. and Figure 4.2. clearly depicts that more than one third (34.17%) of the e-NAM registered farmers were belonged to high school education category followed by primary school (15.00%), middle school (13.33%), graduation (10.83%), illiterate (10.00%), intermediate (08.33%), Functional literate (04.17%) and post-graduation & above (04.17%) categories.

Table 4.2. Distribution of e-NAM registered farmers according to their education

(n= 120)

S. No.	Category	Frequency	Percentage
1.	Illiterate	12	10.00
2.	Functional Literate	5	4.17
3.	Primary school (1st to 5th class)	18	15.00
4.	Middle School (6th to 7th class)	16	13.33
5.	High school (8th to 10th)	41	34.17
6.	Intermediate	10	8.33
7.	Graduate	13	10.83
8.	Post Graduate & Above	5	4.17
Total		**120**	**100.00**

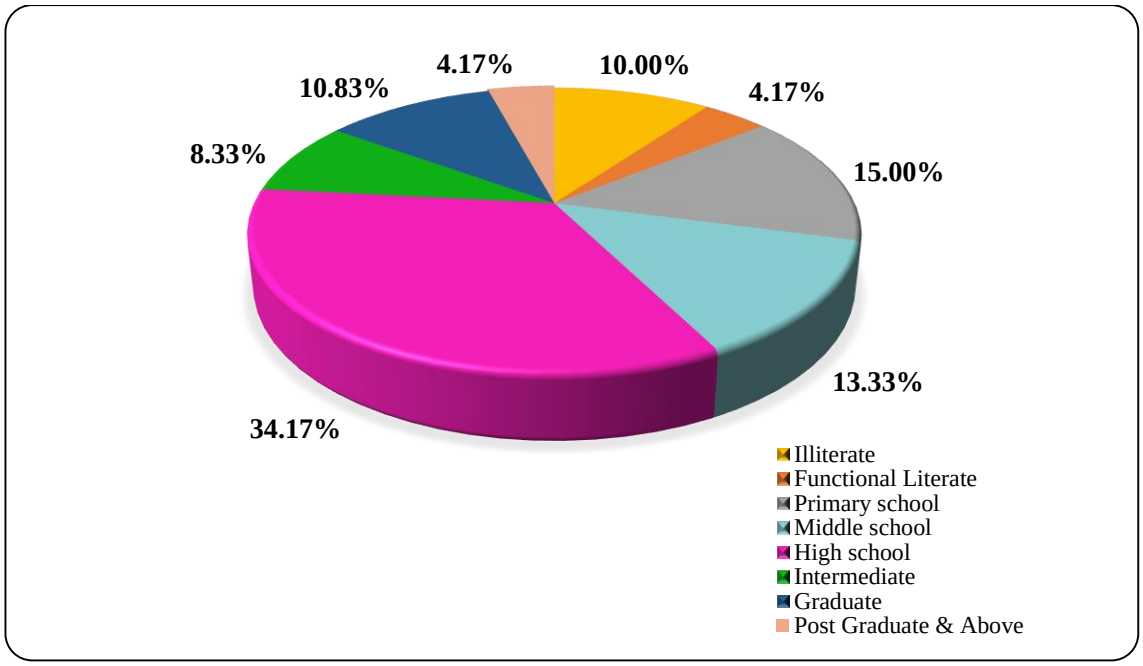

Figure 4.2. Distribution of e-NAM registered farmers according to their education

The above trend might be due to the fact that educational facilities in villages were strengthened and villages were having accessibility to high schools and colleges. Enthusiastic and affordable farmers had completed graduation followed by post-graduation. The findings of the present study were similar with the findings of Maya *et al*. (2018), Tyngkan (2018), Shende (2019) and Smitha (2019).

4.1.3 Land Holding

An overview of the Table 4.3. and Figure 4.3. depicted that nearly one third (29.17%) of the e-NAM registered farmers belonged to small land holdings category subsequently marginal (22.50%), large (21.67%), semi-medium (19.17%) and medium (7.50%) land holding categories.

Table 4.3. Distribution of e-NAM registered farmers according to their land holding

(n= 120)

S. No.	Category	Frequency	Percentage
1.	Marginal (Up to 2.5 acres)	27	22.50
2.	Small (2.5 to 5 acres)	35	29.17
3.	Semi-medium (5 to 7.5 acres)	23	19.17
4.	Medium (7.5 to 10 acres)	9	7.50
5.	Large (>10 acres)	26	21.67
Total		**120**	**100**

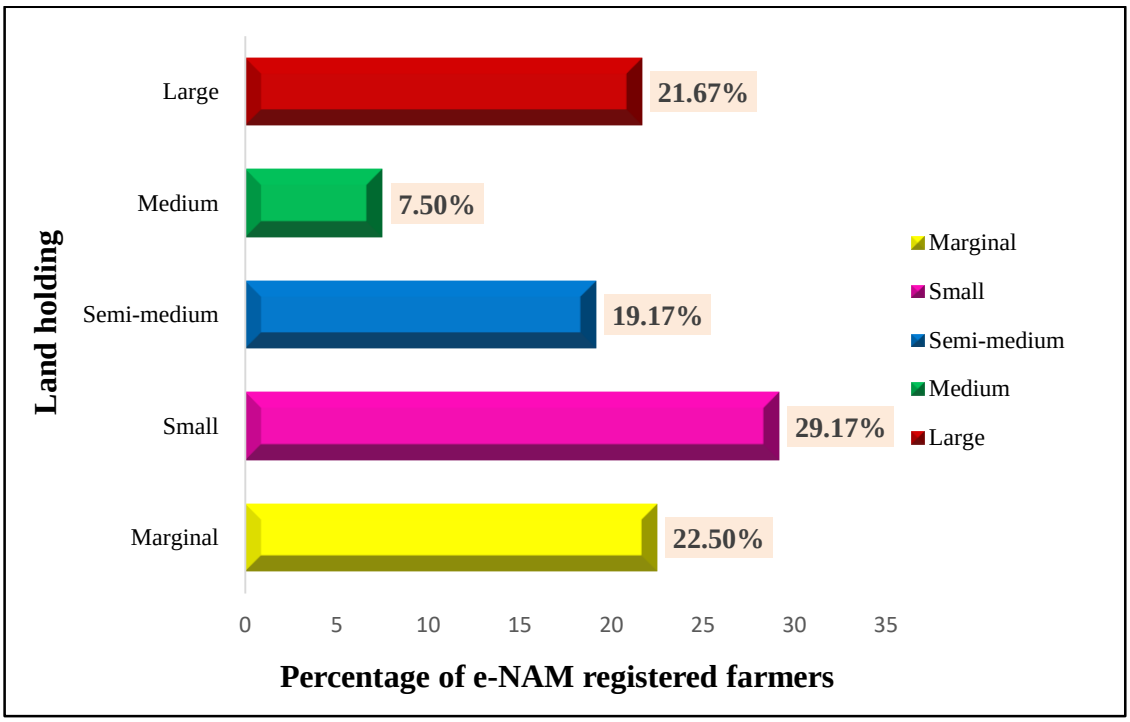

Figure 4.3. Distribution of e-NAM registered farmers according to their land holding

The probable reason for the above trend might be that Turmeric, being a commercial crop, small and marginal farmers might not be interested to take risk both from point of long duration as well as involvement of complex operations. The findings of the present study were similar with that of Dhruw (2018), Tyngkan (2018) and Natthu (2019).

4.1.4 Social Participation

From the Table 4.4. and Figure 4.4. it can be comprehended that nearly three fourth (71.67%) of the e-NAM registered farmers had medium social participation succeeded by high (15.83%) and low (12.50%) social participation.

Table 4.4. Distribution of e-NAM registered farmers based on their social participation

(n=120)

S. No.	Category	Frequency	Percentage
1.	Low social participation	15	12.50
2.	Medium social participation	86	71.67
3.	High social participation	19	15.83
Total		**120**	**100.00**
Mean: 8.59			**S.D:** 2.69

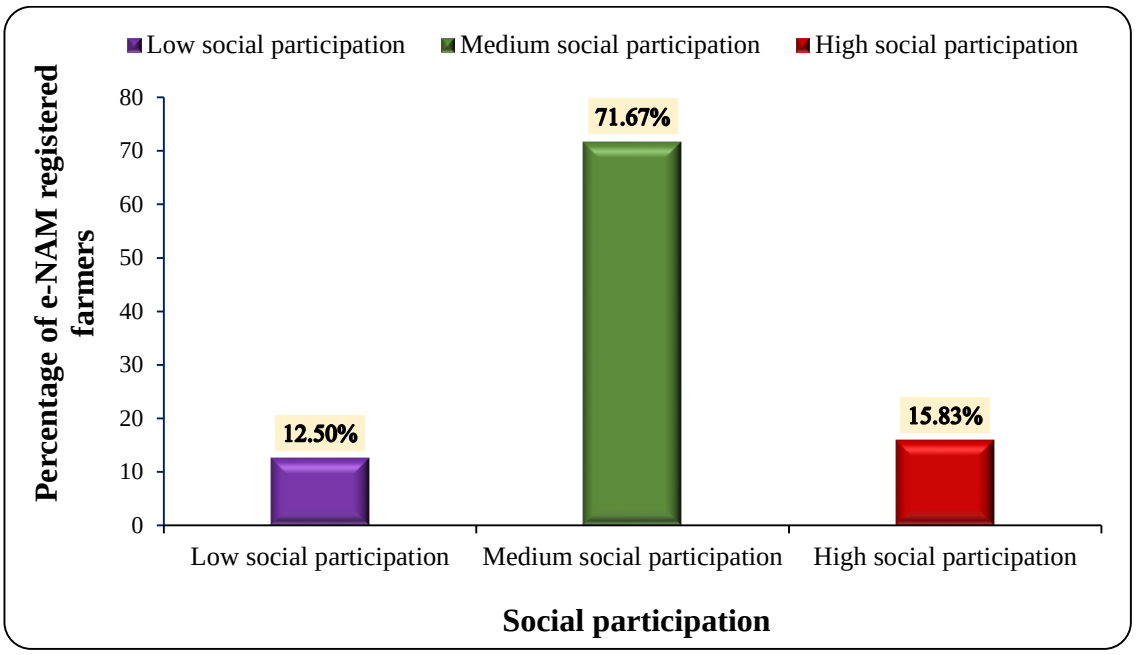

Figure 4.4. Distribution of e-NAM registered farmers according to their social participation

The probable reason for this trend might be due to the fact that some of the e-NAM registered farmers were having membership in more than one organization like Rythu Mitra Groups, Village panchayats, FPOs *etc*., and regularly participating in the meetings held by those organizations. As most of the e-NAM registered farmers were middle aged with high school education their zeal for recognition in the society is satisfied through social participation. One the other side, lower social participation might be due to their higher age, illiteracy and lack of interest towards social activities. The findings were in conformity with that reported by Rao (2016).

4.1.5 Mass Media Exposure

A glance at the Table 4.5. and Figure 4.5. revealed that more than half (55.83%) of the e-NAM registered farmers had medium mass media exposure, succeeded by those with low (22.50%) and high (21.67%) mass media exposure.

Table 4.5. Distribution of e-NAM registered farmers according to their mass media exposure

(n= 120)

S. No.	Category	Frequency	Percentage
1.	Low mass media exposure	27	22.50
2.	Medium mass media exposure	67	55.83
3.	High mass media exposure	26	21.67
Total		**120**	**100.00**
Mean: 4.56			**S.D:** 2.03

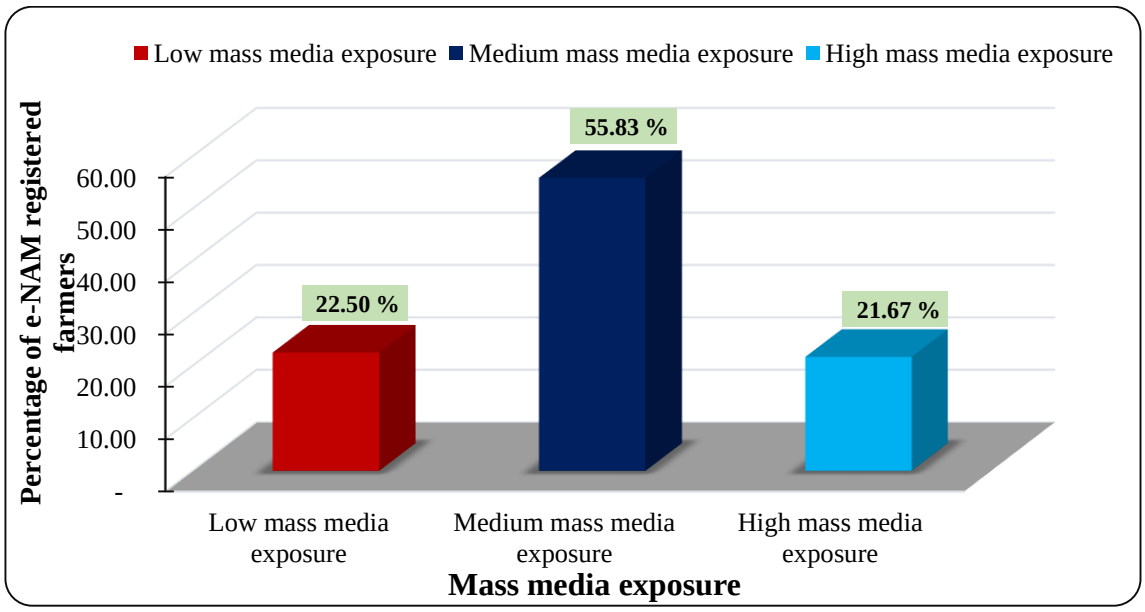

Figure 4.5. Distribution of e-NAM registered farmers according to their mass media exposure

The probable reason for this trend might be due to the fact that as majority of e-NAM registered farmers were middle aged with education up to high school and few with graduation and post-graduation had inclination towards better utilization of different mass media such as T.V, newspapers, farm publications and mobiles to acquire information on modern technologies of production, value addition and marketing. On the other side, low mass media exposure might be due to their heavy workload and non-possession of digital assets by majority of small and marginal farmers. The findings are in conformity with that reported by Maya *et al*. (2018) and Wahab (2018).

4.1.6 Extension Contact

It is apparent from the Table 4.6. and Figure 4.6. that nearly two third (65.83%) of the e-NAM registered farmers had medium extension contact followed by low (22.50%) and high (11.67%) extension contact.

Table 4.6. Distribution of e-NAM registered farmers based on their extension contact

(n= 120)

S. No.	Category	Frequency	Percentage
1.	Low extension contact	27	22.50
2.	Medium extension contact	79	65.83
3.	High extension contact	14	11.67
Total		**120**	**100.00**
Mean: 7.38			**S.D:** 2.91

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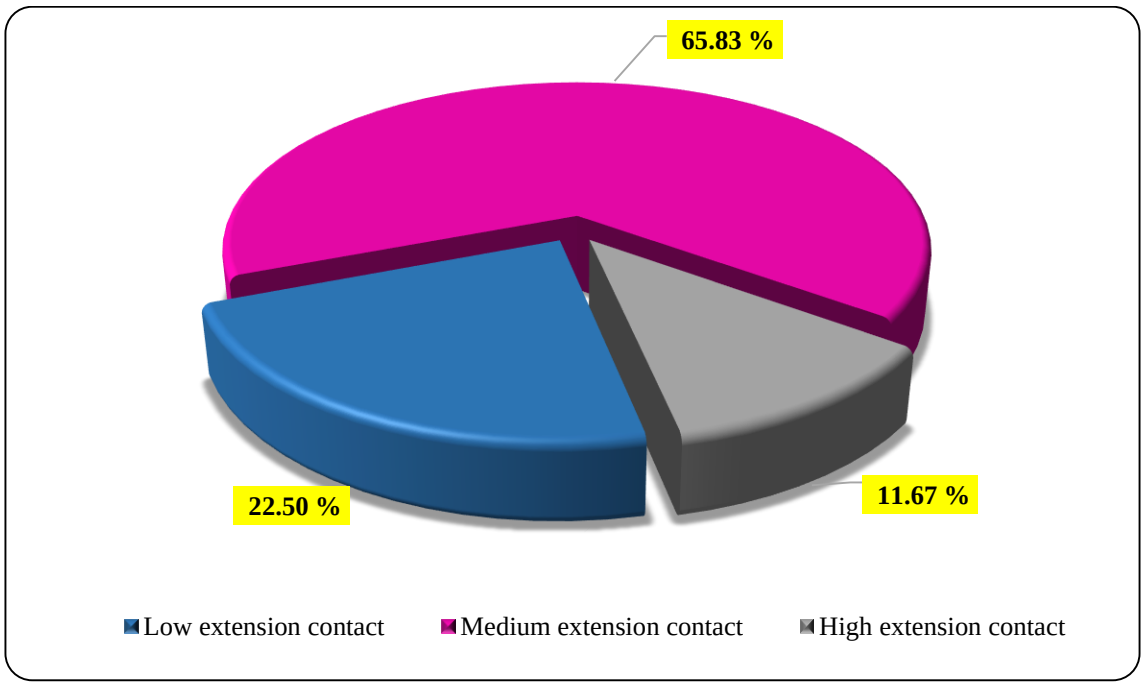

Figure 4.6. Distribution of e-NAM registered farmers according to their extension contact

The probable reason for the above distribution might be that Turmeric, being a commercial crop requires regular technical support for realizing better quality produce as well as remunerative price for produce. Hence the farmers might be maintaining regular contact with scientists, extension agents, progressive farmers input agencies *etc*., so as to take up different farming operations. The findings were in conformity with that reported by Dhruw (2018), Maya *et al*. (2018) and Nagesh (2019).

4.1.7 Risk orientation

The observations from Table 4.7. and Figure 4.7. indicated that nearly two third (63.33%) of the e-NAM registered farmers had medium level of risk orientation followed high (19.17%) and low level (17.50%) of risk orientation.

Table 4.7. Distribution of e-NAM registered farmers based on their risk orientation (n= 120)

S. No.	Category	Frequency	Percentage
1.	Low risk orientation	21	17.50
2.	Medium risk orientation	76	63.33
3.	High risk orientation	23	19.17
Total		**120**	**100.00**
Mean: 12.90			**S.D:** 3.24

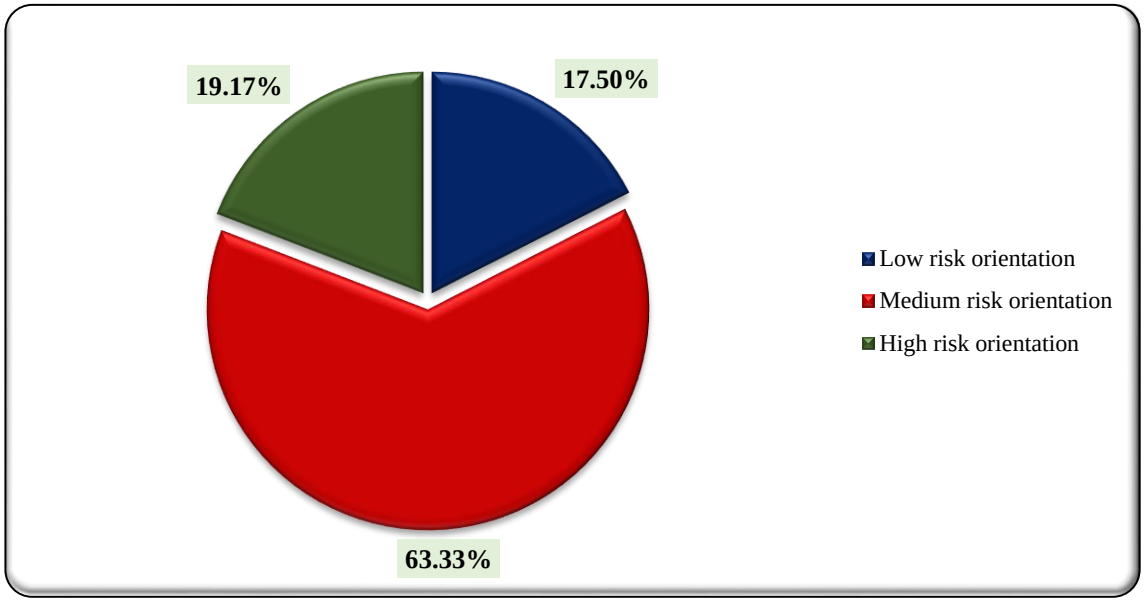

Figure 4.7. Distribution of e-NAM registered farmers based on their risk orientation

Risk is an inevitable evil in every one's life. As the technologies are becoming more obsolete day by day, one has to take risk to reap windfall profits from innovations. Turmeric cultivation involves heavy investment and relatively long duration to get returns from the crop. The probable reason for above trend might be that educated farmers and farmers with large landholdings might be ready to take optimistic risk to adopt the innovations in turmeric cultivation. On the other side, small and marginal farmers with illiteracy might be so conservative and orthodox in their life style not willing to take risk in turmeric cultivation. The results were in conformity with the findings of Nagesh (2019).

4.1.8 Market orientation

Results furnished in Table 4.8. and Figure 4.8. indicated that three fifth (60.00%) of the e-NAM registered farmers had medium level of market orientation, followed by high (24.17%) and low (15.83%) levels of market orientation.

Table 4.8. Distribution of e-NAM registered farmers based on their market orientation

(n= 120)

S. No.	Category	Frequency	Percentage
1.	Low market orientation	19	15.83
2.	Medium market orientation	72	60.00
3.	High market orientation	29	24.17
Total		**120**	**100.00**
Mean: 13.97			**S.D:** 3.08

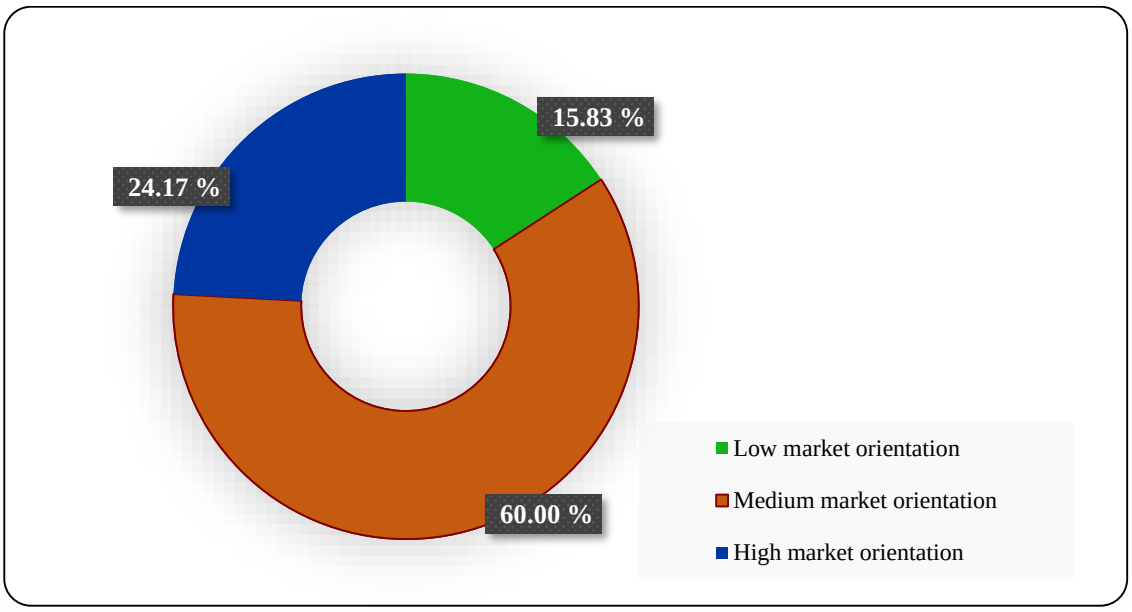

Figure 4.8. Distribution of e-NAM registered farmers based on their market orientation

The plausible reason for the above trend might be that having better marketing avenues turmeric, the turmeric farmers might be exploring all turmeric marketing channels to get better price for their produce. During the course of action, they might be analyzing the pros and cons of different marketing channels based on their past experiences and deciding the best course of action to market their produce. On the other side, the farmers with illiteracy and small landholding might be resorting to the locally available traders to sell their produce. The results were in conformity with the findings of Maya *et al*. (2018), Maratha and Badodiya (2017).

4.1.9 Income orientation

It could be noticed from the Table 4.9. and Figure 4.9. that nearly half (49.17%) of the e-NAM registered farmers had medium level of income orientation followed by high (29.17%) and low level (21.67%) of income orientation.

Table 4.9. Distribution of e-NAM registered farmers based on their Income orientation (n= 120)

S. No.	Category	Frequency	Percentage
1.	Low income orientation	26	21.67
2.	Medium income orientation	59	49.17
3.	High income orientation	35	29.17
Total		**120**	**100.00**
Mean: 14.12			**S.D:** 3.77

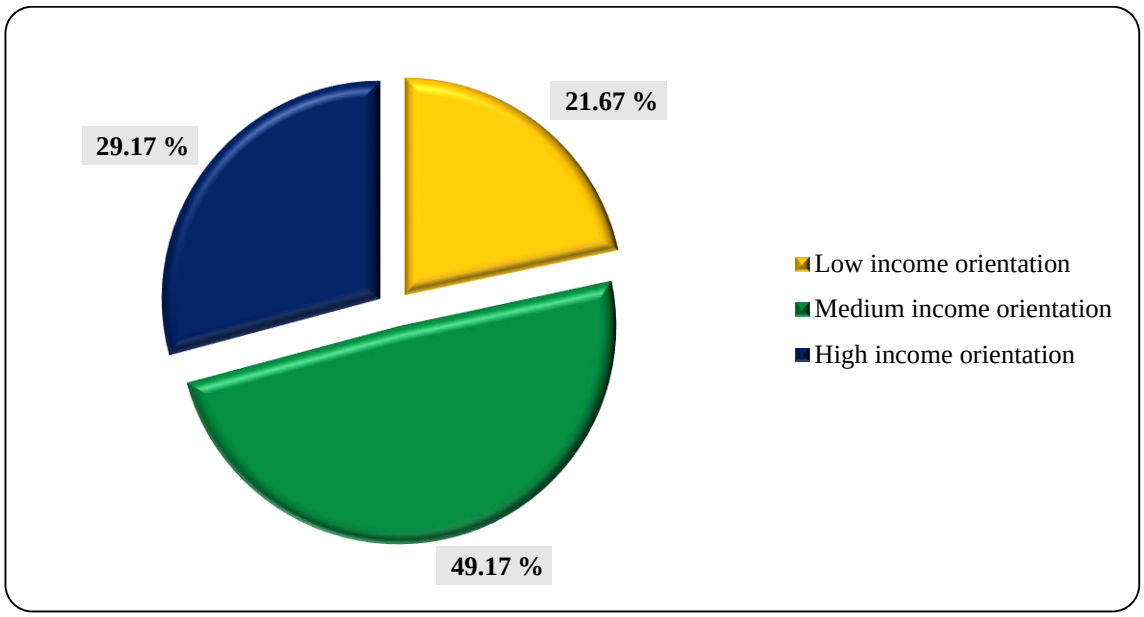

Figure 4.9. Distribution of e-NAM registered farmers based on their Income orientation

The probable reason for above trend might be that majority of the e-NAM registered farmers might be resorting to all possible ways of reducing cost of cultivation in terms of inputs, labour and operational expenses. As a part of that they might be critically persuading every rupee invested in turmeric cultivation. They also focus on most appropriate channels to realize high profits. On the other side, few farmers might be concentrating more on production aspects rather than net returns. They might be investing more on different aspects without scientific rationality. Some of the farmers might be approaching commission agents, money lenders and input agencies. The results were in conformity with the findings of Rao (2016).

4.1.10 Telescopic Faculty

A cursory look at the Table 4.10. and Figure 4.10. indicates that more than half (56.67%) of the e-NAM registered farmers had medium level of telescopic faculty followed by low (24.17%) and high (19.17%) levels of telescopic faculty.

Table 4.10. Distribution of e-NAM registered farmers based on their telescopic faculty (n= 120)

S. No.	Category	Frequency	Percentage
1.	Low telescopic faculty	29	24.17
2.	Medium telescopic faculty	68	56.67
3.	High telescopic faculty	23	19.17
Total		**120**	**100.00**
Mean: 12.99			**S.D:** 3.01

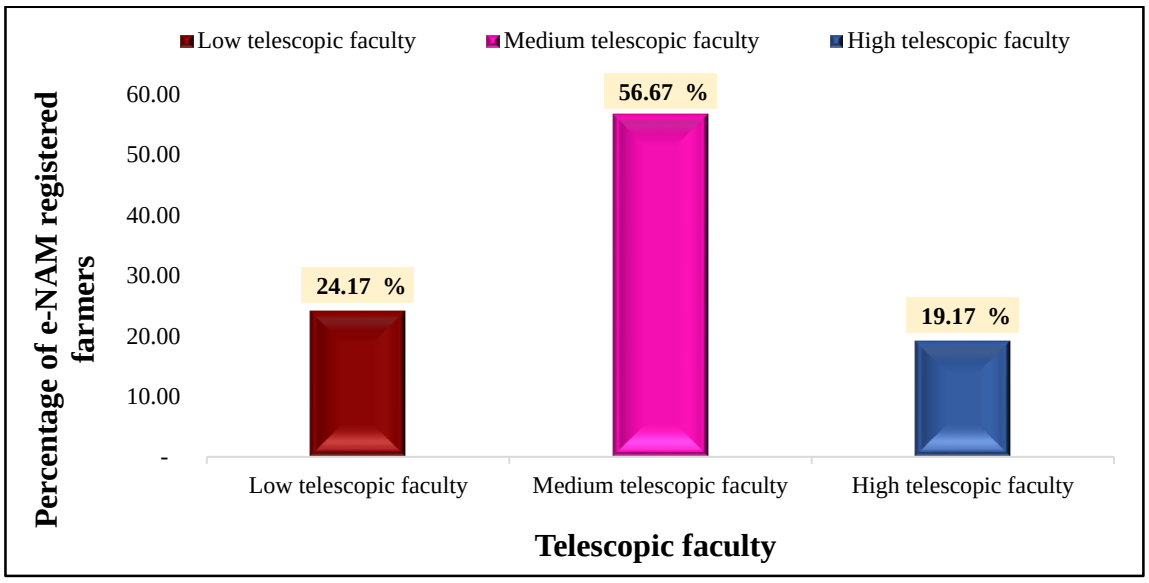

Figure 4.10. Distribution of e-NAM registered farmers based on their telescopic faculty

Majority of the e-NAM registered farmers might be restricting their vision towards mere getting of income during current season rather than building an empire through cultivation. Even though there are ample opportunities to raise their standard of living with optimistic utilization of resources, the farmers might be always thinking towards realization of short term goals. Few of them projecting their vision duly utilizing their telescopic faculty with optimistic reason. It might be also due to the reason that considerable proportion of e-NAM registered farmers were middle aged having medium extension contact, social participation, risk orientation, market orientation and mass media exposure.

4.1.11 Economic Motivation

Table 4.11. and Figure 4.11. highlights that more than three fifth (62.50%) of the e-NAM registered farmers had medium level of economic motivation succeeded by high (24.17%) and low level (13.33%) of economic motivation.

Table 4.11. Distribution of e-NAM registered farmers based on their economic motivation

(n= 120)

S. No.	Category	Frequency	Percentage
1.	Low economic motivation	16	13.33
2.	Medium economic motivation	75	62.50
3.	High economic motivation	29	24.17
Total		**120**	**100.00**
Mean: 12.41			**S.D:** 2.49

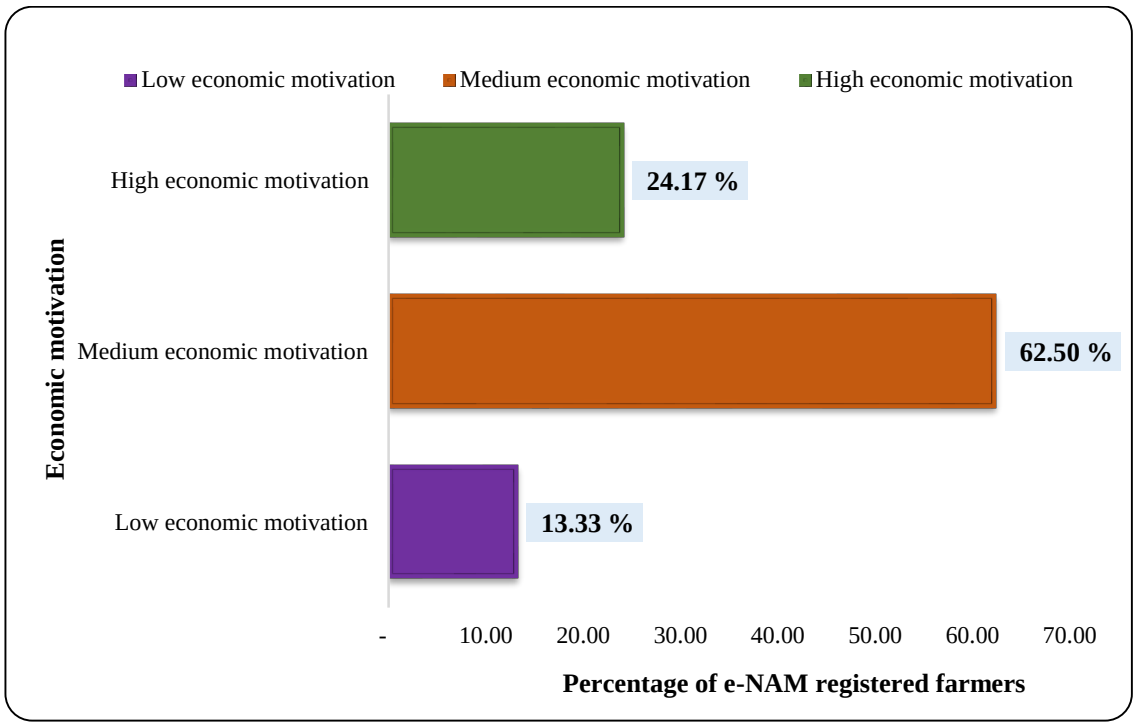

Figure 4.11. Distribution of e-NAM registered farmers based on their economic motivation

The probable reason for the above distribution might be that the urge of earning more profits through turmeric cultivation is optimistic and farmers can accomplish the same by framing modest objectives for this purpose. In this juncture, majority of the e-NAM registered farmers might be oriented towards high profits duly utilizing all the resources in an effective manner. On the whole eighty-five per cent of them were educated and had medium level of social participation, risk orientation and telescopic faculty which had contributed towards medium to high level of economic motivation. The results were in conformity with the findings of Dubey (2018) and Natthu (2019).

4.2 EXPLORATION OF FUNCTIONING OF e-NAM IN DUGGIRALA MARKET

The entire functioning of e-NAM was categorized phase-wise *viz*., Gate entry, Assaying, Online trading, Weighment & Invoice, Online payment and Gate exit. The functioning under each phase was explored by taking the components of each phase in to consideration as well as the prescribed guidelines of e-NAM for each component. Accordingly, the deviations were documented with proper reasoning. Further, the consequences of deviation were also documented keeping in view of the effective functioning of e-NAM.

Stage	Components	Guidelines	Deviation	Reason	Consequence
1. Gate entry	Vehicle registration	Vehicle that enters e-NAM integrated APMC with produce should be registered at entry gate with the following details ➢ Fee type (Monthly / Annually) ➢ Validity ➢ Vehicle type ➢ Vehicle number ➢ Owner name ➢ Mobile number ➢ Address	Vehicle registration is not in execution.	Lack of awareness, negligence and not considered as an important component.	Vehicle wise commodity weighment is not possible. There is every chance for private vehicles to enter in to the mandi. Monitoring and maintenance of records end-to-end is not possible.

Stage	Components	Guidelines	Deviation	Reason	Consequence
	Farmer registration & Lot generation	A dedicated format is available for registration & Lot generation. The details should be collected and maintained are: ➢ Gate number ➢ Yard type ➢ Submarket / warehouse ➢ Seller type & name ➢ Father / Husband name ➢ Mobile number and Address ➢ Commodity ➢ Bag type and No. of bags ➢ Approximate weight ➢ Vehicle type & number ➢ Commission agent name & firm ➢ Generation of Gate Entry Receipt ➢ Bulk registration of Farmers, Traders & Commission Agents through CSV file upload	1. Middlemen are trading the produce by producing requisite documents of the respective farmers. 2. Pre-registration is not in practice. 3. Weighment of vehicle through weigh-bridge is not in practice	1. High transportation cost hinder the direct participation of small & marginal farmers in e-NAM. 2. Lack of comprehension about the process flow and features of e-NAM. 3. Unavailability of electronic weighbridge in new mandi & non integration of existing weigh bridge with the e-NAM portal.	1. Chance of unscrupulous deductions by traders for trading farmer's produce. 2. More time consumption for farmer's registration and lot generation at entry gate during peak seasons of arrival. 3. Chances of illegal offline trading inside the APMC premises.

Stage	Components	Guidelines	Deviation	Reason	Consequence
2. Assaying	Sampling	1. After gate entry, the produce bags should be unloaded from vehicle to auction platform for trading. 2. Hamalis can be hired for unloading purpose. Unloading of the produce should be done lot wise. 3. After unloading, sampling should be done lot wise by Lab Technician. 4. While collecting the samples, the lab technician has to select the lot and enter the quantity taken as a sample for assaying. 5. Two or three samples can be taken based on need. 6. After successful collection of sample, receipt can be generated for reference	Lot wise sampling is not in practice during the season of peak arrivals.	More time consumption. Unawareness of the farmers about sampling procedure and its importance.	The process is perceived as nominal and lost its credibility.

Stage	Components	Guidelines	Deviation	Reason	Consequence
	Quality assaying	1. Testing of the collected sample by Lab technician with lab equipment. 2. Assaying the quality of the commodity based on its assaying parameters. 3. After completion of assaying, result values should be entered lot wise and to be saved in e-NAM portal. 4. These results will be viewed by traders and based on the report they will decide the bid price for respective lot. 5. When the Lab technician selects the lot link in the portal, the details of the respective commodity can be seen. The quality is judged as range 1/2/3 based on assaying parameters and approved standards. After saving the result, the transaction print receipt can be taken for reference. 6. The same results will get reflected in trader portal also for reference.	Quality report is being entered manually in the portal without completing all the steps of assaying.	More time consumption during the season of peak arrivals. Lack of automation / integration of quality assaying equipment with e-NAM portal. Unawareness of farmers about functioning of quality assaying unit.	Quality assaying unit lost its credibility. Farmers become reluctant towards online trading process. Defeated the purpose of quality assaying unit.

Stage	Components	Guidelines	Deviation	Reason	Consequence
3. Online trading	Bid Creation	For bid creation the lots will be visible on bid creation screen of e-NAM portal only after their approval by mandi analyst / DEO. The following details should be entered in portal with the consent of farmer to whom respective lot belongs. ➢ Bid type ➢ Auto assigning of winners ➢ Minimum buyers ➢ Allowing multi-bid ➢ Minimum selling price ➢ Time of bidding (start, close, declaration)	Minimum bid price and number of buyers to be participated in bidding are being entered in the portal without the consent of farmers.	Meagre participation of local traders. Traders from other mandis were not participating in the e-auction process.	Bargaining power of farmers for their own produce is reduced. This factor leads farmers to perceive e-NAM as non-remunerative platform.

Stage	Components	Guidelines	Deviation	Reason	Consequence
	Bid Rejection	Bid Rejection is the process where bid manager reject the bid due to some unsatisfied and technical reasons of both the buying and selling parties.	Low bid prices are being quoted by traders in successive rounds of bids.	Cartelization and low participation of local traders.	Credibility of e-NAM, Transparency in e-auction and better bargaining power of farmers are defeated.

Stage	Components	Guidelines	Deviation	Reason	Consequence
	Bid declaration	1. Bid declaration will be done at bid end timing. 2. Bid manager can select all the lots and can publish result or extend the bid even in the case of time elapse and non-participation of traders. This process is also called as Winner Announcement. 3. If farmer is not satisfied with the price of the commodity, with his willingness bid manager can exit the bid. 4. If trader feels that commodity quality is missing, exit of bid can be done. 5. These kinds of exit bids are considered as Goods Return.	1. Traders quote their bids based on physical inspection of the produce rather than quality assaying report. 2. Live online bidding process is not displayed for the farmers. 3. Cartelization of traders	1. Neither the farmers nor the traders had trust on report of quality assaying unit. Non-uniformity of bidding time 2. Lack of display mechanism and seating provision for farmers in bidding hall. 3. Lack of competition among traders because of informal agreement.	Transparency in e-auction, Better price discovery, price commensuration with quality of produce, farmers' access to more markets and buyers are defeated.

Stage	Components	Guidelines	Deviation	Reason	Consequence
4. Weighment & Invoicing	Weighment	1. Weighment is the process of weighing the commodity after completion of e-bidding and winner announcement. 2. Weighment procedure must be followed strictly before generating Sale Agreement. Weighbridges & Weigh Scales can be used for weighment. 3. The weight that is captured at Gate Entry can be modified in the screen of the e-NAM portal. 4. The same modified weight will be seen in Sale Agreement. 5. Weighment can also be done Vehicle wise and Lot wise.	Even after the completion of e-bidding, farmers were forced to grade their produce by using hired labour before weighment.	Informal inevitable agreement imposed by local traders on farmers before auction. It is an age old tradition in market.	Farmers were over burdened with additional grading cost even after e-auction and subsequent bid winner announcement

Stage	Components	Guidelines	Deviation	Reason	Consequence
	Sale Bill & Sale Agreement	1. Sale Agreement should be generated by updating Trader / Farmer / CA related details and verify its components *i*.e., Invoice Lot code and Invoice ID 2. Seller (name, e-mail address, mobile number, bank account number, IFSC code), Trader (name, company name, e-mail address, mobile number, bank account number, IFSC code). 3. Mandi Analyst / DEO can modify the Farmer / Trader Bank details if went wrong earlier. 4. Sale Agreement report should be printed and given to Farmer / Trader. 5. In case of unsatisfied terms and conditions and wrong details, then Mandi Analyst / DEO should cancel Sale Bill first and followed by Sale Agreement.	Few details are hidden and not being updated in the portal.	Lack of a few details on the part of farmers. Sale by aggregator or middlemen.	End to end transparency, documentation, and digitalization cannot be attained.

Stage	Components	Guidelines	Deviation	Reason	Consequence
5. Online payment	Clearance & Settlement	1. The winning bidder should deposit the amount calculated as per the sale agreement, which include market fee, commission agent's charges, loading / unloading / packaging charges *etc*., as applicable. 2. The amount should be deposited on-line into a settlement account using RTGS /NEFT/BHIM or through on-line payment gateway provided on e-NAM. 3. Once the funds are received by e-NAM, a confirmation message will be sent to the Farmer- Seller / Commission Agent. 4. Depending on the terms of delivery, the winning bidder will be required to take the delivery of goods at the APMC market either by himself or through an authorized agent or logistics provider. 5. Funds due is to be paid to the Farmer- Seller / Commission Agent and other beneficiaries like APMC, service providers etc. which will be transferred within 1 (one) business day after acceptance of delivery by the buyer or his representative to their respective bank accounts that are registered with e-NAM, by the bank operating the e-NAM account, upon on-line approval from concerned APMC.	Delay in online payment. Cash transactions are in practice.	Technical glitches of e-NAM. Farmers' fear that their money in banks will be used to settle crop loan dues	Online payment has not gained attraction. Immediate cash requirements cannot be met by farmers which results in dissatisfaction on trading through e-NAM platform.

Stage	Components	Guidelines	Deviation	Reason	Consequence
6. Gate Exit	Post trade exit & Goods return	1. To exit the lots before or after the bidding. After trade settlement seller have to exit gate with post trade slip. The following details should be maintained. ✓ Exit type ✓ Seller type, Seller name ✓ Trader name ✓ Exit gate number, Lot code, Commodity, Bag type, No. of bags, Quantity. 2. If product / crop is not sold, then the seller has to exit mandi gate with goods return slip.	1. The farmers are being waited until next day in case unsatisfied bids in all rounds of bidding. 2. Small farmers are left with no option other than keeping the produce in mandi for re-bidding it on the next day.	Over heads like high transportation costs & loading and unloading charges	Time consumption and overheads lead to dissatisfaction of farmers for further trading through e-NAM

4.3 KNOWLEDGE OF e-NAM REGISTERED FARMERS ON FUNCTIONING / FEATURES OF e-NAM.

A glance at the Table 4.12. and Figure 4.12. depicted that nearly three fifth (58.33%) of e-NAM registered farmers had medium knowledge level followed by low (22.50%) and high (19.17%) level of knowledge.

Table 4.12. Distribution of e-NAM registered farmers according to their knowledge on functioning/features of e-NAM

(n=120)

S. No.	Category	Frequency	Percentage
1.	Low knowledge	27	22.50
2.	Medium knowledge	70	58.33
3.	High knowledge	23	19.17
Total		**120**	**100.00**
Mean: 13.00			**S.D:** 2.96

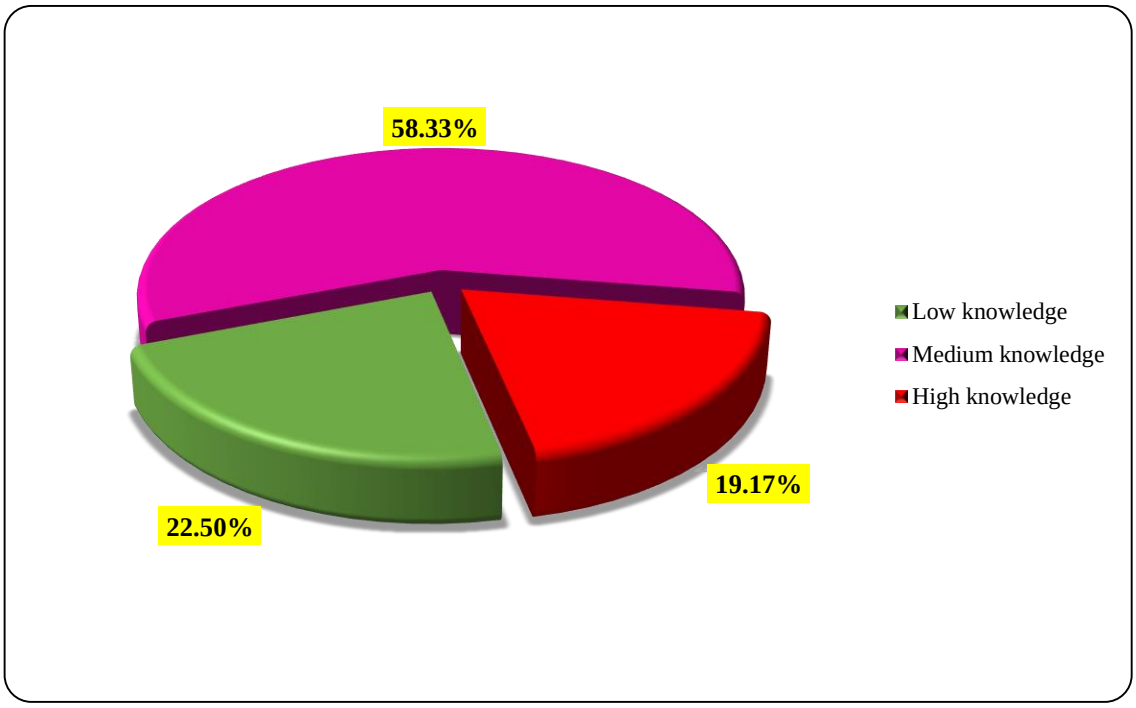

Figure 4.12. Distribution of e-NAM registered farmers according to their knowledge on functioning/features of e-NAM

The probable reason for the above trend could be the medium level of education, extension contact, market orientation, social participation economic motivation and mass media exposure.

Table 4.13. Item analysis on percent knowledge on e-NAM

(n=120)

S. No.	Concepts of e-NAM (Derived from each question as per knowledge test)	Q. No. (as per the interview schedule)	Correct response		Rank
			Frequency	Percentage (%)	
1.	Quality assaying fee	12	116	96.67	1
2.	Registration fee	4	114	95.00	2
3.	Requisite documents	3	112	93.33	3
4.	Entry gate registration	2	103	85.83	4
5.	Choice to accept or reject bid	21	102	85.00	5
6.	Bid winner declaration process	20	101	84.17	6
7.	Unique lot ID	5	96	80.00	7
8.	Creation of e-auction	17	94	78.33	8
9.	Time period of e-Auction	16	90	75.00	9
10.	Grading	8	89	74.17	10
11.	Platform of bidding	19	88	73.33	11
12.	Quality assaying	7	67	55.83	12
13.	Year of implementation of e-NAM	1	63	52.50	13
14.	Optionality of quality assaying	9	61	50.83	14
15.	Mandatory signatures in sale bill	23	50	41.67	15
16.	Digital Moisture Meter	10	49	40.83	16
17.	Tradable parameters of turmeric	13	45	37.50	17
18.	Categorization of produce	11	44	36.67	18
19.	Generation of sale agreement	22	43	35.83	19
20.	Participants in e-auction	18	38	31.67	20
21.	Weight of the sample	15	14	11.67	21
22.	Curcuminoid content percentage	14	11	09.17	22
23.	Pre-registration	6	7	05.83	23

It is evident from Table 4.13. that predominant portion (96.67%) of e-NAM registered farmers had knowledge on quality assaying fee which might be due to their effective participation and observation during online trading of e-NAM platform.

Ninety-five per cent of the e-NAM registered farmers had knowledge on registration fee which might be due to their frequent visits and transactions by participating in trading through e-NAM.

Most (93.33 %) of the e-NAM registered farmers had knowledge on documents required for registration which might be due to the mandatory nature of document submission for trading in e-NAM.

Most (85.83%) of the e-NAM registered farmers had knowledge on entry gate registration. This could be accounted for the reason that entry gate registration is pre-requisite for trading in e-NAM.

Predominant portion (85.00%) of the e-NAM registered farmers had knowledge on choice to accept or reject the bid. This could be accounted for the reason that if prices quoted by traders in e-bidding was not satisfactory, most of them reject that bid and participate in second round of bidding.

Majority (84.17%) of the e-NAM registered farmers had knowledge on bid winner declaration process. The probable reason for this trend might be due to some similarity with traditional auction process and awareness created by APMC officials.

Four fifth (80.00%) of the e-NAM registered farmers had knowledge on allotment of unique lot ID to each farmer's produce which might be due to the mandatory nature of lot ID generation for trading in e-NAM.

Nearly four fifth (78.33%) of the e-NAM registered farmers had knowledge on creation of e-auction through portal which might be due to the awareness created by APMC officials, mass media and interpersonal channels.

Three fourth (75.00%) of the e-NAM registered farmers had knowledge on time period of e-Auction which might be due to the awareness created by APMC officials, frequent visits and transactions by participating in trading through e-NAM.

Almost three fourth (74.17%) of the e-NAM registered farmers had knowledge on grading of the produce which might be due to realization of better prices for graded produce by farmers in market.

Nearly three fourth (73.33%) of the e-NAM registered farmers had knowledge on platform of bidding. This could be accounted for the reason that e-bidding was made compulsory for trading in e-NAM.

More than half (55.83%) of the e-NAM registered farmers had knowledge on quality assaying after lot ID generation registration which might be due to their effective participation and critical observation during sampling by e-NAM personnel.

More than half (52.50%) of the e-NAM registered farmers had knowledge on year of implementation of e-NAM in Duggirala APMC which might be due to the awareness created by mass media, APMC officials and neighbouring farmers.

More than half (50.83%) of the e-NAM registered farmers had knowledge on selling of produce without quality assaying. The probable reason could be the lack of awareness of farmers about sampling procedure and quality assaying unit.

More than two fifth (41.67%) of the e-NAM registered farmers had knowledge on requisite signatures in sale bill which might be due to its mandatory nature for trading in e-NAM.

Nearly two fifth (40.83%) of the e-NAM registered farmers had knowledge on use of Digital moisture meter which might be due to lack of awareness of farmers about sampling procedure and quality assaying unit.

Less than two-fifth (37.50%) of the e-NAM registered farmers had knowledge on use of tradable parameters of turmeric and categorization of produce based on quality which might be due lack of awareness of farmers about sampling procedure and quality assaying unit.

Only less per cent of the e-NAM registered farmers had knowledge on weight of the sample (11.67%), curcuminoid content percentage (9.17%) and pre-registration through mobile application and portal (5.83%). The probable reason for this trend might due to lack of observation during sampling, lack of awareness and complexity in the processes involved.

Table 4.14. Distribution of e-NAM registered farmers according to their per cent knowledge on functioning/features of e-NAM

(n= 120)

S. No.	Percent Knowledge	Frequency	Percentage
1.	Less than 25	0	0.00
2.	25 to 50	83	69.17
3.	50 to 75	37	30.83
4.	More than 75	0	0.00
Total		**120**	**100.00**

It is evident from Table 4.14. that more than two-third (69.17%) of e-NAM registered farmers had more than fifty per cent knowledge on the scheme and nearly one third (30.83%) of e-NAM registered farmers had less than fifty per cent knowledge on the scheme. The plausible reason for the above distribution might be that the farmers were having minimal basic knowledge which is must for involving in trading operations. This knowledge also might have acquired through experience gained during the trading operations through e-NAM. On the other side some of the enthusiastic e-NAM registered farmers might be going through the e-NAM guidelines to facilitate their transactions in a better way. However, there is no full-fledged knowledge among the e-NAM registered farmers due to lack of access as well as lack of comprehension of National Agricultural Market guidelines.

4.4 EFFECTIVENESS OF e-NAM AS PERCEIVED BY REGISTERED FARMERS

The observations from Table 4.15. and Figure 4.13. indicated that more than half (54.17%) of the e-NAM registered farmers perceived the scheme as moderately effective followed by less effective (23.33%) and more effective (22.50%) categories.

Table 4.15. Distribution of e-NAM registered farmers based on their perceived effectiveness

(n= 120)

S. No.	Category	Frequency	Percentage
1.	Less effective	28	23.33
2.	Moderately effective	65	54.17
3.	More effective	27	22.50
Total		**120**	**100.00**
Mean: 34.02			**S.D:** 5.05

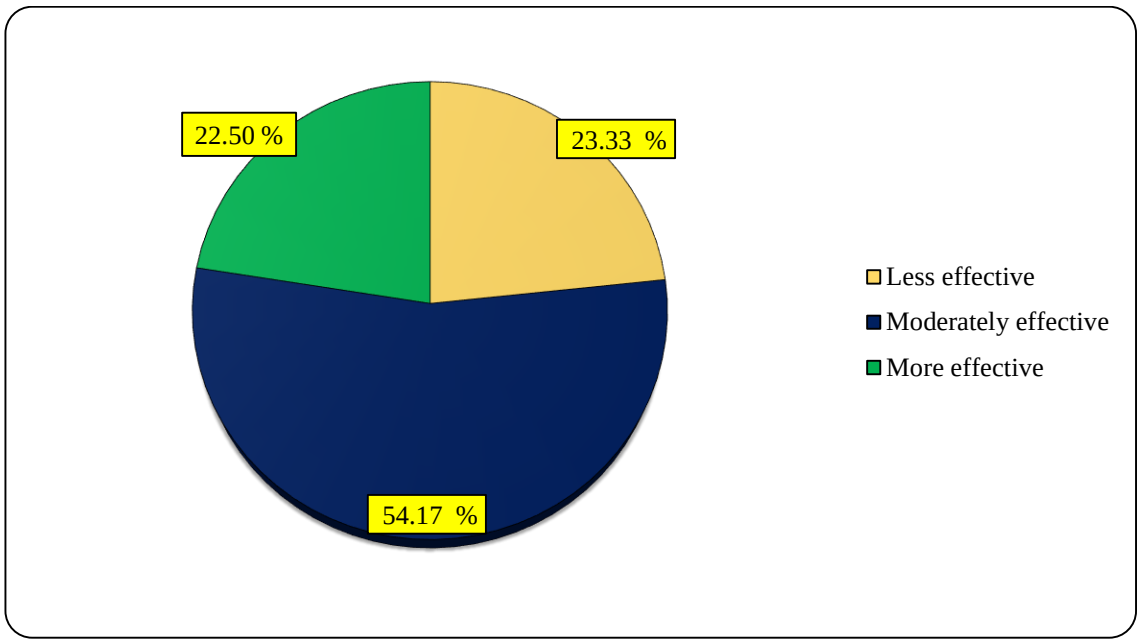

Figure 4.13. Distribution of e-NAM registered farmers based on their perceived effectiveness of e-NAM

The plausible reason for the above trend might be that most of the e-NAM registered farmers were not satisfied and perceived effectiveness of e-NAM in price commensuration with quality (87.50%), Increase in demand of commodity (75.83%), provision of remunerative price (74.10%), enhancing market arrivals (72.50%) as poor. They perceived single window information service (54.17%), transparency in payments (45.00%) and deduction in cost of marketing (45.00%) as fair. On the other hand, they perceived transparency in weighment (72.50%), minimization of commission charge (67.50%) and infrastructural facilities (65.83%) as good.

Table 4.16. Item analysis on perceived effectiveness of e-NAM

(n=120)

S. No	Particulars	Good		Fair		Poor		Z Value	Rank
		F	%	F	%	F	%		
1.	Provision of remunerative price	10	08.33	21	17.50	89	74.10	-0.86	15
2.	Transparency in auction process	6	05.00	43	35.83	71	59.17	-0.62	12
3.	Maintaining stability in price	3	02.50	35	29.17	82	68.33	-0.85	14
4.	Increase in demand of commodity	4	03.33	25	20.83	91	75.83	-0.98	18
5.	Enhancing market arrivals	5	04.17	28	23.33	87	72.50	-0.90	16
6.	Infrastructural facilities	79	65.83	35	29.17	6	05.00	1.62	3
7.	Participation of traders	3	02.50	32	26.67	85	70.83	-0.90	17
8.	Single window information service	17	14.17	65	54.17	38	31.67	0.09	8
9.	Price commensuration with quality	2	01.67	13	10.83	105	87.50	-1.24	19
10.	Disintermediation of markets	43	35.83	30	25.00	47	39.17	0.37	7
11.	Alleviation of cartel by traders	7	05.83	30	25.00	83	69.17	-0.80	13
12.	Reduction in transaction time	23	19.17	41	34.17	56	46.67	-0.10	9
13.	Deduction in cost of marketing	13	10.83	54	45.00	53	44.17	-0.22	10
14.	Minimization of commission charge	81	67.50	34	28.33	5	04.17	1.67	2
15.	Online payment to the farmers	46	38.33	50	41.67	24	20.00	0.79	5
16.	Dispute redressal mechanism	55	45.83	46	38.33	19	15.83	1.02	4
17.	Transparency in weighment	87	72.50	29	24.17	4	03.33	1.79	1
18.	Quality assaying system	7	05.83	45	37.50	68	56.67	-0.56	11
19.	Transparency in payments	43	35.83	54	45.00	23	19.17	0.76	6

It is evident from table 4.16 that three fourth (74.10%) of e-NAM registered farmers perceived effectiveness of e-NAM in provision of competitive / remunerative prices for agricultural produce as poor followed by fair (17.50%) and good (8.33%). The probable reason for this distribution might be due to low participation of traders in e-bidding at market, state and country level. The prices quoted by traders in e-bidding were not satisfactory to many farmers.

Nearly three fifth (59.17%) of e-NAM registered farmers perceived transparency in auction process of e-NAM as poor followed by fair (35.83%) and good (5.00%). This could be accounted for the reason that the prices quoted by different traders across the country to the unique lot and winner transaction details were not displayed on digital display boards by market officials, as expressed by farmers which hinders live trade experience and does not ensure transparency of auction process.

More than two third (68.33%) of e-NAM registered farmers perceived effectiveness of e-NAM in maintaining price stability of the commodity as poor followed by fair (29.17%) and good (2.50%). The probable reason for this trend might be due to fluctuations in market arrivals and low participation of traders in e-bidding of e-NAM.

More than three fourth (75.83%) of e-NAM registered farmers perceived effectiveness of e-NAM in increasing demand of commodity as poor followed by fair (20.83%) and good (3.33%). Seasonal nature of production, Lack of export oriented production on part of farmers and low participation of traders from different states due to lack of logistics and transport facilities might have influenced for decreased demand.

Less than three fourth (72.50%) of e-NAM registered farmers perceived effectiveness of e-NAM in enhancing market arrivals of commodity as poor followed by fair (23.33%) and good (4.17%). This could be accounted for the reason that continuous low price realization of farmers by trading in e-NAM, decreased demand for their produce in the market yard and cartelization by traders as expressed by some e-NAM traded farmers.

Nearly two third (65.83%) of e-NAM registered farmers perceived effectiveness of e-NAM in enhancement of infrastructural facilities in APMC as good followed by fair (29.17%) and poor (5.00%). The probable reason for this distribution might be due to provision of various facilities like auction platform, galvalume roofing sheds, godowns, display boards, rythu rest house, electronic weighing scales, digital moisture meter, weigh bridge, free food and water supply, sale counter of fertilizer and seeds *etc*.

Less than three fourth (70.83%) of e-NAM registered farmers perceived effectiveness of e-NAM in enhancing participation of traders in auction process as poor followed by fair (26.67%) and good (2.50%). Lack of transport and logistics facilities might have discouraged the participation of traders from other markets across the state and country that in turn hinders interstate and inter-mandi trade on e-NAM platform.

More than one half (54.17%) of e-NAM registered farmers perceived effectiveness of e-NAM in provision of single window information services through portal as fair followed by poor (31.67%) and good (14.17%). The probable reason for this distribution might be due to dissemination of market prices and information through e-NAM mobile application & portal, display boards in mandi, newspapers and television.

Majority (87.50%) of e-NAM registered farmers perceived effectiveness of e-NAM in providing prices that commensurate with quality of produce as poor followed by fair (10.83%) and good (1.67%). The probable reason for this distribution might be due to continuous realization of non-remunerative prices on part of e-NAM traded farmers irrespective of quality of produce. Cartelization by local traders and lack of trust on quality assaying report by both traders and farmers might have influenced the above trend.

Nearly two fifth (39.17%) of e-NAM registered farmers perceived effectiveness of e-NAM in disintermediation of markets as poor followed by good (35.83%) and fair (25.00%). This could be accounted for the reason that cent per cent elimination of commission agents by Duggirala mandi even before implementation of e-NAM.

More two third (69.17%) of e-NAM registered farmers perceived effectiveness of e-NAM in alleviation of collusion and cartelization by traders as poor followed by fair (25.00%) and good (5.83%). The probable reason for the above distribution might be due to the frequent low bids from local traders in e-bidding, low participation of the traders, and informal price quotation by the traders to the farmers even before bidding.

Less than one half (46.67%) of e-NAM registered farmers perceived effectiveness of e-NAM in reducing transaction time as poor followed by fair (34.17%) and good (19.17%). This could be accounted for the reason that delays in payments from e-NAM due to technical glitches to the bank accounts of farmers.

Less than one half (45.00%) of e-NAM registered farmers perceived effectiveness of e-NAM in deduction of marketing cost as fair followed by poor (44.17%)

and good (10.83%). High transportation cost and high hamali charges for different operations while trading might have increased the marketing cost. On the other hand, complete absence of commission agents and brokers in market might have reduced the marketing cost to some extent.

More than two third (67.50%) of e-NAM registered farmers perceived effectiveness of e-NAM in minimization of commission charge as good followed by fair (28.33%) and poor (4.17%). This could be accounted for the reason that commission agents and brokers were not allowed to participate in trading through Duggirala APMC even before implementation of e-NAM which completely eliminated commission charges.

More than two fifth (41.67%) of e-NAM registered farmers perceived online payment in e-NAM as fair followed by good (38.33%) and poor (20.00%). This could be accounted for the reason that the farmers might have experienced substantial reduction in unscrupulous deductions while trading through e-NAM since the amount was credited directly in to their bank accounts.

Less than one half (45.83%) of e-NAM registered farmers perceived dispute redressal mechanism of e-NAM as good followed by fair (38.33%) and poor (15.83%). The probable reason for this distribution might be due to in-time response and problem solving on part of marketing officials of e-NAM.

Less than three fourth (72.50%) of e-NAM registered farmers perceived transparency in weighment of e-NAM as good followed by fair (24.17%) and poor (3.33%). This could be accounted for the reason that all the weighments in Duggirala APMC must be done through electronic weighment scales in the presence of farmers.

Less than three fifth (56.67%) of e-NAM registered farmers perceived quality assaying unit of e-NAM as poor followed by fair (37.50%) and good (5.83%). The probable reason for this distribution might be due to lack of trust on report of quality assaying unit on part of both farmers and traders as the prices quoted by bidders might not have matched the quality of produce. On the other hand, some farmers were unaware of existence of quality assaying unit and its functions.

Less than one half (45.00%) of e-NAM registered farmers perceived transparency in payments of e-NAM as fair followed by good (35.83%) and poor (19.17%). This could be accounted for the reason that substantial reduction in unscrupulous deductions, bribery and few other money related malpractices in market yard.

4.5 CONSTRAINTS FACED BY e-NAM REGISTERED FARMERS AND SUGGESTIONS TO OVERCOME THEIR CONSTRAINTS

4.5.1 Constraints Faced by e-NAM Registered Farmers

The responses on the constraints faced by e-NAM registered farmers while trading through e-NAM are furnished in Table 4.17 and Figure 4.14.

It is evident from Table 4.17 and Figure 4.14 that majority of e-NAM registered farmers perceived that lack of remunerative prices (85.83%, Rank I) as a major constraint while trading in e-NAM followed by cartelization of traders (80.83%, Rank II), complexity of e-NAM trading process (75.83%, Rank III), price doesn't match with quality of produce (71.67%, Rank IV), substantial decrease in bid prices (68.33%, Rank V), low participation of traders (65.83%, Rank VI), difficult to meet immediate cash requirements (62.50%, Rank VII), poor functioning of quality assaying unit (60.83, Rank VIII), lack of digital literacy (58.33%, Rank IX), lack of live trading experience (52.50%, Rank X), high hamali charges (45.83%, Rank XI), delay in payments (42.50%, Rank XII), high transportation cost (40.83%, Rank XIII) and lack of intermandi and interstate trade (30.83%, Rank XIV).

Table 4.17. Ranking of different constraints faced by e-NAM registered farmers (n=120)

S. No.	Constraints	Frequency	Percentage	Rank
1.	Lack of remunerative price	103	85.83	I
2.	Cartelization of traders	97	80.83	II
3.	Complexity of e-NAM trading process	91	75.83	III
4.	Price doesn't match with quality of produce	86	71.67	IV
5.	Substantial decrease in bid prices	82	68.33	V
6.	Low participation of traders	79	65.83	VI
7.	Difficult to meet immediate cash requirements	75	62.50	VII
8.	Poor functioning of quality assaying unit	73	60.83	VIII
9.	Lack of digital literacy	70	58.33	IX
10.	Lack of live trading experience	63	52.50	X
11.	High hamali charges	55	45.83	XI
12.	Delay in payments	51	42.50	XII
13.	High transportation cost	49	40.83	XIII
14.	Lack of intermandi and interstate trade	37	30.83	XIV

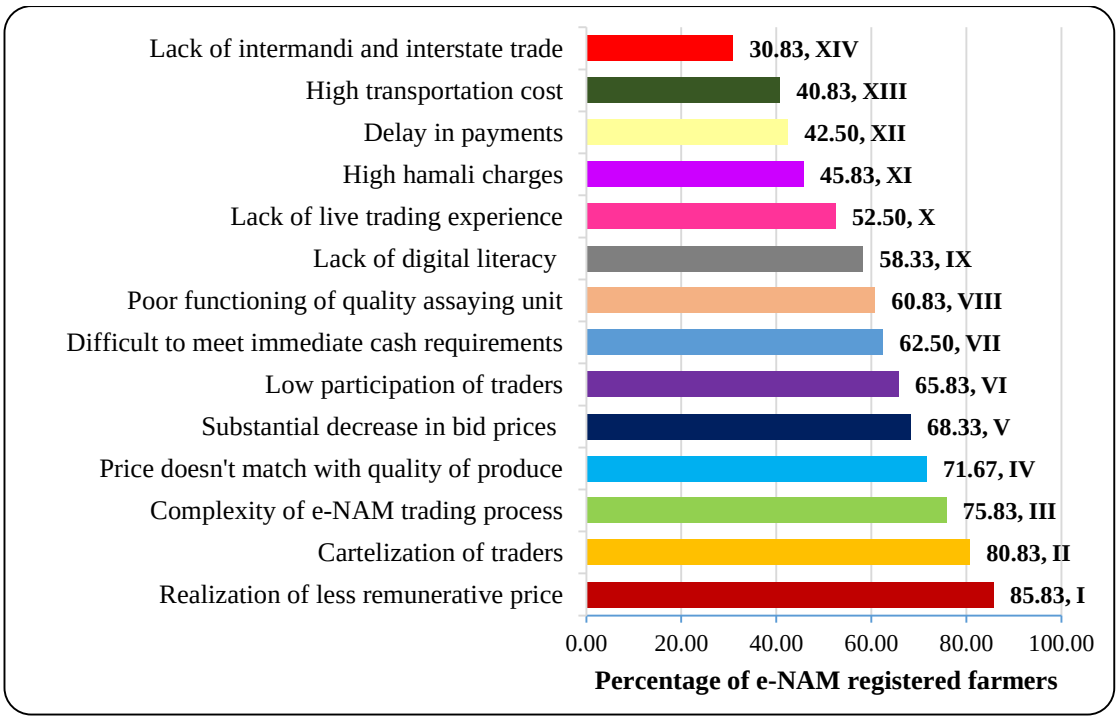

Figure 4.14. Ranking of different constraints faced by e-NAM registered farmers

4.5.1.1 Lack of Remunerative Price: Among different constraints faced by e-NAM registered farmers lack of remunerative price for the produce was ranked one. Remunerative price realization is the crucial factor that determine the success of the farmer. Higher production can't help them to enhance their income unless they realize good prices. Most of the farmers expressed that the prices offered by traders in e-bidding does not fetch their cost of cultivation.

4.5.1.2 Cartelization of Traders: Cartelization of traders was ranked II by the e-NAM registered farmers. It is a secret informal agreement among the traders to avoid competition by fixing the prices to be quoted in e-bidding. Though e-NAM was conceptualized, initiated and intended to reduce collusion, cartelization and price manipulation by the local trading groups. But, there were instances where traders interact with farmers in the name of physical inspection due to lack of trust on quality assaying unit and used to note the lot ID of the produce before e-bidding, few traders tend to quote their prices secretly to the farmers. Farmers expressed that if they reject illegal trading or secret bid, the prices quoted by traders in online bidding will be comparatively less.

4.5.1.3 Complexity of e-NAM Trading Process: Complexity of e-NAM trading process was ranked III by the e-NAM registered farmers. Lack of digital literacy among the farmers might have hindered their interest to get aware of procedure flow, features and operational mechanism of e-NAM which require good comprehension skills. Therefore, farmers were perceiving it as a complex trading process.

4.5.1.4 Price Doesn't Match with Quality of Produce: Though considerable proportion of e-NAM registered farmers were not aware of existence of quality assaying unit and the assaying report produced by it, the farmers used to judge quality of their own produce based on their experience. The perceived quality of their produce does not commensurate with the prices quoted in e-bidding. Neither the farmers nor the traders have trust on the report of quality assaying unit. Traders used to do physical inspection of the produce and note unique lot ID to quote their prices in e-bidding. But due to cartelization and low participation of local traders, they tend to quote low bids irrespective of the quality of the produce. Even the premium quality produce used to be transacted at the price of normal quality produce.

4.5.1.5 Substantial Decrease in Bid Prices: When the farmer is dissatisfied with the final bid, he / she can reject the bid and can participate in second round of e-bidding *i.e.*, re-bidding. In rebidding farmers used to experience lower bids than the previous round of bidding due to collusion and repeated participation of same local traders which hinder farmers' access to more markets / buyers thereby slackening their negotiation power which leads to substantial decrease of prices quoted in the successive rounds of online bidding.

4.5.1.6 Low Participation of Traders: Since every transaction in e-NAM is recorded, digitalized and monitored, a considerable proportion of local traders' fear to participate in online trading which brings them under tax bracket. Lack of provision of logistics and transport facilities by mandi and lack of trust on report of quality assaying unit on part of traders hinders the participation of traders from other mandis, districts and states which defeats the whole purpose of e-NAM.

4.5.1.7 Difficult to Meet Immediate Cash Requirements: Farmers need immediate cash payments to settle their expenses like transportation cost, hamali charges, grading charges, repayment to money lenders and input dealers *etc.*, and purchasing of agricultural inputs for the next season. On the other side, farmers fear that if money is directly transacted to their bank accounts, banks may deduct their unpaid overdue loan amount without their consent.

4.5.1.8 Poor Functioning of Quality Assaying Unit: Considerable proportion of farmers were not aware of existence of quality assaying unit. Traders used to interact with farmers in the mandi and physically inspect the produce. Thus quality assaying report had become a formality to include in records and reports. Neither the farmer nor the trader was taking it in to consideration.

4.5.1.9 Lack of Digital Literacy: As most of the farmers were not tech-savy and were not in a position to use smart phones and mobile applications. Due to lack of e-literacy and access to online features like modal price, arrivals, pre-registration, previous day transaction trend, market information *etc*., they can't utilize the intended benefits of the scheme efficiently.

4.5.1.10 Lack of Live Trading Experience: Before implementation of e-NAM farmers used to sell their produce through manual open auction method by which farmers used to observe the whole transaction process, procedure and competition among traders for buying the produce. But after implementation of e-NAM, farmer enter in to market, get his produce registered and given a unique lot ID. Due to online auction, farmer can't enjoy or have the live trading experience. The condition aggravated due to lack of display of live e-bidding through display boards in the market yard.

4.5.1.11 High Hamali Charges: Irrespective of price realized, the farmer must pay the notified hamali charge immediately. The hamali charges that were being paid by farmers were not in proportion with the price realized by the farmers by selling their produce in market yard.

4.5.1.12 Delay in Payments: Due to some technical glitches of e-NAM software, few farmers experienced delay in payments. Sometimes the online payment was delayed up to 15 days which in turn discourage farmers trading in e-NAM.

4.5.1.13 High Transportation Cost: Higher transportation costs especially during peak seasons make famer to bear excess burden. Transportation by small and marginal farmers with meagre quantity might be becoming excessive overheads in terms of loading, unloading etc., and some farmers might be geographically locating far way places from the mandi.

4.5.1.14 Lack of Inter-Mandi and Inter-State Trade: Single trade license is one of the most important criteria in e-NAM which enhances accessibility of traders to the market across the country thereby increasing competition and aids in price discovery. But due to lack of proper transport, logistics facilities and trust on quality assaying unit, traders were reluctant to participate in inter-mandi trade and inter-state which precludes the purpose of the scheme. The results are in conformity with findings of Shende (2019), Geethavani (2019), Tyngkhan (2018).

4.5.2 Suggestions Given by e-NAM Registered Farmers

The responses on the suggestions as given by e-NAM registered farmers for effective functioning of e-NAM is furnished in Table 4.18. and Figure 4.15.

It is evident from Table 4.18. and Figure 4.15. that majority of e-NAM registered farmers perceived that bid prices should not be less than MSP (94.16%, Rank I) as suggestion for effective functioning of e-NAM followed by payment settlement on the same day of trading. (90.83%, Rank II), Provision of live trading experience (89.16%, Rank III), proper awareness and trainings should be given to farmers on operation of scheme (86.67%, Rank IV), effective feedback mechanism should be established (82.50%, Rank V), dissemination of market information (77.50%, Rank VI), hamali charges regulation (74.16%, Rank VII), trainings on post-harvest management (67.50, Rank VIII), Credibility of quality assaying unit (63.33%, Rank IX) and logistics and transport facilities (60.83%, Rank X).

Table 4.18. Ranking of different suggestions given by e-NAM registered farmers (n=120)

S. No.	Suggestions	Frequency	Percentage	Rank
1.	Bid prices should start from MSP	113	94.16	I
2.	Payment settlement on the same day	109	90.83	II
3.	Provision of live trading experience	107	89.16	III
4.	Proper awareness and trainings on e-NAM	104	86.67	IV
5.	Effective feedback mechanism	99	82.50	V
6.	Dissemination of market information	93	77.50	VI
7.	Hamali charges regulation.	89	74.16	VII
8.	Trainings on post-harvest management	81	67.50	VIII
9.	Credibility of quality assaying unit.	76	63.33	IX
10.	Logistics and transport	73	60.83	X

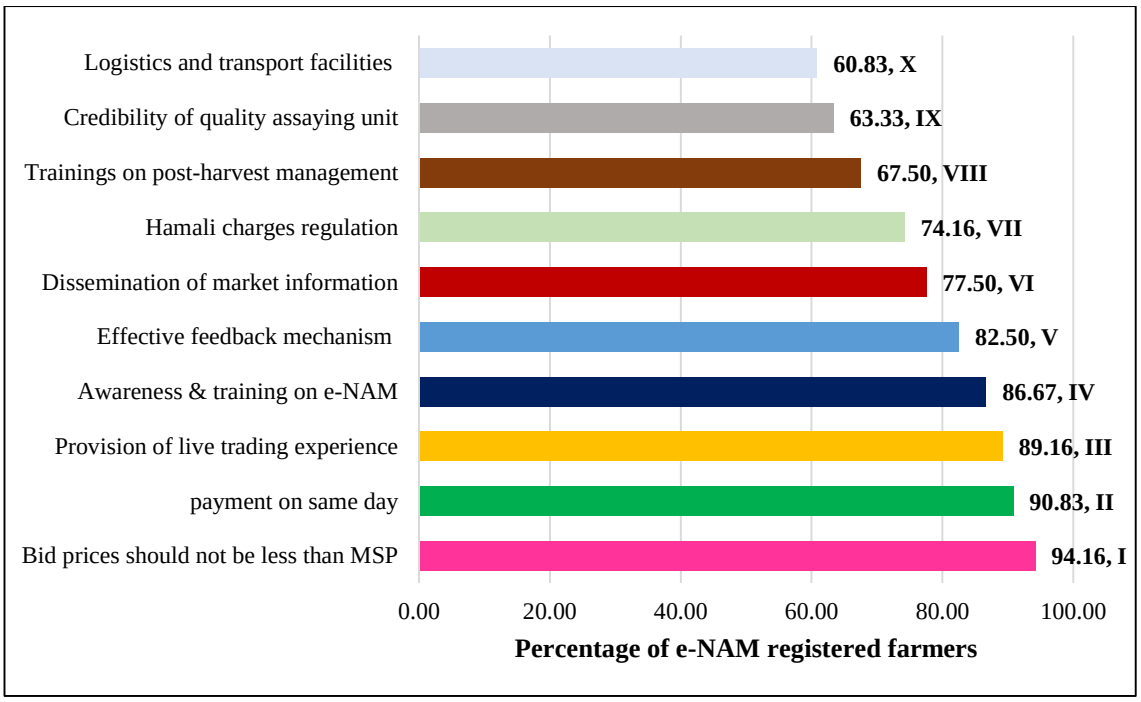

Figure 4.15. Ranking of different suggestions given by e-NAM registered farmers

4.5.2.1 Bid Prices Should Start from MSP: In e-NAM there is a provision of setting up minimum selling price by the farmer during bid creation. Therefore, the bids should start from minimum selling price or above. But, most of the e-NAM registered farmers were not aware of it. As the price quoted by local participating traders doesn't fetch their cost of cultivation, the farmers suggested that bids by default should start at least from minimum support price.

4.5.2.2 Payment Settlement on the Same Day of Trading: After successful online payment by trader to e-NAM account, e-NAM takes at least one business day to credit the amount in the bank account of farmers. Farmers need immediate cash to meet their expenses like transportation, loading & unloading, procurement of inputs *etc*.

4.5.2.3 Provision of Live Trading Experience: Auction hall with display board / projector screen showing the bids quoted by trades to the respective lot in local language will provide live trading experience to farmers. Further pop up messages to registered mobile number for every bid quotation makes the process more transparent.

4.5.2.4 Proper Awareness and Trainings on e-NAM: Most of the farmers were not aware of guidelines and operation procedure of e-NAM. Hence they suggested to organize awareness and training programmes to improve their understanding and participation.

4.5.2.5 Effective Feedback Mechanism: Feedback is an effective tool to improve the performance of any scheme. Farmers suggested that e-NAM officials should take feedback from them at the end of trade which provide an opportunity to express their problems and suggestions that can lead to reform policy for better utilization of the platform.

4.5.2.6 Dissemination of Market Information: Most of the farmers were not aware of e-NAM mobile application and online portal which provides daily market information. As market intelligence is one of the factors that determine the success of the farmer, they suggested to disseminate daily market information through SMS, print media and other electronic means.

4.5.2.7 Hamali Charges Regulation: A considerable portion of famers opined that costs incurred for loading & unloading of produce in the market were very high. They suggested that government should make a provision to reduce that cost burden on them.

4.5.2.8 Trainings on Post-Harvest Management: Provision of prices that commensurate with quality of produce is one of the objectives of e-NAM. To meet the quality requirements, farmers wish to have more training on post-harvest management.

4.5.2.9 Credibility of Quality Assaying Unit: Due to lack of credibility on report of quality assaying unit, traders from other mandis were not participating in e-bidding of e-NAM which in turn decreases competition among them. Therefore, farmers suggested the provision of trusted quality assaying unit in e-NAM with public private partnership which must give guarantee to the buyer.

4.5.2.10 Logistics and Transport Facilities: Farmers incur heavy transportation charges due to long distance of market from their farm. It is difficult to find a transport vehicle with reasonable cost during peak season of marketing, especially for small and marginal farmers. On the other side, lack of proper transport and logistics facilities in market hinders participation of traders from other mandis across the country. Hence they suggested to provide logistics and transport facilities at reasonable cost.

4.6 FEW SUCCESSFUL CASE LETS OF e-NAM REGISTERED FARMERS

An attempt has been made to document three successful caselets of e-NAM traded farmers. They are given as below.

Caselet – I

Name of the e-NAM registered farmer	:	Sri J. Venkatesh
Address	:	Chilumuru Lanka village, Kollur mandal, Guntur district
Age	:	47
Education	:	Functional literate
Land holding (acres)	:	3
Area under turmeric cultivation (acres)	:	1
Farming Experience (years)	:	25
Crops grown	:	Turmeric, Papaya & Banana
Livestock	:	Two buffaloes
Annual Income (Rs.)	:	4,70,000/-
Soil type	:	Black soil
Turmeric varieties	:	Kadapa
Yield obtained (quintals / acre)	:	25
Extension contact	:	Agricultural Extension Officer (AEO), Agricultural Officer (AO), Agricultural Produce Market Committee (APMC)
Social participation	:	Rythumitra group, Primary cooperative society
Year of trading in e-NAM	:	2017
Source of information about e-NAM	:	Neighboring farmers, TV, Agricultural Officer , APMC officials

“Realized higher income through e-NAM”

-Sri J. Venkatesh

A farmer namely Sri J. Venkatesh of Chilumuru Lanka village of Kollur mandal in Guntur district doing turmeric cultivation since 25 years. Though he is a functional literate he is having good social participation and extension contact. He is 47-year-old illiterate small farmer with good social participation and extension contact. He

had adopted crop diversification by growing papaya, banana and turmeric in his 3 acres landholding to have assured income. He used to market his turmeric produce in local markets. Once when turmeric sale was in distress he came to know about that e-NAM is in operation at Duggirala APMC. He got registered and traded his produce through e-NAM and realized nearly 25 percent more price *i.e.*, Rs. 6,600/quintal compared to local market price of Rs. 5,266/quintal. This contented farmer is continuing trading through e-NAM.

Table.4.19. Comparative examination of APMC features during Pre and post-unification e-NAM - I

S. No.	Particular	Pre e-NAM	Post e-NAM
1.	Price (Rs./Quintal)	5266	6600
2.	Mode of payment	Cash payment	Online payment
3.	Unscrupulous deduction	Yes	No

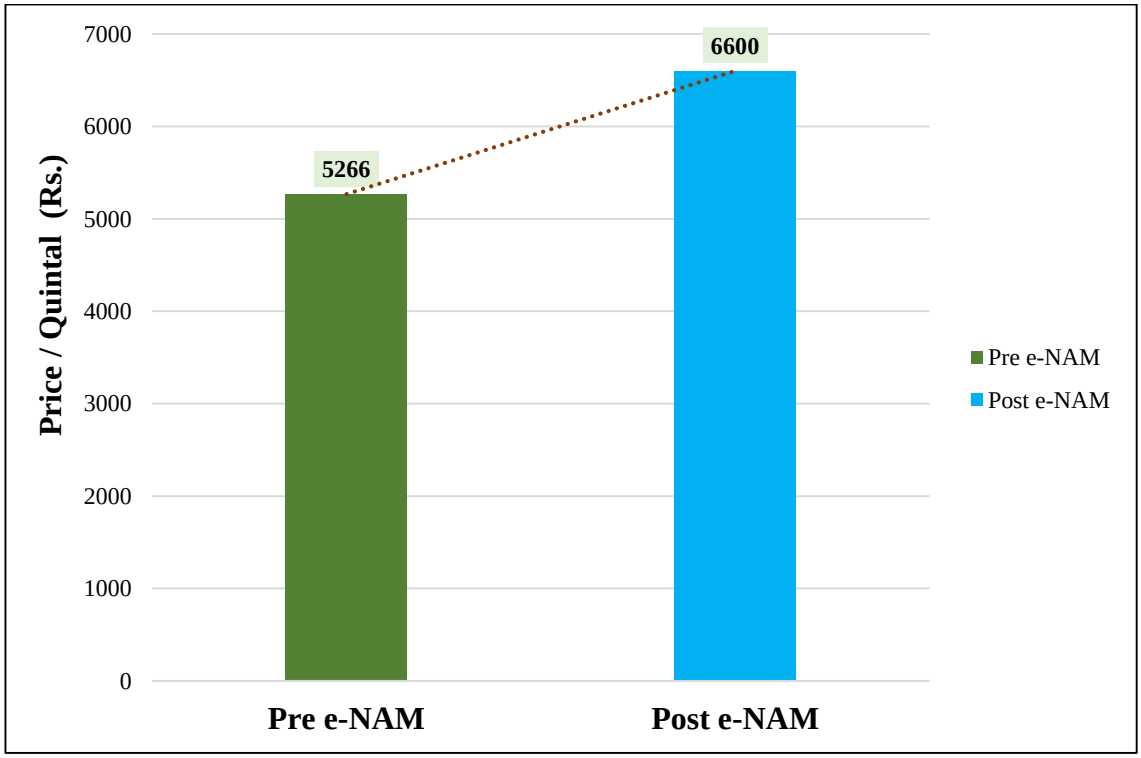

Figure 4.16. Comparative examination of price / quintal during Pre and post-unification of APMC with e-NAM - I

Caselet – II

Name of the e-NAM registered farmer	:	D. Rambabu
Address	:	Pathabommuvaripalem, Kollipara mandal, Guntur district
Age	:	55
Education	:	High school
Land holding (acres)	:	2
Area under turmeric cultivation (acres)	:	1
Farming Experience (years)	:	38
Crops grown	:	Banana, Turmeric
Livestock	:	No
Annual Income (Rs.)	:	1,72,000/-
Soil type	:	Black
Turmeric varieties	:	Seelam, Duggirala
Yield obtained (quintals / acre)	:	30
Extension contact	:	Agricultural Extension Officers (AEO), Agricultural Officers (AO), Scientists of ANGRAU & YSRHU.
Social participation	:	Office bearer in Primary co-operative society, Agricultural Produce Market Committee (APMC)
Year of trading in e-NAM	:	2017
Source of information about e-NAM	:	Newspaper, TV, APMC officials

“e-NAM - a boon for farmers”

-Sri D. Rambabu

Sri D. Rambabu resident of Pathabommuvaripalem village of Kollipara mandal, Guntur district expressed that trading turmeric through e-NAM increased his farm income.

He is a 55-year-old marginal farmer having high school education with 38 years of farming experience. He used to maintain good contacts with AEO, AO and scientists and having good social participation as office bearer in co-operative society and APMC.

In March 2016, he got details of e-NAM scheme from Agricultural Officer (AO). He went to the APMC for more information and soon registered himself for e-NAM. In just two months he was able to sell produce worth about Rs. 1.92 lakh through e-NAM. He realized an increment in price about Rs. 1,250/- per quintal by trading through e-NAM platform compared to traditional methods of marketing.

Table 4.20. Comparative examination of APMC features during Pre and post-unification of e-NAM - II

S. No.	Particular	Pre e-NAM	Post e-NAM
1.	Price(Rs./Quintal)	5150	6300
2.	Mode of payment	Cash payment	Online payment
3.	Unscrupulous deduction	Yes	No

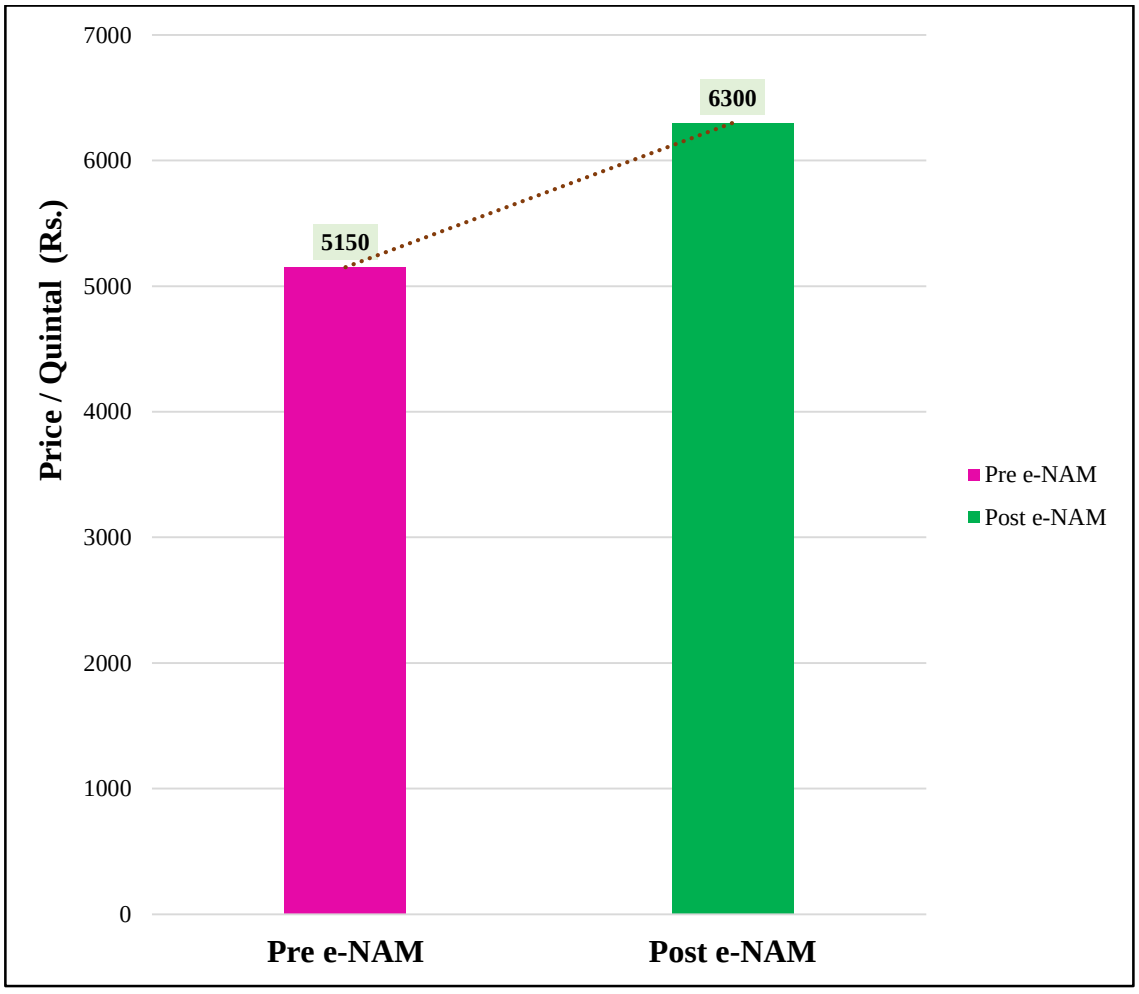

Figure 4.17. Comparative examination of price / quintal during Pre and post-unification of APMC with e-NAM - II

Caselet – III

Name of the e-NAM registered farmer	:	B. Rajasekhar
Address	:	Buragapudi, Bhattiprolu mandal, Guntur District
Age	:	32
Education	:	Primary school
Land holding (acres)	:	8
Area under turmeric cultivation (acres)	:	2.5
Farming Experience (years)	:	12
Crops grown	:	Turmeric, Banana, Yam & Maize
Livestock	:	2 Buffaloes
Annual Income (Rs.)	:	4,22,500
Soil type	:	Black
Turmeric varieties	:	Duggirala, Kadapa
Yield obtained (quintals / acre)	:	28.16
Extension contact	:	Agricultural Extension Officers (AEO), Agricultural Officers (AO), Scientists of ANGRAU & YSRHU.
Social participation	:	Agricultural Produce Market Committee (APMC)
Year of trading in e-NAM	:	2017
Source of information about e-NAM	:	TV, APMC officials

"Hassle free transactions through e-NAM"

- *B. Rajasekhar*

Mr. B. Rajasekhar, Resident of the Buragapudi village of Bhattiprolu mandal, Guntur district, aged 32 years old. He owns eight (8) acres of land and having 12 years of experience in agriculture and agriculture marketing. He is following farming system approach *i.*e., agriculture combined with livestock. He used to grow a variety of crops in his own land namely Turmeric, Banana, Yam and Maize

Though he is having primary education due to good extension contact and mass media exposure he sold his produce through e-NAM at higher price than he usually sells.

He was regularly selling his produce at Duggirala, APMC since last 10 years. Previously he was forced to sell his produce at the price offered by the local trader without any clarity regarding deductions and reasons for the low prices offered to the produce.

He witnessed different modes of trading at APMC *i.e.,* open auction, e-tendering and e-NAM. He expressed satisfaction about e-NAM procedures quoting that he sold 28.16 quintals of turmeric in e-NAM and realized an additional amount of Rs.1500.00 per quintal.

Table 4.21. Comparative examination of APMC features during Pre and post-unification of e-NAM - III

S. No.	Particular	Pre e-NAM	Post e-NAM
1.	Price(Rs./Quintal)	4900	6400
2.	Mode of payment	Cash payment	Online payment
3.	Unscrupulous deduction	Yes	No

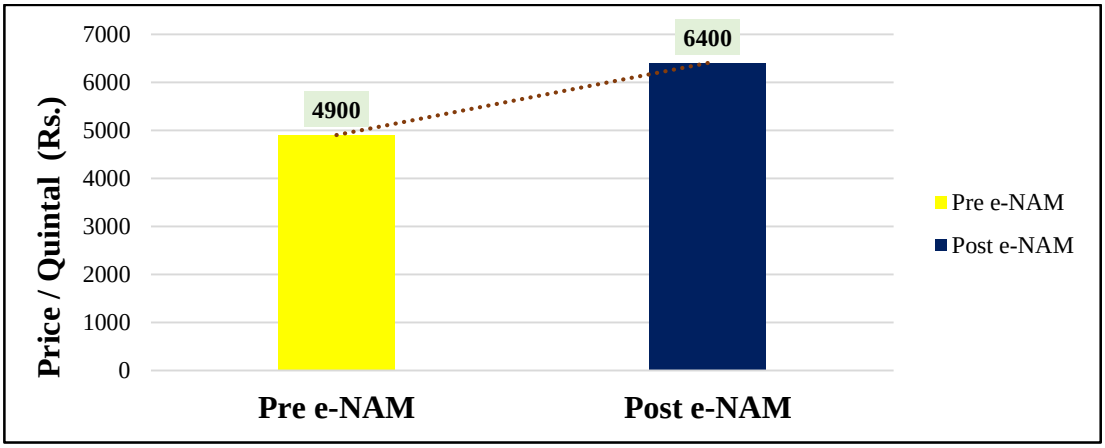

Figure 4.18. Comparative examination of price / quintal during Pre and post-unification of APMC with e-NAM - III

One important common marketing strategy noticed among all the three successful e-NAM beneficiary farmers for their success was that they were selling the premium quality produce to the local traders and the remaining was sold in the e-NAM. They expressed that, for the premium quality produce they were getting relatively higher price with local traders than e-NAM. On the other side, they also mentioned that there is no difference in prices with respect to quality of the produce at e-NAM. Further, there is a slightly higher price for the other than premium quality produce at e-NAM than local market. They are utilizing this tactical approach in getting better prices for their turmeric produce duly involving both local traders and e-NAM in their marketing.

4.7 STRATEGY FOR EFFECTIVE FUNCTIONING OF e-NAM

4.7.1 Step Wise Strategy for Effective Functioning of e-NAM

Keeping in view of the explored functions of e-NAM, constrains and suggestions given by e-NAM registered farmers and other pertinent information documented from the research study, a strategy has been formulated for effective functioning of e-NAM. Strategy was formulated by taking step wise functioning of e-NAM.

4.7.1.1 Gate Entry: Each mandi in its catchment area should conduct structured and scheduled awareness programmes on advanced pre-registration of stakeholders through e-NAM portal or mobile application which reduces the time consumption especially during the peak season of arrivals. Farmers' registration and lot ID generation should also be separated. Unique identification card should be issued for stakeholders instead of acquiring details (aadhar card, bank pass book *etc*.,) for every time and the trade details should be saved in data base. Vehicle registration should be made mandatory.

4.7.1.2 Assaying: Quality is one of the most important factors that determine the price of the produce. Hence, highly credible quality assaying unit must be maintained. Physical inspection of produce by the trader must be phased out. The opinions, needs, suggestions and interests of buyers should be taken in to consideration before determination of tradable parameters. There should be harmonization of tradable parameters and quality standards across the country. An automated quality assaying unit that is linked to e-NAM portal should be established at each mandi instead of manual entry of quality results in to the portal. Highly credible, economically viable third party quality assaying unit in public private partnership (PPP) approach should be established which should take the responsibility in case of any deviations. Care should be taken during man power planning by taking peak season arrivals and lumpy nature of few commodities in to consideration. A video may be documented while collecting, assaying and determining the quality of sample from each lot.

4.7.1.3 Online Trading: Awareness and training programmes should be conducted to all the stakeholders of e-NAM for improved comprehension and utilization of e-NAM. The upgraded guidelines should be made available and accessible to all the stakeholders in local languages for better understanding. Standard operating procedures should be released to improve effectiveness and uniformity of performance. While creation of bid,

the bid manager must take details of minimum selling price of the seller. Live trading experience should be provided to the seller *i.e.*, display of bids per lot in projector screens or display boards which brings more transparency. Commodity wise harmonization of bidding time across the country must be done which enhances participation of traders from other mandis, which in turn increases competition among traders. Highly credible and economically viable third party transport and logistics facilities in public private partnership (PPP) approach should be provided to encourage inter-mandi and inter-state transactions. Measures should be taken to reduce distortion, miscommunication and propaganda on e-NAM.

4.7.1.4 Weighment and Invoicing: Weighment should be done in presence of farmer on automated electronic weighment scales or weighbridge. In case of any discrepancy in sale agreement, the concerned authority must be made responsible.

4.7.1.5 Online Payment: Payment should be done immediately after the sale agreement. Technical glitches of e-NAM software should be reduced. To meet immediate cash requirements, cash withdrawal facilities should be provided near the market. e-NAM toll free help line service should respond to queries in time in local languages to solve the problems of the farmers. Provision of incentives to buyers and sellers; awards to mandi for better trading through e-NAM and documentation of success stories.

4.7.1.6 Gate Exit: Feedback regarding price realization, transparency in procedures and suggestions for further improvement must be taken from the farmers before exit. Systematic review, monitoring and evaluation should be done.

Further quarterly review and evaluation should be done for better performance of e-NAM. Need based training and awareness programmes should be conducted on procedure flow and features of e-NAM.

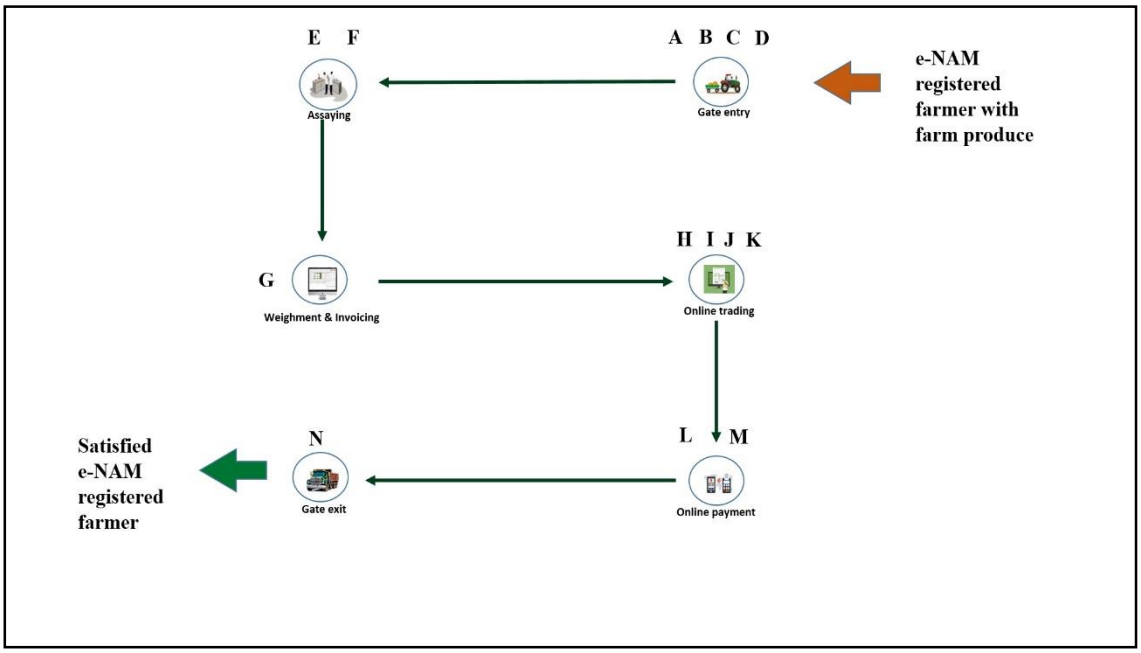

Figure 4.19. Strategy for effective functioning of e-NAM

A.	Mandatory Vehicle registration	H.	Harmonization of commodity specific auction time across the country
B.	Unique ID card	I.	Live trading experience
C.	Linking weighbridge to e-NAM portal	J.	Harmonization of tradable parameters.
D.	Pre-registration	K.	Standard operating procedures.
E.	Third party Quality assaying	L.	Payment within 24 hours
F.	Linking Quality assaying equipment to e-NAM portal	M.	Incentives
G.	Linking of e-weighment to portal	N.	Feedback mechanism

4.7.2 e-CAM – Conceptualization of an Alternate Model for e-NAM

e-NAM is an extensive model covering the entire country in trading operation. But, this model might be having some lacunae in its implementation because of geographical, communicational and transactional difficulties. Hence after having a thorough exploration as well as in-depth interaction with the stakeholders involved in Duggirala e-NAM, an attempt was made to conceptualize an alternate model for e-NAM which will adopt cluster approach with farmer centric objectives.

Cluster Agriculture Market (e-CAM): It is a conceptual model derived out of the present investigation to promote cluster approach in agriculture. The model focus on utilizing all the available natural resources as well as the available infrastructure for agricultural production with effective marketing. The model aims at reducing the unnecessary transactional cost, interference of middlemen and the price spread. It also promotes location specific agripreneurship by establishing demand driven agri-enterprises in that particular cluster.

Features of e-CAM

1. Adoption of cluster approach such that electronic cluster agriculture market should be operation in its jurisdiction of 15 -20 km covering all farmer beneficiary groups growing different crops, processors and retailers.
2. All e-CAM beneficiary farmers should form in to groups' *viz*., FPOs/CIGs/FIGs.
3. The planning and monitoring board of cluster agriculture market should need, demand, market survey, market assessment, economic viability and price trends to plan and determine the commodity to be produced by the beneficiary farmers group in that jurisdiction by involving all the stakeholders in decision making.
4. The cluster agriculture market should announce procurement prices of respective commodity before the cropping season by assigning range of quality standards and provide technical support to the beneficiary farmers.
5. Technical support includes advisory services, determining detailed cost of cultivation, farm management strategies and post-harvest management practices by taking the help of other departments.
6. After harvest and post-harvest management, the produce should be procured by e-CAM at farm gate in systematic and scheduled manner.
7. The planning and monitoring board has to be designed at various levels *i.e.*, cluster, district, state and national level to regulate the flow of farm produce. At cluster level, each e-CAM has to determine the cropping pattern and estimate the total production, arrivals in their respective clusters. The requirements of local processors, e-CAM haat, e-CAM export hub and other e-CAMs should be determined. It also should negotiate with local processors about their requirement and fix buying price in advance. e-CAM should submit the report to district level planning and monitoring board which in turn have to send report to the state level and thereby to the national level planning and monitoring boards. The planning and monitoring board at national

level should have representative members from all state level planning and monitoring boards.

8. Every transaction should be digitalized, recorded.

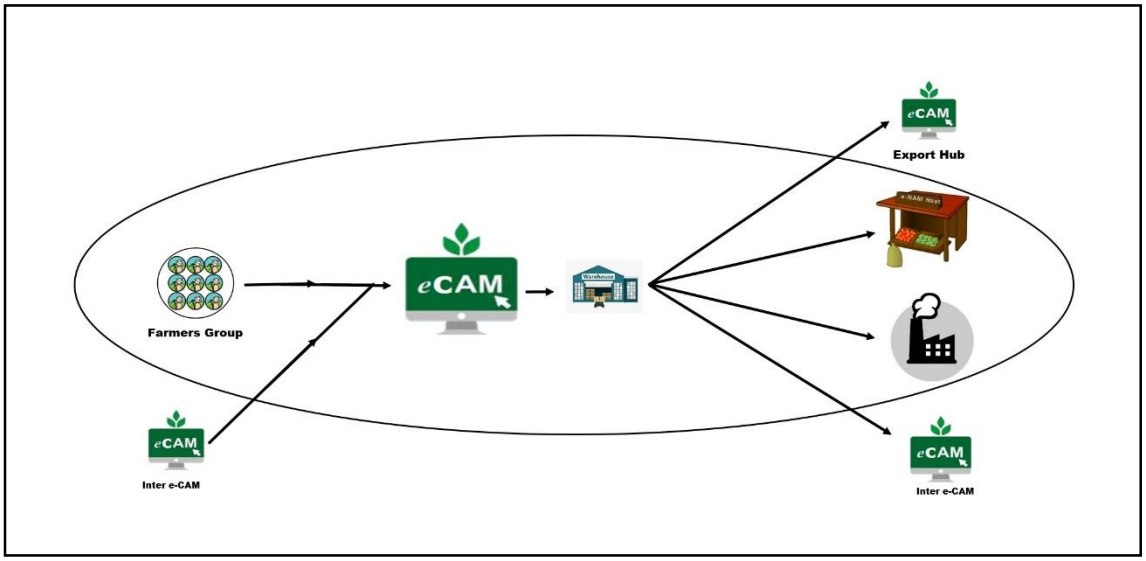

Figure 4.20. Electronic Cluster Agriculture Model (e-CAM)

4.7.2.1 Model for trading the farm produce that doesn't require processing: The local farmer groups should inform date of harvest in advance to e-CAM. It should procure the produce from farm gate and should pay the predetermined procurement price within 24 hours. Based on the requirement of i) export, ii) local retailers and iii) other e-CAMs, the produce should be sent to e-CAM export hub, retailers in the cluster and inter e-CAM respectively. The consumer price in respective cluster should be determined by e-CAM.

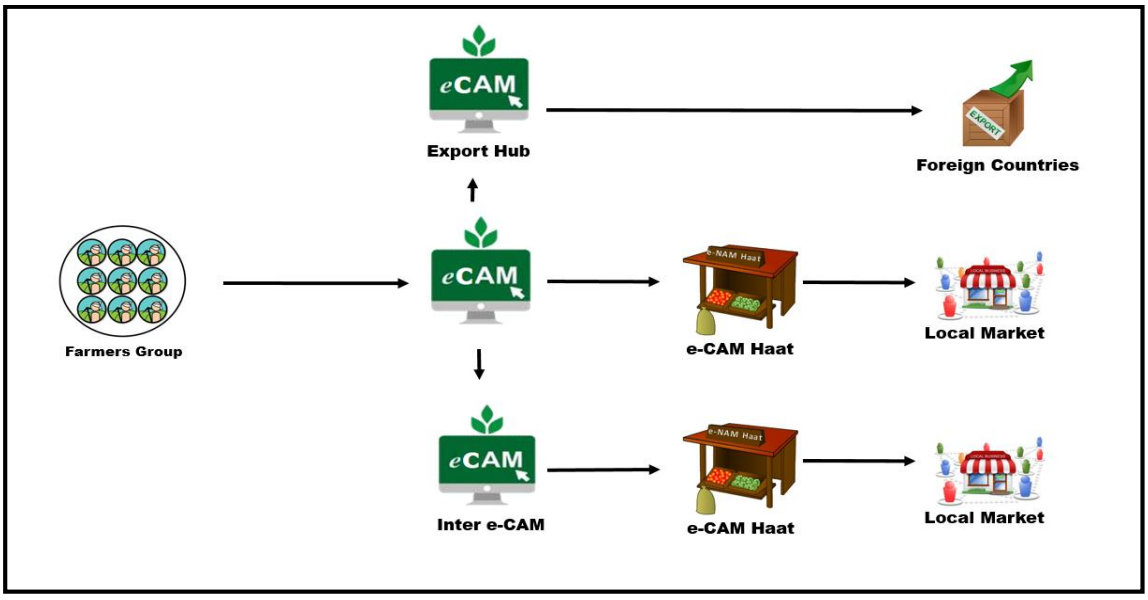

Figure 4.21. Model for produce that doesn't require processing

4.7.2.2 Model for trading the farm produce that requires processing: The local farmer groups should inform date of harvest in advance to e-CAM. It should procure the produce at farm gate and should pay the predetermined procurement price within 24 hours. The produce should be sent to the local warehouse from which the produce is allocated on priority basis to local processors, inter e-CAMs and export hub. In addition, processed, semi-processed and final products from companies can be exported through e-CAM hub. In case of export, the priority should be given to final products.

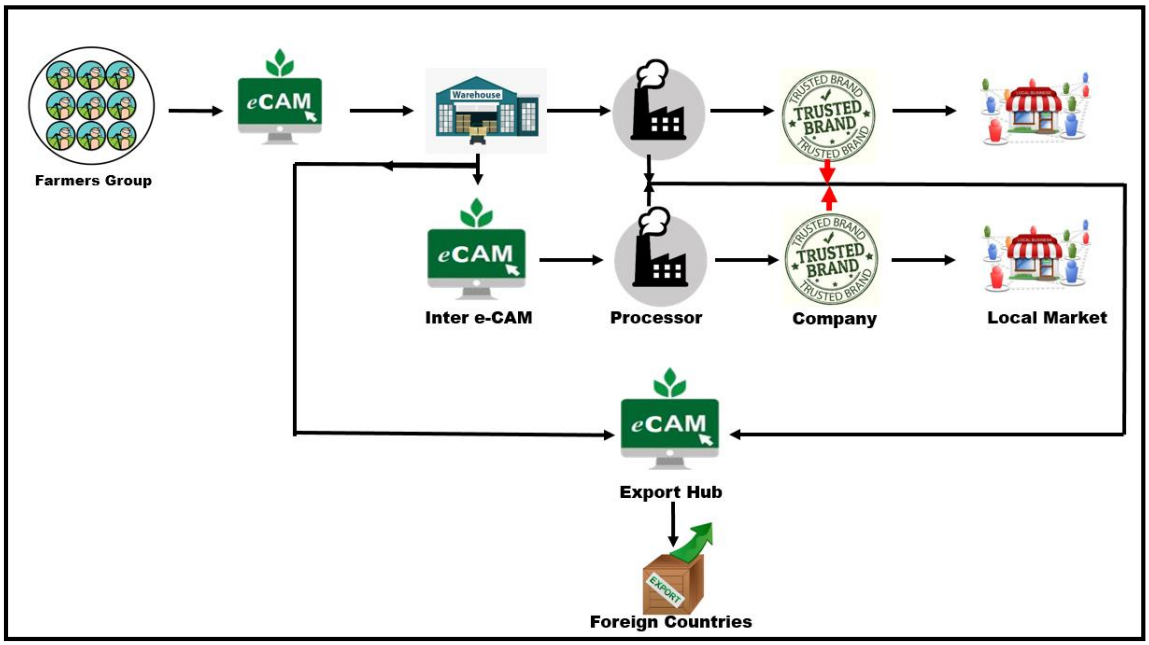

Figure 4.22. Model for produce that requires processing

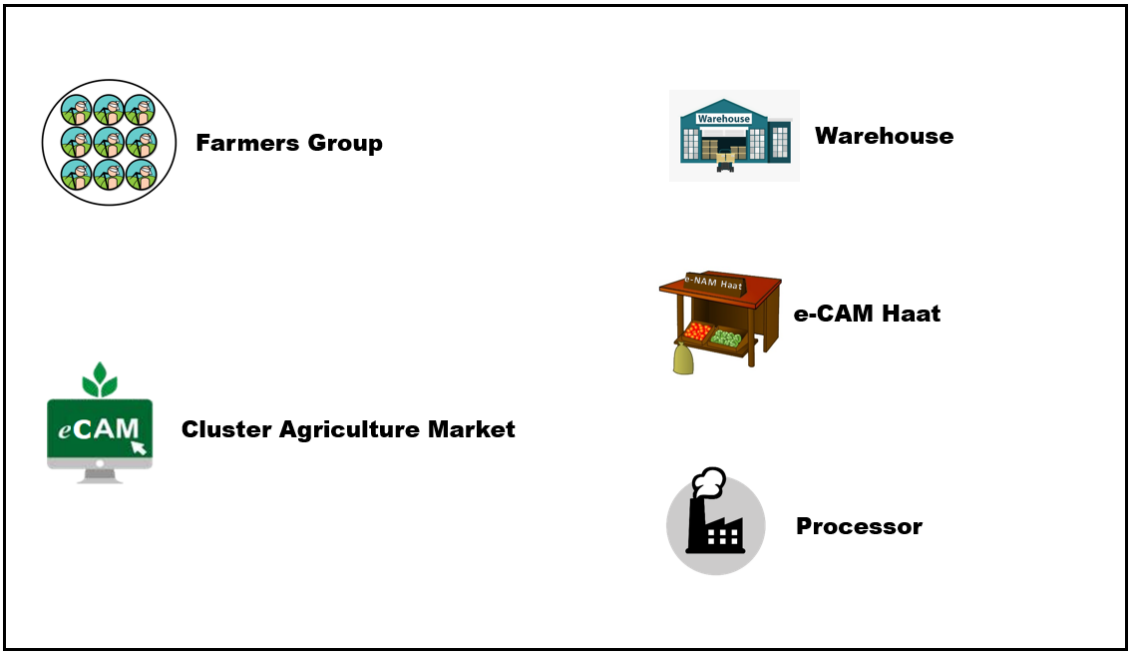

Figure 4.23. Symbolic representations

Chapter - V

Summary and Conclusions

Chapter V

SUMMARY AND CONCLUSIONS

This chapter provides brief information on the systematized efforts undertaken for the empirical study with a focus on the emerged findings. It includes summary of the findings, implications of the study and suggestions for further research.

5.1 OBJECTIVES OF THE STUDY

1. To study the profile of the registered farmers of e-NAM.
2. To explore the functioning of e-NAM and to assess the knowledge of registered farmers in the functioning / features of e-NAM.
3. To assess the effectiveness of e-NAM in improving farmers' income as perceived by the registered farmers.
4. To unearth the constraints of e-NAM as perceived by the registered farmers.
5. To document a few successful case lets of e-NAM registered farmers.

5.2 REVIEW OF LITERATURE

Keeping in view the above objectives, the relevant literature on various aspects was collected and reviewed with the results of the present investigation.

5.3 RESEARCH DESIGN

Exploratory research design was selected for the study.

5.4 SAMPLING PROCEDURE

The study was purposively conducted in Guntur district of Andhra Pradesh during the year 2019-20, as it consists of highest number of e-NAM registered farmers in the State. Duggirala e-NAM integrated APMC was selected purposively as it was the only e-NAM integrated APMC having 100 per cent online transactions. Six mandals of Guntur district with highest number of e-NAM registered farmers namely Kollur, Kollipara, Bhattiprolu, Tenali, Mangalagiri and Duggirala were purposively selected. From each of the selected mandal, 20 respondents who had registered and traded in Duggirala e-NAM were selected using simple random sampling. Thus total sample consists of 120 e-NAM registered farmers.

5.5 COLLECTION OF DATA

Semi-structured interview schedule which was developed for the study was used for collecting the data along with focused group discussion. The gathered data was then coded, classified and analyzed statistically and the results were suitably interpreted.

5.6 RESULTS

5.6.1 Distribution of e-NAM Registered Farmers Based on Their Profile

5.6.1.1 Age: Nearly two third of the e-NAM registered farmers belonged to middle age (63.33%) category succeeded by old age (24.17%) and young age (12.50%) categories.

5.6.1.2 Education: More than one third (34.17%) of the e-NAM registered farmers were belonged to high school education category followed by primary school (15.00%), middle school (13.33%), graduation (10.83%), illiterate (10.00%), intermediate (08.33%), Functional literate (04.17%) and post-graduation & above (04.17%) categories.

5.6.1.3 Land Holding: Nearly one third (29.17%) of the e-NAM registered farmers belonged to small land holdings category subsequently marginal (22.50%), large (21.67%), semi-medium (19.17%) and medium (7.50%) land holding categories.

5.6.1.4 Social Participation: Nearly three fourth (71.67%) of the e-NAM registered farmers had medium social participation succeeded by high (15.83%) and low (12.50%) social participation

5.6.1.5 Mass Media Exposure: More than one half (55.83%) of the e-NAM registered farmers had medium mass media exposure, succeeded by those with low (22.50%) and high (21.67%) mass media exposure.

5.6.1.6 Extension Contact: Nearly two third (65.83%) of the e-NAM registered farmers had medium extension contact followed by low (22.50%) and high (11.67%) extension contact.

5.6.1.7 Risk Orientation: Nearly two third (63.33%) of the e-NAM registered farmers had medium level of risk orientation followed by high (19.17%) and low level (17.50%) of risk orientation.

5.6.1.8 Market Orientation: Three fifth (60.00%) of the e-NAM registered farmers had medium level of market orientation, followed by high (24.17%) and low (15.83%) levels of market

5.6.1.9 Income Orientation: Nearly one half (49.17%) of the e-NAM registered farmers had medium level of income orientation followed by high (29.17%) and low level (21.67%) of income orientation.

5.6.1.10 Telescopic Faculty: More than half (56.67%) of the e-NAM registered farmers had medium level of telescopic faculty followed by low (24.17%) and high (19.17%) levels of telescopic faculty.

5.6.1.11 Economic Motivation: More than three fifth (62.50%) of the e-NAM registered farmers had medium level of economic motivation succeeded by high (24.17%) and low level (13.33%) of economic motivation.

5.6.2 Exploration of Functioning of e-NAM in Duggirala Market

The entire functioning of e-NAM was categorized phase-wise *viz*., Gate entry, Assaying, Online trading, Weighment & Invoice, Online payment and Gate exit. The functioning under each phase was explored by taking the components of each phase in to consideration as well as the prescribed guidelines of e-NAM for each component. Accordingly, the deviations were documented with proper reasoning. Further, the consequences of deviation were also documented keeping in view of the effective functioning of e-NAM.

5.6.3 Distribution of e-NAM Registered Farmers Based on Their Knowledge Level

Nearly three fifth (58.33%) of e-NAM registered farmers had medium level of knowledge followed by low (22.50%) and high (19.17%) level of knowledge.

5.6.4 Distribution of e-NAM Registered Farmers Based on Their Perceived Effectiveness

More than half (54.17%) of the e-NAM registered farmers perceived the scheme as moderately effective followed by less effective (23.33%) and more effective (22.50%) categories.

5.6.5 Constraints Faced by e-NAM Registered Farmers and Suggestions Given by Them for Effective Implementation and Utilization of the Scheme

5.6.5.1 Constraints Faced by e-NAM Registered Farmers: The constraints faced by e-NAM registered farmers were ranked based on frequency and percentage. Majority of e-NAM registered farmers perceived that lack of remunerative prices (85.83%, Rank I) as constraint while trading in e-NAM followed by cartelization of traders (80.83%, Rank II), complexity of e-NAM trading process (75.83%, Rank III), price doesn't match with quality of produce (71.67%, Rank IV), substantial decrease in bid prices (68.33%, Rank V), low participation of traders (65.83%, Rank VI), difficult to meet immediate cash requirements (62.50%, Rank VII), poor functioning of quality assaying unit (60.83, Rank VIII), lack of digital literacy (58.33%, Rank IX), lack of live trading experience (52.50%, Rank X), high hamali charges (45.83%, Rank XI), delay in payments (42.50%, Rank XII), high transportation cost (40.83%, Rank XIII) and lack of intermandi and interstate trade (30.83%, Rank XIV).

5.6.5.2 Suggestions Given by e-NAM Registered Farmers: The suggestions given by e-NAM registered farmers were ranked based on frequency and percentage. Majority of e-NAM registered farmers suggested that bid prices should start from MSP (94.16%, Rank I) as suggestion for trading in e-NAM followed by payment settlement on the same day of trading (90.83%, Rank II), Provision of live trading experience (89.16%, Rank III), proper awareness and trainings should be given to farmers on operation of scheme (86.67%, Rank IV), effective feedback mechanism should be established (82.50%, Rank V), dissemination of market information (77.50%, Rank VI), hamali charges regulation (74.16%, Rank VII), trainings on post-harvest management (67.50, Rank VIII), Credibility of quality assaying unit (63.33%, Rank IX) and logistics and transport facilities (60.83%, Rank X).

5.7 IMPLICATIONS OF THE STUDY

In the light of the findings of the study and from the personal experience of researcher at the time of interaction with the e-NAM registered farmers, following implications are made for the improvement of effectiveness of e-NAM.

1. Majority of the e-NAM registered farmers were middle aged having high school education there is every chance of motivating them towards utilization of innovative marketing platforms like e-NAM.

2. As extension contact, social participation and mass media exposure have great potential to influence the farming community in right direction, there is every scope to improve these three components still better so as to utilize the extension personnel and mass media for strengthening their knowledge for efficient utilization of e-NAM.
3. Psychological variables like Risk orientation, market orientation and Income orientation, telescopic faculty and economic motivation were found to be medium. Hence there is need to organize training programmes for e-NAM registered farmers to improve quality of these variables.
4. The focal point of this research study is to assess the knowledge of e-NAM registered farmers and perceived effectiveness of e-NAM in enhancing their farm income. The research findings revealed that there was 57.86 per cent of knowledge and 33.33 per cent of effectiveness perceived by the e-NAM registered farmers. This is an indication for the policy makers / researchers / extension functionaries that there is wider gap between intent and execution of e-NAM and hence there is an ample scope for improving restructuring, reforming and modifying e-NAM for its efficient utilization by stakeholders.
5. The designed strategy will help the researchers, extension functionaries and policy makers for effective implementation of the scheme.

5.8 SUGGESTIONS FOR FUTURE RESEARCH

The outcome of the present investigation demands the need for future investigations in several directions. The following suggestions were made for future researchers who would propose to undertake studies related to this subject.

1. The investigation was carried out in a specific area with a restricted sample of 120 e-NAM registered farmers. Therefore, similar studies may be conducted with larger samples covering more areas.
2. The present study was conducted for e-NAM registered farmers to explore the effectiveness of e-NAM in Duggirala; more number of studies can be conducted involving all stakeholders of e-NAM at different location of the country with different types of research designs.
3. Further researches should devote more attention towards documentation of case studies of those successful e-NAM traded farmers and e-NAM integrated APMCs that succeed in proper execution, implementation and effective utilization of the scheme.

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Note: The pattern of literature cited presented above is in accordance with the guidelines for thesis presentation for Acharya N G Ranga Agricultural University, Lam, Guntur.

Appendix

APPENDIX

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
AGRICULTURAL COLLEGE, BAPATLA
DEPARTMENT OF AGRICULTURAL EXTENSION

A STUDY ON EFFECTIVENESS OF e – NAM IN DUGGIRALA MARKET OF ANDHRA PRADESH

INTERVIEW SCHEDULE

Respondent No. :
Name of the respondent :
Village :
Mandal :
District :
Mobile No. :

I. Age: _____years

II. Education

S. No.	Education Level	Response	Score
1.	Illiterate		1
2.	Functional literate		2
3.	Primary school (1^{st} to 5^{th} class)		3
4.	Middle school (6^{th} to 7^{th} class)		4
5.	High school (8^{th} to 10^{th})		5
6.	Intermediate		6
7.	Degree		7
8.	PG & above		8

III. Land holding (in acres)

1. Total area under cultivation a) Owned _____ b) Leased _____
   c) Total _____
2. Area under Turmeric cultivation a) Owned _____ b) Leased _____
   c) Total _____

IV. Social participation

Please state your involvement in different formal, social organizations in the following items applicable to you.

S. No.	Name of the Organization	Position held			Frequency of participation		
		Office bearer (2)	Member (1)	Not a Member (0)	Regular (2)	Occasional (1)	Never (0)
1.	Village Panchayat						
2.	Primary Cooperative Society						
3	Rythumitra Group						
4.	Farmers Producers Organizations						
5.	APMC						
6.	Agriclinics						
7.	Private input agencies						
8.	Religious associations						
9.	Bank						
10.	Any Others						

V. Mass media exposure

Please mention the frequency of exposure to the different mass media sources.

S. No.	Name of the Mass Media	Extent of mass media exposure		
		Regularly (2)	Occasionally (1)	Never (0)
1.	Radio			
2.	TV			
3.	Newspaper			
4.	Farm publications Books / Magazines / Printed Literature			
5.	Mobile			
6	Computer			
7.	Others			

VI. Extension Contact: Please state your extent of contact with the following personnel.

S. No.	Particulars	Frequency of contact		
		Often (2)	Some times (1)	Never (0)
1.	HEO / AEO			
2.	MHO / MAO			
3.	ADH / ADA			
4.	JDH / JDA			
5.	Scientists of YSRHU			
6.	Scientists of ANGRAU			
7.	APMC Officials			
8.	Officials of Department of Agricultural Marketing			
9.	Officials of FPO			
10.	Input agencies			
11.	Any others			

VII. Risk Orientation

A set of statements representing risk orientation is given below. Please state the degree of your response in three-point continuum against Agree or Disagree or Undecided with each statement.

S. No.	Statements	Agree (3)	Undecided (2)	Disagree (1)
1	A farmer should sell the produce through more than one marketing method to avoid uncertainties of payment			
2	A farmer should take more of chance in making a big profit than to be content with a smaller but less risky profit			
3	A farmer who is willing to take greater risk than average farmer usually does better financially			
4	It is good for a farmer to take risk when he/she knows her chance of success is fairly high			
5*	It is better for a farmer not to try new means of marketing unless most others in the locality have used it with success			
6*	Trying entirely a new method of marketing by a farmer involves risk			

VIII. Market orientation

A set of statements representing marketing orientation is given below. Please state the degree of your response in three-point continuum against Agree or Disagree or Undecided with each statement.

S. No.	Item	Agree (3)	Undecided (2)	Disagree (1)
1*	Market news is not so useful to farmer			
2.	A farmer can get good price by grading his produce			
3*	One should purchase inputs from nearest shop where his relatives buy.			
4*	One should sell his produce at the nearest market though price is average			
5.	Produce must be stored for a brief period to get better price			
6.	One should opt for growing crops which have export value			

IX. Income Orientation

A set of statements representing income orientation is given below. Please state the degree of your response in three-point continuum against Agree or Disagree or Undecided with each statement.

S. No.	Statements	Agree (3)	Undecided (2)	Disagree (1)
1.	One should grow diversified crops to increase farm income			
2.	Farm mechanization reduces the cost of cultivation			
3*	Organic cultivation decreases the market value of the product			
4.	Scientific post-harvest practices improves the quality as well as shelf life of produce and fetches higher price			
5.	Farmer will get more price by selling of produce through government agencies			
6.	Farmer should see the farming as an enterprise			
7.	Scientific methods of cultivation increases farm income			

X. Telescopic Faculty

A set of statements representing telescopic faculty is given below. Please state the degree of your response in three-point continuum against Agree or Disagree or Undecided with each statement.

S. No.	Statement	Agree (3)	Undecided (2)	Disagree (1)
1.	All future farmers are entrepreneurs.			
2.	Using warehouse is key success for future farming			
3.	Production in future must be linked to processing by the farmer			
4.	All future market transactions should be digitalized			
5.	Future farming is fully mechanized and automated			
6.	Single window is the key for success of future agri marketing			

XI. Economic Motivation

A set of statements representing economic motivation is given below. Please state the degree of your response in three-point continuum against Agree or Disagree or Undecided with each statement.

S. No	Statements	Agree (3)	Undecided (2)	Disagree (1)
1	A farmer should try the new ideas which may help him to earn more money.			
2	The most successful farmer is one who makes more profits out of his farming			
3	A farmer should go for crop intensification and crop diversification to increase their incomes instead of a single crop			
4	It is difficult for the farmer's children to make good start unless he provides them with economic assistance.			
5	A farmer must earn for his living but everything in life cannot be measured in economic terms			
6*	A farmer should focus on production of crop rather than value addition to gain more profits.			

XII. Exploration of functioning of e-NAM in Duggirala market

Stage	Components	Guidelines	Deviation	Reason	Consequence

XIII. Knowledge of registered farmers about the functioning of e-NAM

1. e-NAM is implemented in Duggirala APMC from the year
   a) 2016 b) 2017 c) 2018 d)2020

Entry Gate

2. Farmers' registration is done at entry gate of APMC. (True / False)
3. Which of the following details are mandatory for registration?
   a) Bank account b) Aadhar card c) Both a & b
4. Farmers registration at entry gate is completely free of cost (True / False)
5. Unique lot ID is allotted to each farmer's produce. (Yes / No)
6. Pre-registration of farmers is be done through e-NAM portal (Yes / No)

Quality Assaying

7. Quality assaying is done only after lot ID generation registration (Yes / No)
8. _____ should be done for improving the quality of produce.
9. Farmers can sell their produce without quality assaying (True / False)
10. Digital Moisture Meter is used to determine the _____ of turmeric.
11. Turmeric is categorized in to _____ ranges based on quality assaying result
    a) 2 b) 3 c)5
12. Quality assaying of turmeric in e-NAM is _____ of cost.
13. What are the tradable parameters of turmeric in e-NAM
    a) moisture b) foreign matter
    c) defective rhizomes and damaged matter d) all the above
14. Percentage of Curcuminoid content (m/m) should not be less than 2.0 (True / False)
15. Weight of the sample to be taken for quality assaying
    a) 500 grams b) 1 Killogram c) 2 Kilograms

e-Auction

16. e-Auction in Duggirala e-NAM is done between 9:30 am to 11:00 am (True / False)
17. APMC officials create e-auction through e-NAM portal at specified time slot. (True / False)
18. Who can participate in online auction of e- NAM
    a) Registered CA b) Registered Trader c) Both a &b
19. Bidding must be done through _____ platform.
20. The bidder who quote highest price in the specified time slot is considered as winner of respective turmeric lot. (True / False)
21. Farmer has choice to accept or reject the bidding price. (True / False)
22. _____ is generated after bid declaration.
23. Sale agreement will be finalized only after getting signatures of _____

XIV. Effectiveness of e-NAM in improving farmers' income as perceived by the registered Farmers

S. No.	Statement	Good (3)	Fair (2)	Poor (1)
1.	Provision of remunerative price			
2.	Transparency in auction process			
3.	Maintaining stability in price			
4.	Increase in demand of commodity			
5.	Enhancing market arrivals			
6.	Infrastructural facilities			
7.	Participation of traders			
8.	Single window information service			
9.	Price commensuration with quality			
10.	Disintermediation of markets			
11.	Alleviation of cartel by traders			
12.	Reduction in transaction time			
13.	Deduction in cost of marketing			
14.	Minimization of commission charge			
15.	Online payment to the farmers			
16.	Dispute redressal mechanism			
17.	Transparency in weighment			
18.	Quality assaying system			
19.	Transparency in payments			

XV. Constraints faced by Duggirala e-NAM registered farmers

a)

b)

c)

d)

e)

f)

XVI. Suggestions given by Duggirala e-NAM registered farmers

a)

b)

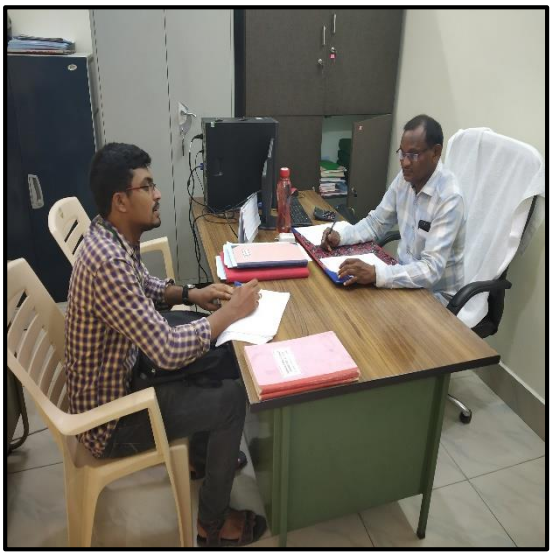
c)

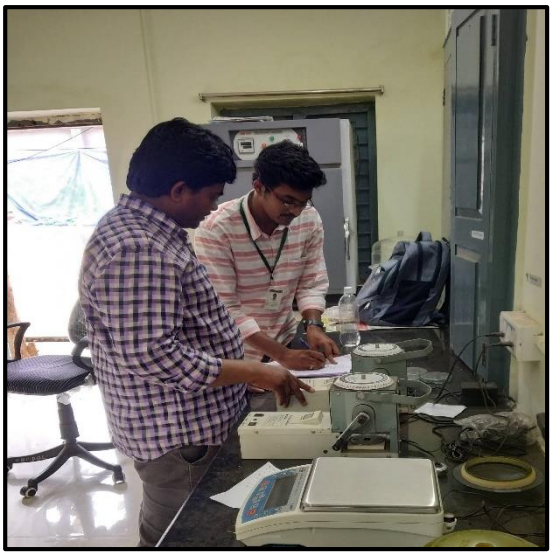
d)

e)

f)

Researcher's Interview with the e-NAM Registered Farmers





Researcher's Interview with the e-NAM Stakeholders